CENTRALINES
LIMITED

18

REGULATORY ASSET MANAGEMENT PLAN 2018-28

TABLE OF CONTENTS

This Regulatory Asset Management Plan (RAMP) is available for public disclosure and applies for the period 1 April 2018 to 31 March 2028.

CENTRALINES LIMITED

1

SUMMARY OF THE PLAN

CONTENTS

1. SUMMARY OF THE PLAN

1.1 About Centralines

Centralines is in the business of providing a safe, reliable and cost-effective supply of electricity to their customers throughout the Central Hawke's Bay region. This is achieved through the provision, operation and long-term management of their electricity distribution infrastructure, including overhead lines, underground cables, transformers and substations. Centralines currently supplies electricity to over 8,500 consumers. Centralines' supply area is shown in Figure 1-1.

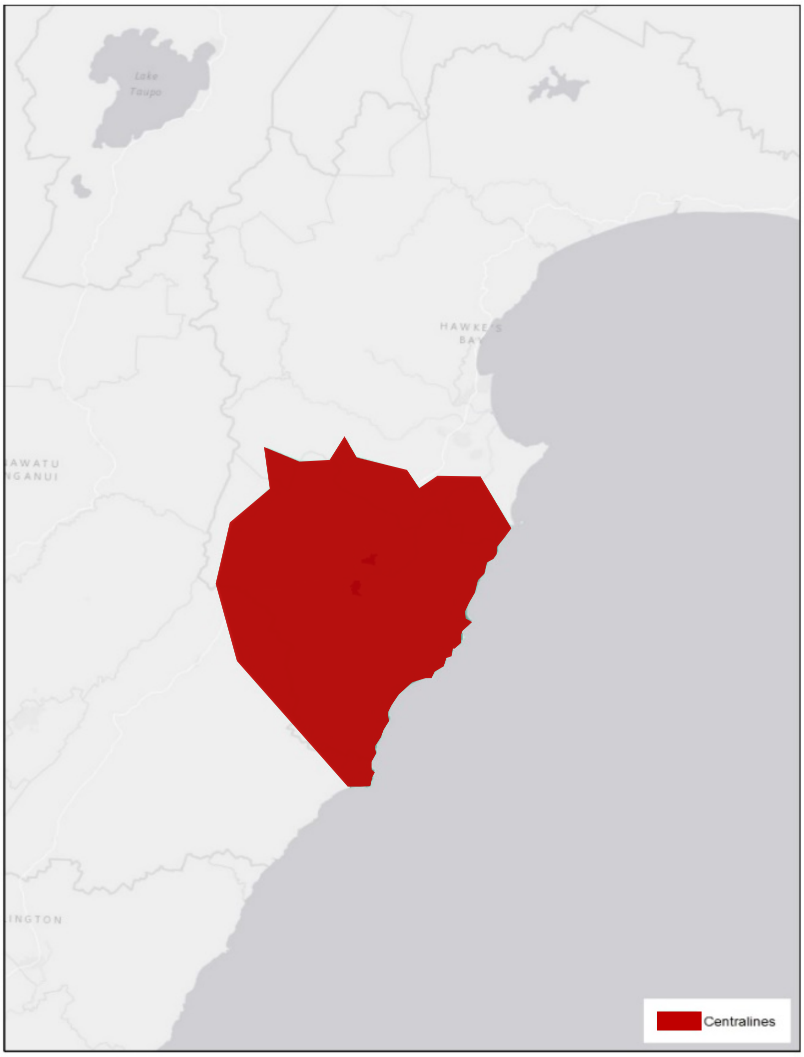


Figure 1-1: Map of Centralines' Network

1.1.1 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 are what defines Centralines as an organisation. They underpin Centralines' organisational culture and inform the behaviours that are expected of employees. Centralines' Values are Safety, Teamwork, Integrity, Openness and Passion. Centralines' Vision and Values have an influence on all components of the Asset Management System (AMS).

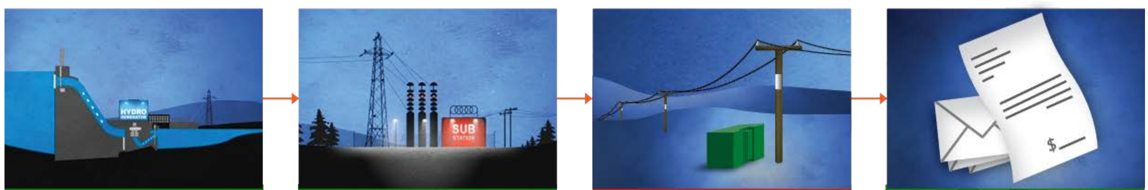
1.1.2 Ownership and Governance

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

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. The network is managed and operated by Unison Networks Limited under a Management Services Agreement (MSA) with Centralines.

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.



Generation

Electricity is generated around New Zealand, with the majority coming from renewable sources such as hydro dams and wind farms.

Transmission

Electricity is transmitted across New Zealand by Transpower, the national grid owner / operator.

Distribution

Centralines takes the power from the national grid, and distributes it across your region.

Retailer

Your retailer packages it up and sends you a bill which includes transmission and distribution costs as well as the cost of the power you have used.

Figure 1-2: New Zealand Electricity Industry Diagram

When taking a supply of electricity, customers deal with electricity retailers like Contact, Meridian and Mercury. The bill that customers receive includes the cost of the energy as well as a contribution to the cost of maintaining the electricity distribution network and the National Grid. The electricity distribution component of the typical consumer's bill is around 26%[1].

1.1.4 Changing Energy Landscape

Like in many other developed countries, the electricity landscape in New Zealand is beginning to change. This is being brought about by advancing technology, including the improved economics of solar photovoltaics (PV) and batteries, as well as electric vehicles. Increasing levels of locally generated electricity and the complexity that this can create on a distribution network, as well as the potential for greater electricity demand from electric vehicles, represent important risks and opportunities for Centralines. Centralines is closely monitoring these trends and technologies.

As well as the risks directly presented by technology uptake, there are also potential risks to Centralines in how regulators choose to respond. Centralines will continue to engage with the Commerce Commission and Electricity Authority as to how the regulatory environment can be developed to accommodate changing technology without compromising incentives for excellent asset management.

1.2 About the Centralines' Network

Centralines' suite of assets is referred to as the Asset Portfolio. Some key statistics associated with Centralines' Asset Portfolio is provided in Table 1-1, along with a comparison against the industry median for context.

Metric	Description	Value 2016/17	Industry Median
Consumers Connected	Total installation control points (ICP) connected to the network.	8,496	31,365
System Length	Total length of all energised circuits.	1,906km	3,951km
Sub-Transmission System Length	Total length of all energised 33kV circuits.	96km	333km
Distribution System Length	Total length of all energised 11kV circuits.	1,427km	2,326km
Low Voltage System Length	Total length of all energised LV circuits.	273km	794km
Percentage Underground	The proportion of total system length that is undergrounded.	5.9%	19.2%

[1] https://www.ea.govt.nz/consumers/my-electricity-bill/

Metric	Description	Value 2016/17	Industry Median
Asset Value	Centralines Regulatory Asset Base.	$54,150,000	$184,138,000
SAIDI	System Average Interruption Duration Index. A measure of the number of minutes per year the average consumer is without electricity supply.	92.1 minutes	173.6 minutes
SAIFI	System Average Interruption Frequency Index. A measure of the number of interruptions per year that affect the average consumer.	1.67	1.67
Electricity Supplied	Electricity entering system for supply to consumers.	115 GWh	578 GWh
Loss Ratio	Proportion of electricity lost on the high voltage network.	8.8%	5.1%

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

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1.3 Asset Management

Managing electricity networks is Centralines' service provider's core skill set. They see Asset Management as a long-term undertaking, because of the high dependence that Centralines' customers have on the electrical infrastructure now, and for the foreseeable future, and the long-lived nature of assets that are managed.

At the heart of Centralines' Asset Management service provider's philosophy is the goal of balancing cost, risk and performance according to stakeholder requirements. To ensure that this idea is embedded at all levels of Asset Management, an Asset Management System (AMS) has been developed. The AMS ties together and aligns all asset management activities.

Core components of the AMS include the Asset Management Policy, Asset Management Objectives and three key asset management processes:

- Asset Management Planning – development of plans that ensure Asset Management Objectives will be met, including asset renewal and asset capability improvement
- Lifecycle Delivery – the safe execution of asset management plans, ensuring that work is delivered efficiently and in conformance to quality standards, and
- Continual Improvement – the monitoring, measurement and evaluation of the performance of assets and asset management, and actions taken to continually improve how things get done.

1.3.1 ISO 55001 Certification

ISO 55001:2014 is an international standard that specifies the requirements for Asset Management Systems. It builds on the management systems approaches utilised in ISO 9001 for quality management and ISO 14001 for environmental management.

Centralines' service provider, Unison, is the first company in New Zealand to be certified to this standard which was confirmed in March 2018 through accredited auditor, British Standards Institute (BSI). This certification provides further external scrutiny and validation of their AMS, and means they can measure themselves up to the best asset managers globally. While the ISO 55001 is specific to the Unison network, key frameworks and processes developed as part of the certification processes will and are being adopted to manage the Centralines' network.

1.4 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.

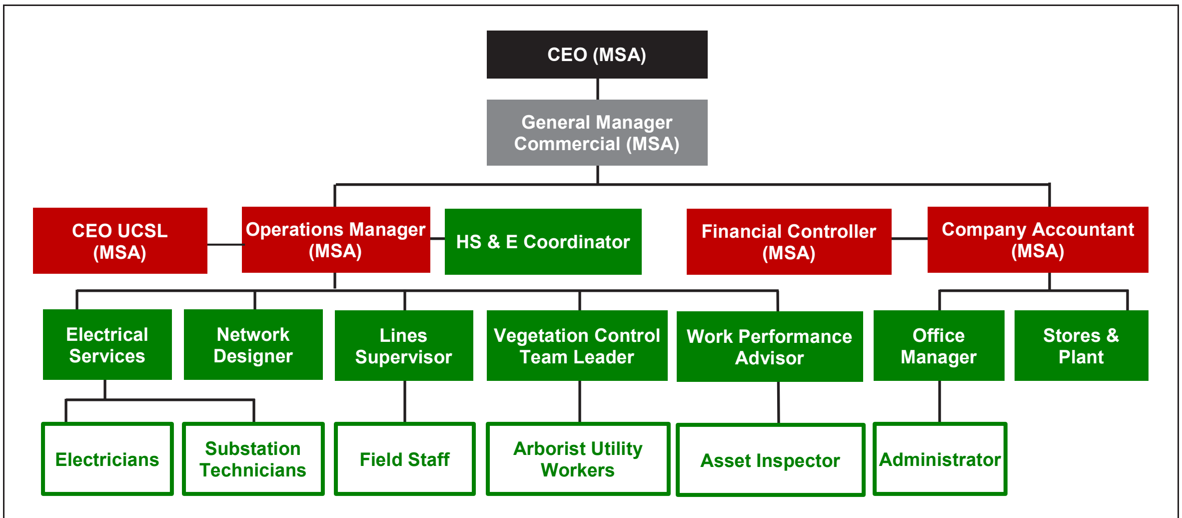

Figure 1-3: Centralines' Organisation Structure

1.5 About the Regulatory Asset Management Plan

The Regulatory Asset Management Plan (RAMP) is Centralines' key external asset management publication. It is developed to meet the requirements of the Commerce Commission's electricity distribution information disclosure framework, as well as other stakeholder groups that have an interest in our asset management strategy, planning and performance.

The RAMP is a composite of the many documents that form part of Centralines' AMS and includes:

- Asset Management Policy – principles that Centralines commits to in asset management
- Asset Management Strategy and Objectives – Centralines' Asset Management Objectives and strategy to ensure those objectives will be met, and
- Asset Management Plan – register of asset risks and project proposals to be implemented within the ten-year planning period to manage down those risks.

1.6 Structure of the RAMP

The structure of the RAMP is set out in Table 1-2, with a mapping of sections to the information disclosure determination to assist in the assessment of compliance.

Section Name	Description	Determination Reference
1. Summary of the Plan	Overview of the RAMP and Centralines' company profile.	3.1
2. Background and Objectives	Centralines' asset management objectives and the strategy employed to meet them.	3.3 – 3.17
3. Service Levels	The performance measures used to evaluate Centralines' performance against its asset management objectives.	5. - 10.
4. Network Development Plans	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	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	Overview of Centralines' approach to management of non-network assets. including vehicles and buildings.	13.
7. Risk Management	Overview of risk processes of the AMS.	14.

Section Name	Description	Determination Reference
8. Evaluation of Performance	Evaluation of Centralines' asset management performance against the Service Levels disclosed in the 2016 RAMP.	15.
9. Capability to Deliver	Explains how Centralines assures itself that the AMP can be delivered.	16.
10. Schedules	Completed schedules containing required asset management information.	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 RAMP

1.7 Overview of the Asset Management Plan

The Asset Management Plan (AMP) is Centralines' ten-year forward plan of major work in the Asset Portfolio to ensure that risks are managed and opportunities are secured. The AMP is covered in detail in Sections 4 and 5.

1.8 Key Stakeholder Information

Centralines firmly believes the RAMP 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.

1.9 Asset Management Objectives

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

Asset Management Objectives
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.
Customer Service Performance: Deliver great customer service 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.

Table 1-3: Asset Management Objectives

Further detail on the strategic context for Asset Management at Centralines is provided in Section 2 of the RAMP.

1.10 Levels of Services

Centralines' Asset Management Objectives (AMOs) listed in 1.9 provide the ability to report on whether the needs and expectations of stakeholders of the Asset Management System are met.

The current measures that enable Centralines to monitor and improve performance in relation to these AMOs are provided in table below. More detail on Centralines' Customer Service Performance objectives and associated measures is provided in Section 3 – Service Levels.

Asset Management Objective	Service Level	Unit/Type	Service Level Targets				
			2018/19	2019/20	2020/21	2021/22-22/23	2023/24-27/28
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
	Surveyed Customer Satisfaction	%	> 95%	> 95%	> 95%	> 95%	> 95%

Asset Management Objective	Service Level	Unit/Type	Service Level Targets				
			2018/19	2019/20	2020/21	2021/22-22/23	2023/24-27/28
Customer Service Performance	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)	$1,710	$1,710	$1,710	$1,710	$1,710
	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	≥ 2 rolling	≥ 2 rolling	≥ 2 rolling	≥ 2 rolling	≥ 2 rolling
	Operating Expenditure per ICP	$ (nominal)	$474	$474	$481	$488-$495	$502-$530
	Faults per 100km of network	Overhead	6.4	6.4	6.4	6.4	6.4

Table 1-4: Service Level Framework

1.11 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 RAMP 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 RAMP sees a continuation of capital investment in the network to:

- manage any risks associated with Centralines' network assets
- 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.

1.12 Customer Experience Improvement Projects

Year	Project Name	Description
2018/2019-2027/2028	Automation of Switching on Rural feeders	Rural customers experience more frequent outages of longer duration than urban customers. Implementing additional automated switching across the network will reduce the duration of these outages and improve the customer experience.
2018/2019-2020/2021	Reconfiguration of Wilder Road Substation	In the event of loss of the 33kV supply to Wilder Road Substation there are limited back feeding options due to voltage constraints. Reconfiguring the substation should resolve these constraints and help minimise outages in event of this contingency.

Table 1-5: Projects that will Improve Customer Experience

1.13 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

1.14 Determination Reference Mapping Table

Section 1 Reference	Determination Reference
1.1 About Centralines 1.2 About the Centralines' Network 1.3 Asset Management 1.4 Organisational Structure 1.5 About the Regulatory Asset Management Plan 1.6 Structure of the RAMP 1.7 Overview of the Asset Management Plan 1.8 Key Stakeholder Information 1.9 Asset Management Objectives 1.10 Programmes and Projects to Improve Customer Service	3.1

Table 1-6: Determination Reference Mapping Table

2

BACKGROUND & OBJECTIVES

CONTENTS

2. BACKGROUND AND OBJECTIVES

2.1 Introduction to this Section

Section 2: Background and Objectives provides an overview of the organisation and the Asset Management System (AMS), including the Asset Management Policy and the Asset Management Objectives (AMOs). A statement of Centralines' Asset Management Strategy is provided, along with a summary of the three key processes that ensure the strategy will be delivered effectively.

The most important role this 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 Context of the Organisation

2.2.1 About Centralines

Centralines is the electricity distribution business (EDB) that serves the communities of Central Hawke's Bay. Centralines is owned by the Central Hawke's Bay Consumers Power Trust (CHBCPT) on behalf of the power consumers it supplies. It is responsible for connecting homes and businesses to its network, safely distributing electricity, and sustainably managing its infrastructure. Centralines' infrastructure includes a network of lines, cables, transformers, switchgear and other distribution equipment across the region it serves.

Centralines generates revenue by distributing electricity to over 8,500 consumers. The organisation also provides other services to its customers including:

- providing new connections to homes and businesses
- cutting and trimming trees near lines, and
- locating underground cables to ensure safe excavation.

Centralines works in partnership with all members of the electricity supply chain including generators, Transpower and retailers to meet the needs of electricity consumers. It also collaborates closely with other stakeholders including councils, government authorities and owners of other infrastructure to promote effective management of community resources.

Centralines, under provisions of a Management Services Agreement (MSA), contracts Unison Networks Limited (Unison) to provide asset management services including planning, acquisition and construction, livening, operation, maintenance, renewal and modification, and disposal. A broad range of people with diverse skills are engaged in carrying out these asset management activities.

In March 2018, Unison became the first New Zealand organisation to be certified to ISO 55001. ISO 55001 is the international global benchmark for asset management capability and contains the requirements specification for an integrated, effective management system for asset management. While the ISO 55001 certification is specific to Unison and its own distribution network, it is expected key frameworks and processes associated with the Asset Management System, including asset management planning, developed as part of this certification process will over time be fully adopted to manage Centralines' distribution asset fleet.

Centralines typically undertakes the majority of its own capital projects, asset maintenance and vegetation management activities through a small team of in-house resources. Some large, technically complex projects, mainly associated with zone substations are managed on Centralines behalf by Unison.

EDBs are natural monopolies and are regulated by the Commerce Commission, under the Default Price-Quality Path (DPP). The DPP places an upper limit on EDB revenues and sets minimum network performance standards according to the frequency and duration of outages. The Commerce Commission also requires Centralines to disclose certain information including this Regulatory Asset Management Plan (RAMP).

Centralines is a responsible corporate citizen and responds to customer feedback. It takes a proactive stance on health and safety of employees, contractors and the public, and takes responsibility for the effective management of environmental impacts of its operations.

2.2.2 Vision and Values

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

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 optimal trade-offs between asset lifecycle cost, performance and risk that best reflect the needs of customers and other stakeholders.

Centralines understands the importance of people, culture and climate to enable effective asset management. The behaviours and attitudes that Centralines is committed to and expects of its people are encapsulated within its five organisational values presented below. Asset management is aligned with these values through the Asset Management Policy.

Figure 2-1: Centralines' Vision and Values

2.3 Overview of Centralines' Asset Management System

A key pillar of Centralines' Asset Management service provider's corporate strategy, is to establish a strong competence in asset management. This is supported through the implementation of an asset management system. Through this process they are committed to:

- developing Asset Management Plans that optimise investment on a total lifecycle basis
- ensuring all teams are clear in their responsibilities and are appropriately empowered
- making decisions about priorities through consideration of relative risk
- using data and information to support fact-based decision-making
- communicating to all stakeholders on asset management issues relevant to their role
- continually improving in all facets of asset management, and
- implementing novel and innovative asset management solutions where this will best support achievement of the Asset Management Objectives.

Centralines' Asset Management System (AMS) has been established based upon existing:

- asset management capabilities
- processes and procedures
- standards
- practices, and
- institutional knowledge in the management of electricity distribution networks and assets.

Its primary function is to provide structure and connectivity to ensure that asset management is in all cases delivered in alignment with:

- stakeholder requirements
- Corporate Strategic Objectives, and
- the Asset Management Policy.

An overview of the key elements of Centralines' current and future Asset Management System (AMS), which is yet to be fully developed to the ISO 55001 standard, is provided in Figure 2-2 and the following sections.

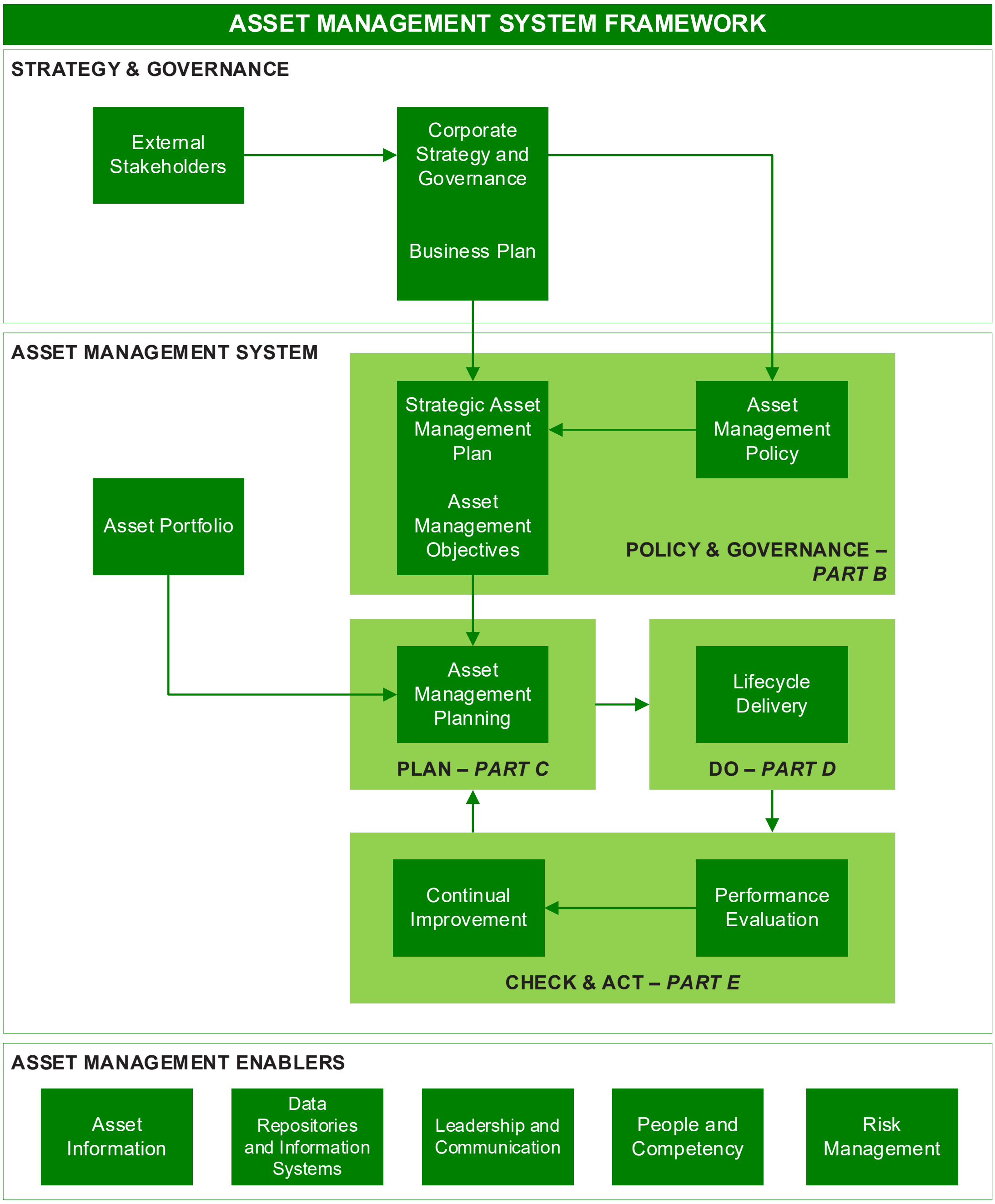

Figure 2-2: AMS Framework

2.3.1 *Corporate Strategy*

Centralines' strategy and corporate governance processes integrate strategic decision making with the requirements and expectations of external stakeholders. This results in the annual development and Board ratification of the Business Plan which contains Centralines' Corporate Strategic Objectives. The Asset Management System is one of the key organisational systems supporting the delivery of the portfolio of Corporate Strategic Objectives. Other systems include customer service processes, environmental management processes, and health and safety management processes. These business systems are supported by the integrated management system (IMS) which includes specification of processes that are applicable across the business, such as documentation control, internal audit and risk management (refer to Figure 2-4).

2.3.2 Asset Management Policy

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

Asset Management Policy
1. 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.
2. 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.
3. 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.
4. 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.

Asset Management Policy	
	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.
5.	Balance Performance, Risk and Cost Asset Management requires us to balance these three competing factors: • maximising asset performance • minimising risk, and • minimising lifecycle cost. At the same time, we must take into account legislative compliance, regulatory requirements and the preferences of our communities.

Table 2-1: Asset Management Policy

2.3.3 Asset Portfolio

The Asset Portfolio is the comprehensive inventory of assets which must be managed in accordance with the AMS. Asset information associated with individual assets and asset systems comprising the Asset Portfolio is a key enabler of decision-making processes throughout the AMS. The Asset Portfolio is defined below.

Inclusions (the Asset Portfolio)	Exclusions
• All assets comprising Centralines' electricity distribution networks. • Assets comprising Centralines' Regulatory Asset Base (RAB). • Includes conductive assets (for example, wires, cables, switchgear and transformers). • Includes non-conductive assets (for example, poles, stay wires and substation buildings). • Includes assets permanently installed to monitor the operating environment, condition and other information relating to the asset (for example, weather stations, oil condition monitors and meters). • Includes overhead assets (for example, conductors, insulators and crossarms), ground mounted assets (for example, ring-main units	• Personal Protective Equipment (PPE) used by Centralines' employees. • Vehicles and tools owned by Centralines. • Non-network buildings and land owned by Centralines. • Portable test equipment that is not permanently installed on the network (for example, power quality loggers, distributed temperature sensing equipment and oil spectroscopy testers). • Customer service mains, i.e. electrical infrastructure beyond the fuse located inside pedestals and on private property (not within council owned road reserve). • Electricity meters, smart meters and ripple relays at customer premises. • Some assets energised at 11kV located on customer premises as defined in relevant

Inclusions (the Asset Portfolio)	Exclusions
and pedestals) and underground assets (for example, cables). • Operational land holdings used for electricity distribution. • Asset information systems and supporting IT infrastructure. • Some assets located on customer premises as defined within Line Function Services Agreements. • Low voltage streetlight circuits, fuses and ripple relays up to the base of streetlight poles where these are owned by Centralines.	schedules of Line Function Services Agreements, ownership agreements or MOU's. • Streetlight poles and associated hardware.

Table 2-2: Asset Portfolio

2.3.4 Asset Management Strategy and Objectives

The Asset Management Strategy includes Centralines' Asset Management Objectives (AMOs), 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 three core AMOs which are tabled below.

Asset Management Objectives
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.
Customer Service Performance: Deliver great customer service 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.

Table 2-3: Asset Management Objectives

The current measures that enable Centralines to monitor and improve performance in relation to these AMOs are provided in Table 2-4. More detail on Centralines' Customer Service Performance objective and associated measures is provided in Section 3: Service Levels.

Asset Management Objective	Measure	Current Target (2018/19)
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%
	Average annual number of minutes a customer is without supply (SAIDI)	98.80 – 119.07
	Average annual number of supply interruptions a customer experiences (SAIFI)	2.84 – 3.52
	Revenue per ICP (nominal)	$1,710
	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 rolling
	Operating expenditure per ICP (nominal)	$474
	Faults per 100km of network	6.4

Table 2-4: Asset Management Objective Performance Measurements

2.3.5 Asset Management Plan

The Asset Management Plan (AMP) is the specification of major work to be undertaken on or in association with the assets to enable Asset Management Objectives to be achieved. These include plans for managing network risk by renewing, upgrading and maintaining network assets, connecting new customers, managing information systems and asset information, and improving the AMS.

Centralines' Asset Management Plan (AMP) should not be confused with this document (now referred to as the Regulatory Asset Management Plan or RAMP), which has a much wider scope. It is prepared for consumption by external stakeholders and to satisfy the requirements of the Electricity Distribution Information Disclosure Amendments Determination 2017.

2.3.6 Lifecycle Delivery Processes

Centralines' Lifecycle Delivery processes include:

- the real-time network management performed by the Network Operations Centre (NOC)
- management of the capital works programme
- asset maintenance and inspection programmes
- construction and livening of new assets
- vegetation management, and

- associated configuration management and transactional processes essential to ensure assets are safe and fit to deliver the Asset Management Objectives.

2.3.7 Performance Evaluation

Evaluation of the performance of the AMS is accomplished through:

- measurement against performance indicators related to asset management objectives
- the achievement of specified business outcomes, and
- the internal audit of processes and systems of the AMS to assure conformance to requirements.

2.3.8 Continual Improvement Process

The feedback generated through the processes specified above is a primary input into Continual Improvement (CI) processes, and includes feedback on:

- both asset capability and condition, and
- the organisation’s asset management capability.

The CI processes utilised by the AMS are consistent with the organisational approach to continual improvement provided in Centralines’ integrated management system.

2.3.9 Asset Management Enablers

All asset management processes are enabled by:

- appropriate asset management information which is stored and accessible from fit for purpose data repositories and information systems
- effective leadership and communication processes
- a well-defined organisational design
- people who have appropriate skills, competencies and qualifications, and
- processes that utilise risk management concepts and principles to support effective decision-making.

2.4 Purpose of the Regulatory Asset Management Plan (RAMP)

2.4.1 Purpose Statement

The purpose of this Regulatory Asset Management Plan (RAMP) is to publish information about Centralines’ Asset Management System (AMS) and the Asset Management Plans that are developed to manage down risks and secure opportunities, in support of the Asset Management Objectives. This enables interested stakeholders to make an informed judgement about the appropriateness of

Centralines overall approach to asset management and to learn of changes in the Asset Portfolio that may impact them. In addition to this, the RAMP ensures that Centralines is compliant with the requirements of the Electricity Distribution Information Disclosure Amendments Determination 2017.

The purpose of asset management planning is to ensure that the AMOs specified in Table 2-3 are achieved by the organisation for the benefit of all stakeholders.

2.4.2 *Documented Plans*

Figure 2-3: Consolidation of Asset Management Information in the RAMP below provides a hierarchical view of the documented plans produced as outputs of the annual business planning processes utilised by Centralines, and their relationship with the Regulatory Asset Management Plan (RAMP).

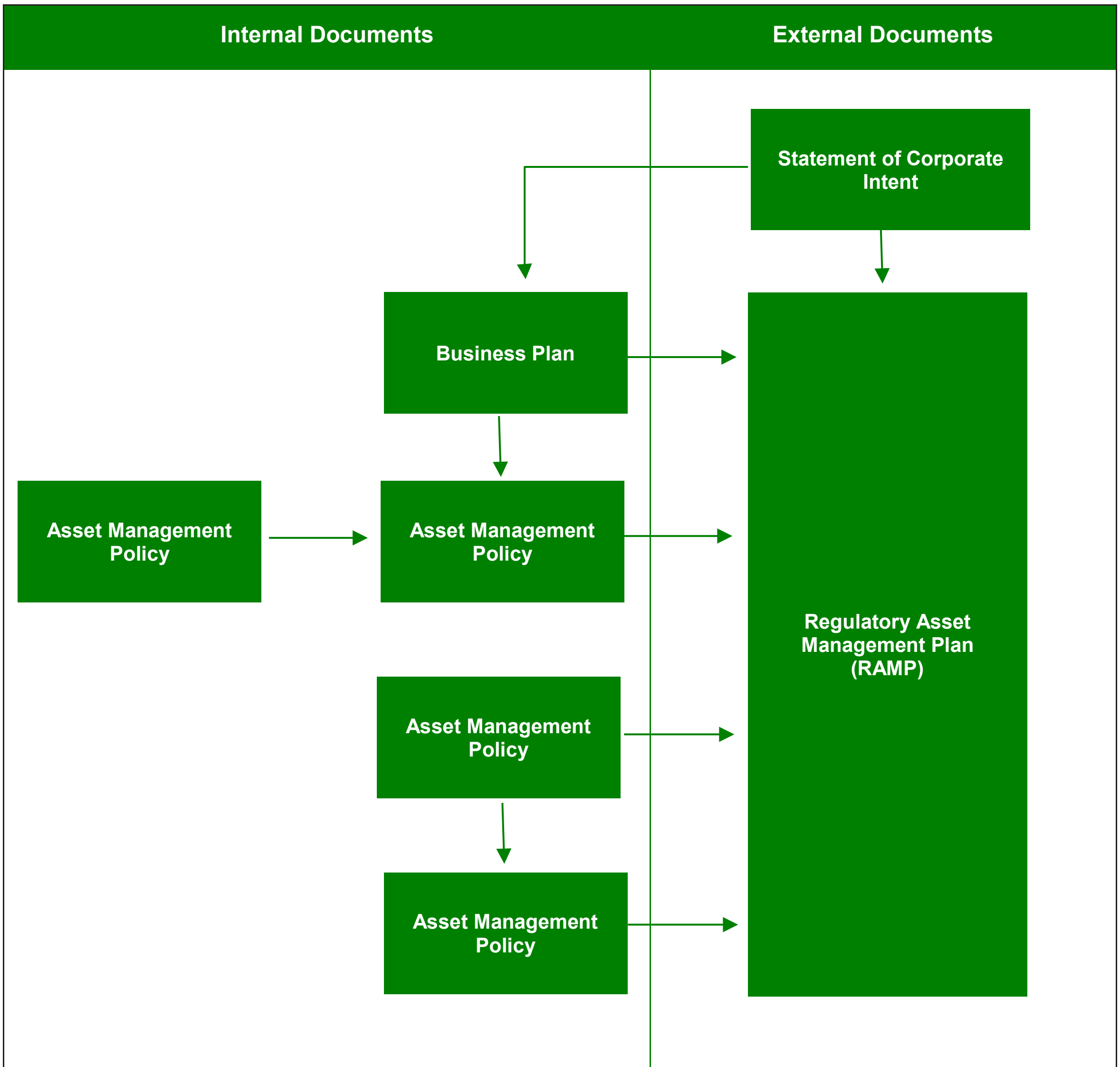

Figure 2-3: Consolidation of Asset Management Information in the RAMP

2.4.2.1 *Statement of Corporate Intent*

The Statement of Corporate Intent (SCI) sets out the Centralines scope of activities and strategic aims as well as the key performance targets for the next three financial years. It is a requirement of the Energy Companies Act 1992 and is refreshed and published annually on Centralines' website. The SCI provides top-level guidance to the development of the Asset Management Policy and strategy, and although rare, significant changes to the SCI requires a detailed review of subordinate plans.

2.4.2.2 *Business Plan*

The Business Plan is Centralines' key strategic plan and therefore is highly influential in driving the Asset Management Strategy. The Business Plan contains the following elements:

- a review of Centralines' strategic context both internally and externally
- Centralines' corporate strategic objectives
- a review of Centralines' performance in past periods against corporate strategic objectives, and other goals and targets
- financial information including capital and operating expenditure forecasts, revenue forecasts and a summary of the company's financial position, and
- an overview of key strategic initiatives for the organisation in the next period.

The Business Plan is reviewed and approved annually by Centralines' Board of Directors.

2.4.2.3 *Asset Management Policy*

The Asset Management Policy specifies Centralines' commitments in the delivery of asset management. It is reviewed annually to ensure continued alignment with the SCI and Business Plan.

2.4.2.4 *Asset Management Strategy and Objectives*

The Asset Management Strategy is a container for Centralines' Asset Management Objectives (AMOs), as well as the documents that record Centralines' strategies for achieving the objectives.

2.4.2.5 *Asset Management Plan*

The Asset Management Plan (AMP) is the register of the major work required in the Asset Portfolio to ensure that Asset Management Objectives are met. Most of the work registered in the AMP is capital work, however major non-routine maintenance programmes may be included. It has a ten-year horizon, where the first two years are well-defined proposals of work ready to be actioned, the next three years are plans with high levels of confidence, and the remaining five years are speculative, but represent the best plan based upon the information available.

For all work registered in the AMP the following information must be provided:

- the assets to be worked on
- the issue driving the requirement for work
- an assessment of the level of risk associated with the issue utilising a risk management framework, and
- the proposal of work required to manage down the risk, including the recommended timing, estimated cost, any risks in delivering the work, shutdown windows required and contractor resource requirements.

2.4.2.6 *Annual Works Plan*

The Annual Works Plan (AWP) is the consolidated programme of work to be conducted on the Asset Portfolio in a given financial year. This includes the following types of work:

- major capital projects from the AMP, including any large customer driven projects
- preventive maintenance programmes including inspections
- provisions for small scale customer driven projects
- provisions for minor asset replacements (e.g. pole replacements following inspections), and
- provisions for reactive maintenance (e.g. fault response).

2.4.3 Business Management System

The AMS is aligned with Centralines' Business Management System Framework (BMSF) which has been adopted from Centralines' service provider to enable its effective implementation and sustainment. The BMSF supports Centralines' three primary management systems. The supporting processes within the integrated management system (IMS) are outside the scope of the AMS but must be available to enable the AMS to function as required. These include:

- Controlled Document System and associated processes
- Internal Assurance Framework
- Legislative Compliance Programme
- Emergency/crisis management processes
- Competency management systems and processes
- Complaints management processes
- Records management systems and processes
- Incident management processes, and
- Continual improvement.

Centralines' BMSF is represented in Figure 2-4: Business Management System Framework with the red outline representing the scope of the AMS in this context.

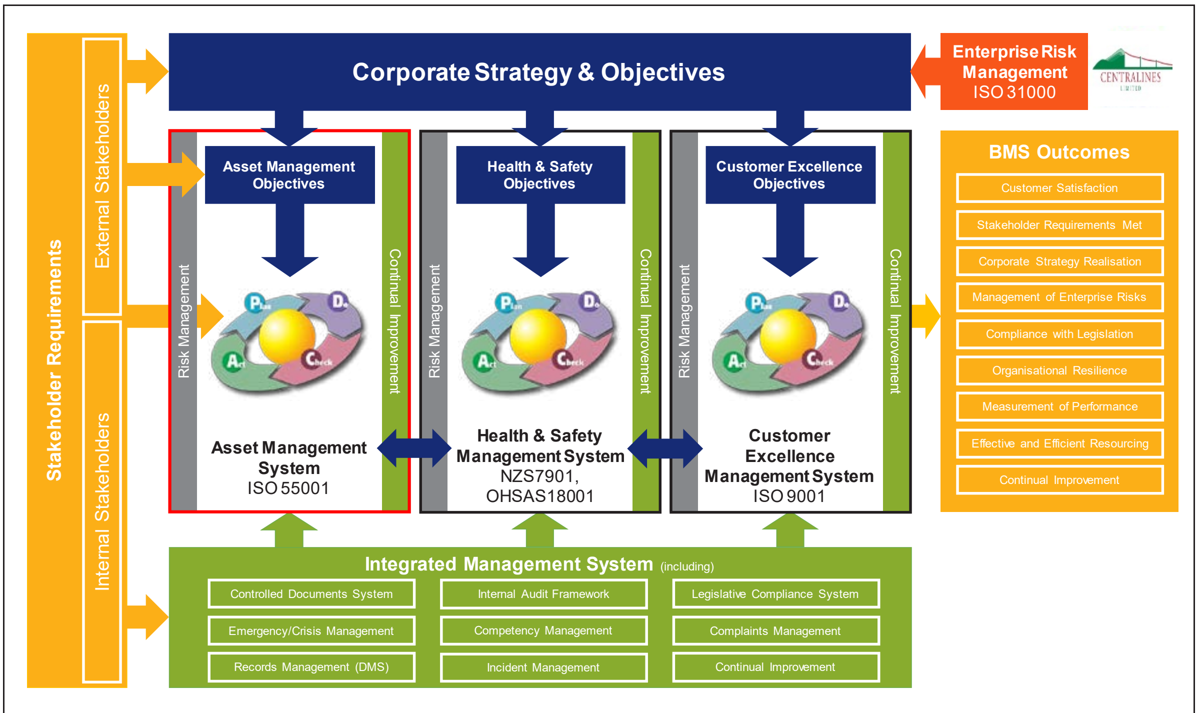

Figure 2-4: Business Management System Framework

2.5 Planning Period of the Regulatory Asset Management Plan

The RAMP covers the period from 1 April 2018 to 31 March 2028. 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 Centralines 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.

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.

2.6 Date of Director Approval

The RAMP was approved by Centralines' Board of Directors on 28 March 2018.

2.7 Centralines' Stakeholders

The requirements and expectations of stakeholders are strongly influential in Centralines' asset management strategy and decision-making processes.

Table 2-5 and Table 2-6 set out Centralines' key external and internal stakeholders respectively. The Stakeholder Interests column provides the key expectations of the stakeholder in relation to

Centralines' operations, including the information, notification and coordination required by the stakeholder from Centralines.

2.7.1 External Stakeholders

The table below summarises Centralines key external stakeholders, how their interests are identified, and what their interests are.

External Stakeholder	Role/ Relationship	How Stakeholder Interests are Identified	Stakeholder Interests
Electricity consumers	Customers of the overall electricity supply chain	• Customer surveys • Customer enquiries • Customer feedback and complaints	• A reasonably priced service that meets performance expectations. • Infrastructure is safe, environmentally sustainable and supports local amenity. • Information about changes to prices is effectively communicated. • Notification of planned outage windows and conformance to these windows by Centralines. • Planned outages minimised on especially cold days of the year. • Information about restoration following unplanned outages is available.
Major customers	Industrial customers supplied at HV who have a contract with Centralines	• Customer surveys • Customer enquiries • Customer feedback and complaints • Relationship Meetings	• Expectations as for general electricity consumers. • Changes to Line Function Service Agreements are well managed. • Engagement around planned outage requirements.
Electricity retailers	Customers, downstream participant in electricity supply chain	• Relationship meetings	• Effective communication on transactional matters, including new connections, outages and billing submissions. • Effective engagement and negotiation of changes to pricing structures, tariffs and Use of System Agreements. • Centralines meeting its requirements under Use of

External Stakeholder	Role/ Relationship	How Stakeholder Interests are Identified	Stakeholder Interests
			System Agreements, including network performance requirements.
Transpower	Upstream asset owner in the electricity supply chain	• Relationship meetings • Engagement through projects • Transpower disclosures and planning documents	• Effective communication on transactional matters, including planned work, billing submissions and account management. • Sharing of long-term planning information including demand forecasts. • Coordination of planned work and associated outage management. • Coordination between service provider's Network Operations Centre and Transpower System Operator, especially in grid emergency situations.
Councils (District, City and Regional)	Territorial authorities, local government, local infrastructure owner	• Relationship meetings • Engagement through projects • Planning documents issued by Councils	• Infrastructure is sensitive to local amenity, compliant to planning requirements, such as District Plans, and are environmentally sound. • Sharing of long-term planning information to support synergies. • Project coordination to ensure effective service corridor management and minimal disruption to communities. • Coordination of civil defence and emergency management. • Notification of environmental issues.
Landowners	Individuals, iwi and businesses with interests in land	• Engagement through projects • Enquiries, feedback or complaints	• Engagement and negotiation on access requirements and the location of new infrastructure. • Local infrastructure is safe, tidy and well-maintained. • Notification of vegetation management issues and plans to address these issues. • Engagement on asset related issues in proximity to land holdings,

External Stakeholder	Role/ Relationship	How Stakeholder Interests are Identified	Stakeholder Interests
			• Understanding, sensitivity and respect towards cultural issues in relation to land.
Electricity Networks' Association	Industry association	• Involvement and participation	• Regular management engagement with the Association and its members to support industry collaboration and advance the interests of the industry. • Involvement and support in regulatory submissions. • Participation on industry working groups.
Other electricity distribution businesses	Industry peers	• Information sharing forums • Asset Management Plans	• Collaboration on issues of mutual interest, including information sharing, joint projects and trials, and associated commercial arrangements. • Contracting resource support for businesses affected by major events such as storms and natural disasters.
Electricity Engineers' Association	Industry association	• Involvement and participation on working groups	• Involvement in working groups, sharing of knowledge and best practices. • Funding support for initiatives including research and working groups. • Promotion of electrical engineering as a career pathway for young New Zealanders.
Commerce Commission	Economic regulator	• Regulatory requirements • Documents issued by the Commission • Engagement processes coordinated by the Commission	• Disclosure of information including Regulatory Asset Management Plans in conformance with requirements. • Compliance with the Default Price Path. • Submissions and feedback on proposed changes to regulatory framework.

External Stakeholder	Role/ Relationship	How Stakeholder Interests are Identified	Stakeholder Interests
Electricity Authority	Electricity market regulator	• Regulatory requirements • Documents issued by the Authority	• Compliance with market rules, associated electricity industry legislation, regulation and codes. • Consultation and issues-based correspondence. • Participation and cooperation with investigations.
WorkSafe New Zealand	Health and safety regulator	• Regulatory requirements • Engagement on specific issues • Documents issued by the Authority	• Engagement in working groups and consultation processes. • Notification of incidents and near misses. • Compliance with legislative and regulatory requirements.
Office of the Auditor General	Independent regulator	• Engagement during audits • Review of documents issued by the OAG	• Efficient use of electricity bill payers' funds through effective asset management. • Participation and cooperation with audit processes initiated from time to time.
Utilities Disputes Commissioner	Industry regulator	• Cooperation in any investigations • Review of decisions by the Commissioner	• Participation in dispute resolution processes. • Provision of information and records to support dispute resolution processes. • Adherence to rulings not found in Centralines' favour.
New Zealand Police	Partner agency	• Relationship meetings • Information sharing	• Notification of accidents involving Centralines' assets. • Coordination of responses to incidents and compliance with incident management processes. • Response capability from Centralines' first responders.
Fire and Emergency Response New Zealand	Partner agency	• Relationship meetings • Information sharing	• Notification of fires and emergencies involving Centralines' assets. • Coordination of responses to incidents and compliance with incident management processes.

External Stakeholder	Role/ Relationship	How Stakeholder Interests are Identified	Stakeholder Interests
			• Response capability from Centralines' first responders.

Table 2-5: Centralines' External Stakeholders and their Interests

2.7.2 Internal Stakeholders

The table below summarises Centralines' key internal stakeholders, how their interests are identified, and what their interests are.

Internal Stakeholder	Role/ Relationship	How Stakeholder Interests are Identified	Stakeholder Interests
Central Hawke's Bay Consumers Power Trust (CHBCPT)	Owner of Centralines on behalf of power consumers	• Annual General meeting • Meetings between Trustees, Directors and Executive Management	• Reporting of performance against Statement of Corporate Intent (SCI). • Effective and efficient asset management performance. • Prompt resolution of issues raised by Centralines' power consumers.
Board of Directors	Corporate governance Strategic direction	• Monthly Board meetings	• Performance against the Corporate Strategic Objectives. • Regular reporting on the health of the AMS and performance against Asset Management Objectives. • Effective management of the organisation, especially relating to health and safety performance.
Executive Management	Governance Policy and strategy Enterprise risk management	• Business Plan • Communication and engagement with staff	• Regular management review of the health of the AMS and performance against Asset Management Objectives. • Escalation of strategic risks in the Asset Portfolio and the AMS where necessary, especially relating to the impact of DER.

Internal Stakeholder	Role/ Relationship	How Stakeholder Interests are Identified	Stakeholder Interests
			• Quarterly reports on progress towards the implementation of the AMS.
Centralines employees	Internal customers Users and advocates Implementers	• One-on-one discussions with managers • Satisfaction surveys • Training and development processes	• Awareness of the AMS and its implications for roles and responsibilities, and how teams work together. Providing a basis for understanding why certain actions are important. • Awareness of significant risks and potential consequences of deviating from defined AM practices. • Training and education on asset management, the AMS and role specific skills and competencies. Professional development. • A secure role in a respected and professionally managed organisation. • Information about asset management risks, particularly relating to health and safety.
Other contractors and vendors	Supplier of goods and services	• Relationship meetings • Contract negotiation processes	• Information about asset management risks, particularly relating to health and safety. • Adherence to terms and conditions of trade and contractual obligations. • Two-way feedback on performance and areas for improvement. • Quality technical standards and operating procedures.

Table 2-6: Centralines' Internal Stakeholders and their Interests

2.7.3 Accommodation of Stakeholder Interests in Asset Management Practices

The importance of accommodating stakeholder interests in asset management is recognised in the Asset Management Policy, and this flows through into the Asset Management Objectives (AMOs) and the design of the business processes utilised in the AMS.

Centralines' performance against the AMOs is measured and reported monthly to provide an overview of how effective Centralines is in meeting stakeholder interests. Where gaps are identified between actual and targeted levels of performance, opportunities for improvement are considered through management review meetings, and actions are put into place through the continual improvement process of the AMS.

2.7.4 How Conflicting Interests are Managed

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 and 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.

In all cases the reasons for the decision will be communicated openly with all parties.

2.8 Accountabilities and Responsibilities for Asset Management

2.8.1 Corporate Governance

Leadership and commitment to the Asset Management System (AMS) starts at the corporate governance level of the organisation. 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. 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.

2.8.1.1 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.

As well as 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 optimum option with justification from both a technical and commercial perspective
- identification of any risks associated with the selected option, and
- a disaggregated costing for the project, and an estimated timeframe for delivery.

2.8.1.2 Reporting on Asset Management Outcomes

Performance against the Asset Management Objectives specified earlier are reported to Directors at the monthly Board meeting. Explanations are provided by senior management in respect of deviations from expected performance.

Asset management related outcomes including network reliability, progress in the execution of asset management plans, network CAPEX and OPEX budget management and health and safety outcomes are all reported on.

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 detailed 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 quality regulatory framework.

2.8.2 Leadership Processes

The implementation, utilisation and sustainment of Centralines' AMS is driven by the following top-level processes initiated and led by the organisation's Executive Management. These processes include:

- establishment and communication of Centralines' Asset Management Policy, which specifies the principles by which asset management will be implemented at Centralines, to all internal stakeholders
- annual management review of Asset Management Strategy and Objectives
- communication to all members of the organisation on asset management performance, and the extent to which this supports the Corporate Strategic Objectives
- consolidation of all legacy asset management processes, practices, plans and other material into the AMS
- annual delivery and disclosure of either a full Regulatory Asset Management Plan (RAMP) or RAMP Update documents that are compliant with the Electricity Distribution Information Disclosure Amendments Determination 2017
- planning and implementation of AMS Capability Projects by Centralines' Management service provider to drive continual improvement and build asset management capability
- ongoing internal assurance, management review and external audit of the AMS, and
- engagement by Centralines' Management service provider with external groups and subject matter experts in certain domains to augment and grow capabilities, including:
    - the Institute of Asset Management (IAM)
    - the Electricity Engineers' Association (EEA)
    - the New Zealand Organisation for Quality (NZOQ)
    - the EPECentre of the University of Canterbury, and
    - Covaris.

2.8.3 Leadership Responsibilities

In accordance with their defined Position Descriptions and authorities, all Centralines' executive managers, line managers and team leaders are required to:

- model the company values in leadership actions, decisions and communications
- encourage and coach people to apply the company values in their day-to-day work and challenge behaviours that do not match Centralines' value
- communicate clear performance expectations to people so that they understand how their role contributes to the achievement of Centralines' vision
- coach and support people to:
    - identify their personal development needs
    - formulate and implement an individual development plan, and
    - assess its impact on results and relationships.
- inspire and motivate teams by leading, guiding and providing motivational and developmental feedback to build a high performing team and individuals
- cultivate an environment of continuous improvement, innovation and initiative by facilitating an open exchange of ideas

- take a long-term view and formulate effective strategies consistent with the business strategy, and
- develop and build relationships, engage in cross-functional activities, collaborate across boundaries, and utilise contacts to build and strengthen internal processes.

2.8.4 Organisational Structure

Centralines' asset management organisation is led by Centralines' Asset Management service provider, which includes six groups tasked with managing the functional activities required to deliver Centralines' corporate objectives. Each group is led by an Executive Manager reporting to the Group CEO, as shown in Figure 2-5.

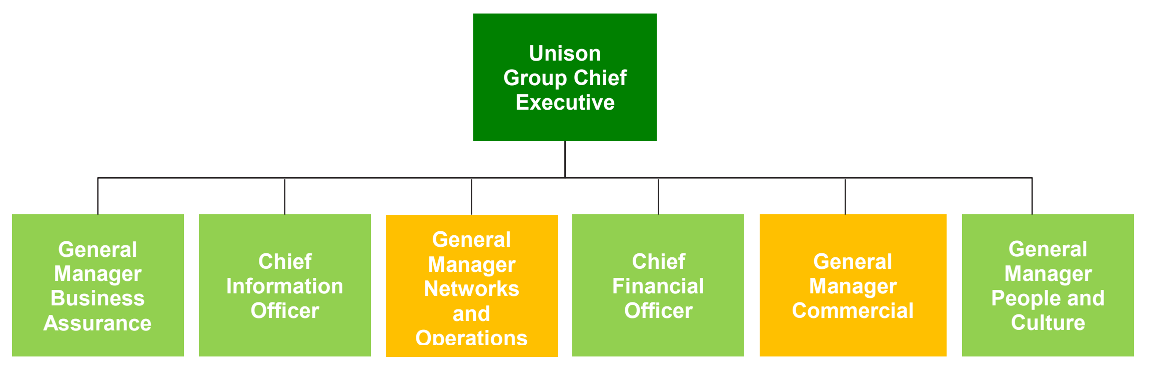

Figure 2-5: Management Structure of the Asset Management Organisation

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2.8.4.1 General Manager Commercial

The General Manager Commercial ensures that the Management service provider delivers the asset management outcomes as outlined in the Management Services Agreement.

2.8.4.2 General Manager Networks and Operations

The General Manager Networks and Operations is assigned responsibility for the AMS, which includes:

- coordinating review of the Asset Management Policy
- aligning the Asset Management Objectives with the Corporate Strategic Objectives
- overseeing and coordinating the Asset Management Plans, and
- organising management review and external assessment of the AMS.

2.8.4.3 Management Responsibilities

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

While the Management service provider's General Manager Networks and Operations has primary responsibility for implementation of the AMS, each of the other Management service provider's General Managers has an important role to play in the asset management organisation, as shown in Table 2-7.

General Manager	Key Accountabilities
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
Networks and 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 • Procurement and logistics
Commercial	• Customer projects • Customer engagement and service levels • Billing
People and Culture	• Human resources and organisational culture

Table 2-7: General Manager Key Accountabilities within Asset Management System

2.8.4.4 Responsibility for Asset Management System Processes

The service provider's Networks and Operations Group, reporting to the General Manager Networks and Operations has the primary responsibility for the AMS. The structure of the group is represented in Figure 2-6. It indicates the primary areas of responsibility of each line manager in the key processes of the AMS.

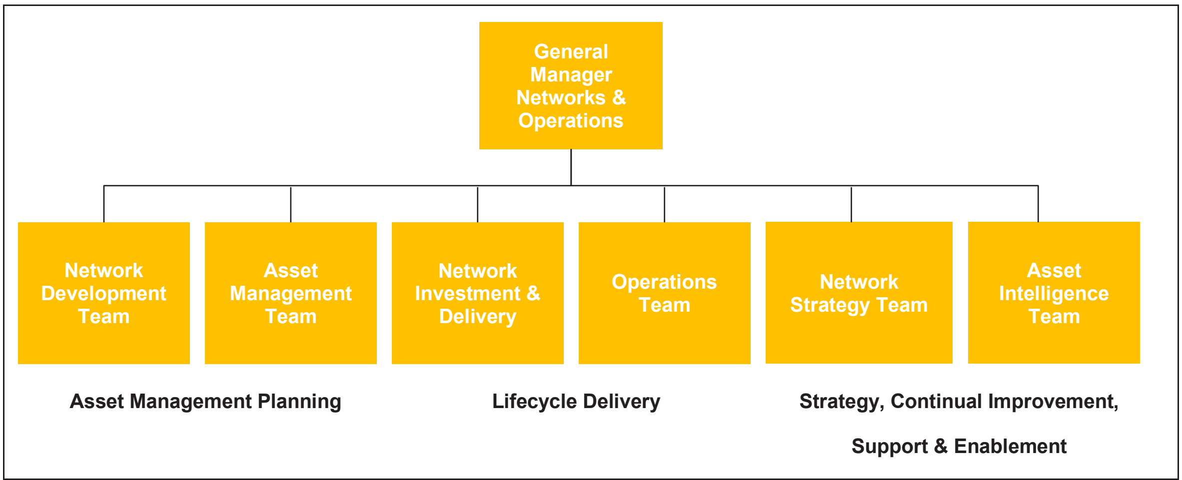

Figure 2-6: Management of the Asset Management System

Further detail on the key processes that each team is responsible for is provided in the following tables.

Planning Processes	Responsible Team
Network Development Planning	Network Development
Contingency Planning	Asset Management
Asset Renewal Planning	Asset Management
Maintenance Planning	Asset Management
Works Planning and Consolidation	Network Investment and Delivery
CapEx Programme Establishment	Network Investment and Delivery

Table 2-8: Responsible Teams for Planning Processes

Lifecycle Delivery Processes	Responsible Team
Work Management	Network Investment and Delivery with field work undertaken by Centralines.
Switching and Outage Management	Operations with field work undertaken by Centralines.
Asset Portfolio Control	Asset Management
Asset Information Management	Asset Management

Table 2-9: Responsible Teams for Lifecycle Delivery Processes

Continual Improvement Processes	Responsible Team
Performance Evaluation	Asset Management
Internal Audit	Network Strategy
Coordination of Management Review	Network Strategy
Coordination of Capability Projects	Network Strategy
Continual Improvement	Network Strategy

Table 2-10: Continual Improvement Processes

2.8.4.5 Responsibility for Field Operations

The field delivery of asset lifecycle activities that are specified in the RAMP including design, construction, inspection, maintenance, refurbishment, fault response and repair, vegetation management, replacement and disposal is the responsibility of the Centralines' Operations Manager.

The vast majority of this work is carried out by Centralines' field staff who work out of the Centralines' Waipukurau depot. The field staff report to the Centralines' Operations Manager who in turn reports to the Management service provider's General Manager Commercial, as shown in Figure 2-7. Collaboration takes place between Centralines staff and the Management service provider's Network and Operations Teams to ensure the efficient and effective delivery of projects.

An example of this is the close collaboration for work taking place in the field between the Operations Manager and the Management service provider's Network Operations Centre. This collaboration ensures the network is configured in a way that allows work to proceed, the impact of outages is 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.

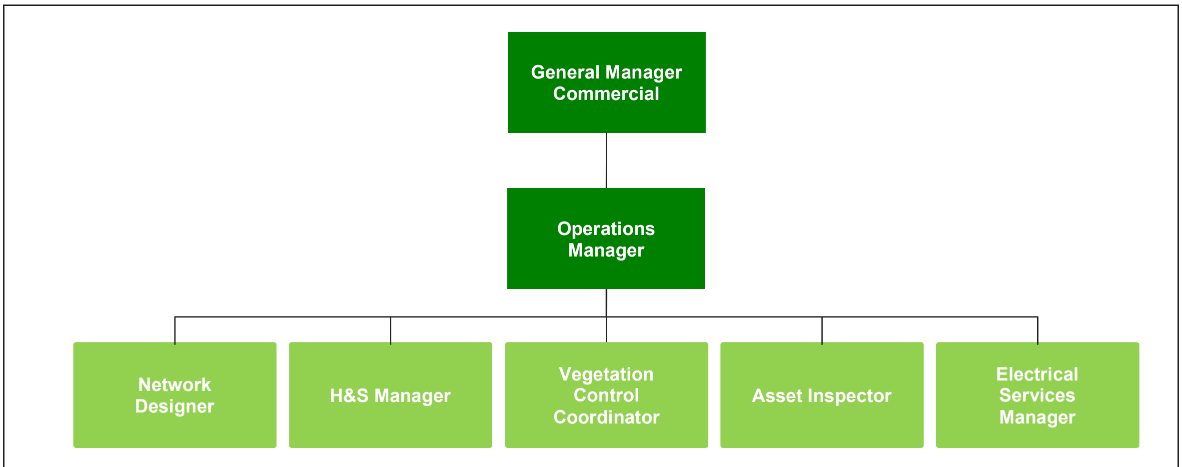

Figure 2-7: Field Leadership Structure of Centralines

2.8.4.6 Outsourcing of Field Operations

Centralines on occasions subcontracts work during times when demands on contracting resources cannot be met by the company's existing capacity. From time-to-time Centralines also directly engages other contractors when specialist capabilities are required. An example of this is substation design and related project engineering functions which are performed by the Management service provider's Network Investment and Delivery Team as required.

2.9 Significant Assumptions made in the AMP

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.

2.9.1 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 constraint forecasting in Section 4: Network Development Plans.

Table 2-11: Macro-Environmental Assumptions

2.9.2 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 personnel 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 2-12: Assumptions about Actions of Regulatory Bodies and other External Entities

2.9.3 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 November 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 2-13: Governance and Ownership Assumptions

2.9.4 Asset Management Planning Assumptions

Assumption	Significance of the Assumption
Accuracy of constraint forecasts	• Constraint 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 constraint 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 constraint 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 believes that uptake of distributed energy resources and electric vehicles and ongoing improvements in energy efficiency will render such constraint 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	• Centralines has been installing sensors and automated switches on the network for some time, and the transition of Centralines' network onto their service provider's, Advanced Distribution Management System was completed in 2017. As a result, Centralines' situational awareness has improved. This, coupled with Unison's maturing asset management capability, is enabling better asset management decisions to be made,

Assumption	Significance of the Assumption
	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 RAMP 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 2-14: Asset Management Planning Assumptions

2.9.5 Price Inflator Assumptions

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

The inflation rates for 2019 and 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 2-15, presented as a forecast annual rate of inflation.

2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
2.11%	2.06%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%

Table 2-15: Price Inflator Assumptions

2.10 Overview of the Asset Management Strategy and Delivery

2.10.1 Strategic Context

The macro-environment that Centralines operates within is changing and this is influencing the organisation's strategy. The key drivers of change and the strategic risk implications are summarised in the PESTEL analysis below.

Category	Driver	Risks and Implications
Political	Increasing requirement to assure a secure electricity supply to customers, retailers and industry.	Significant external attention would be directed towards any major power interruption or increasing frequencies.
	Prices for power are retained as low as practicable to enable the local economy to grow.	Centralines has external constraints to ensure price efficiencies for delivery of its services and these constraints may be increased over time. Centralines must continue to be, and be perceived to be, prudent in its expenditure and asset management.
Economic	Electricity consumption is flattening and reducing in some parts of Centralines' network which is believed to be driven by energy efficiency and increasing cost relative to incomes.	Capital available for network development and enhancement is constrained. Downstream revenue pressures on funding available to sustain existing assets.
	Low inflation outlook.	Increases in costs to sustain the network are primarily driven by aging equipment, not the unit cost of work, although this may be challenged by skills shortages and increasing resilience requirements in future.
	New Zealand economy performing well relative to many other developed nations.	Expectations of reliable power supply are high to ensure economy performance is maintained. Businesses expanding. Potential for pressure on contracting resources.
Social	General societal concerns about a lack of affordability of basics including housing, food and energy.	Substantive price increases even if allowed under the DPP will be deeply unpopular.
	Increasing expectations of society for businesses to make decisions that accord with environmental sentiments, whether rational from Centralines' frame of reference.	Effective stakeholder management on decisions that affect or are perceived to affect the environment is necessary in all cases.
	Reducing numbers of young people taking on trades apprenticeships in the electricity industry.	Ageing contracting workforce putting pressure on the availability of skilled people to undertake field-based work.
	Engineering skills shortages in New Zealand due to high demand to support economic growth.	Difficulty of attracting skilled and experienced engineers to replace employees retiring or relocating.
Techno-logical	Advancement in technologies that can affect electricity consumption and demand including solar PV, batteries,	The range of choice for consumers about how to meet their energy needs are increasing, meaning increased competition for EDBs.

Category	Driver	Risks and Implications
	electric vehicles and home energy management.	Widespread uptake of electric vehicles could increase peak demand and consumption.
	The discipline of asset management is maturing rapidly, particularly in the UK, Japan and Australia. Case studies of excellence emerging.	There is a wealth of information and good practice available to support Centralines in improving its practices and performance in this business area.
	Information security and cybercrime are increasing risks to Centralines.	Loss of control of the service provider's Network Operations Centre could have major business disruption and health and safety implications, and this risk is costly to manage.
Environ-mental	Some indications from climate scientists that the frequency and severity of storm events will increase in coming decades.	Increasing likelihood of damage to Centralines' network due to weather events. Increasing cost of infrastructure to ensure resilience.
	Lack of regulatory mechanisms to enable the removal of trees within falling distance of lines.	Impact of severe weather events compounded by vegetation resulting in repair costs, network performance issues, and safety risks.
Legal/ Regul-atory	Electricity Authority is pushing for more cost-reflective electricity distribution pricing. There are currently some regulatory and technical hurdles to achieving this.	Greater focus on bottom up understanding of cost drivers enabling justification of costs based on specific work and risks. Demonstration of asset management competence essential to maintain confidence in Centralines by external stakeholders.
	Internationally economic regulators and governments are becoming increasingly interested in ISO 55001. DNOs in UK already required to be PAS55 certified.	Alignment and certification to ISO 55001 represents a significant outward indicator that Centralines' service provider is competent in all aspects of asset management. Certification would enhance Centralines' position in justifying expenditure and pricing its services to all stakeholders.
	Health and safety legislative reform occurring in New Zealand due to perceived poor performance in several industries.	Higher compliance costs likely for Centralines. Greatly reduced ability to carry out work live-line, meaning more outages for planned work affecting customers and increased pressure on regulatory SAIDI and SAIFI performance metrics. Greater scrutiny of the broader organisational context for dangerous work, including the management systems the work is initiated through.

Table 2-16: PESTEL Analysis

2.10.2 Strategy Overview

The focus of Centralines' strategy is aligning and keeping abreast of the changing energy landscape. The improving economics of distributed energy resources (DER), such as solar photovoltaics and batteries as well as managing the organisation sustainably are the key factors on which Centralines' strategy is based.

Centralines' Management service provider has aligned their business with ISO 50001 through the developed of an Asset Management System (AMS). In their view this represents best practice and will support Centralines' overall asset management aspiration of delivering best practice asset management decisions. This will allow Centralines to respond to the changing environment with flexibility and ease.

The strategy framework presented in Figure 2-8 represents the current practice.

- Asset Management Objectives are established based upon external context and internal context. 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 Asset Management Plans as well as through separate improvement initiatives.
- Implementation progress is reported on as required and major projects are reviewed upon completion. Externally conducted assessments of asset management maturity against good practice standards (formerly PAS 55:2008; now ISO 55001:2014), and expert review of key pieces of work are employed as quality assurance mechanisms.

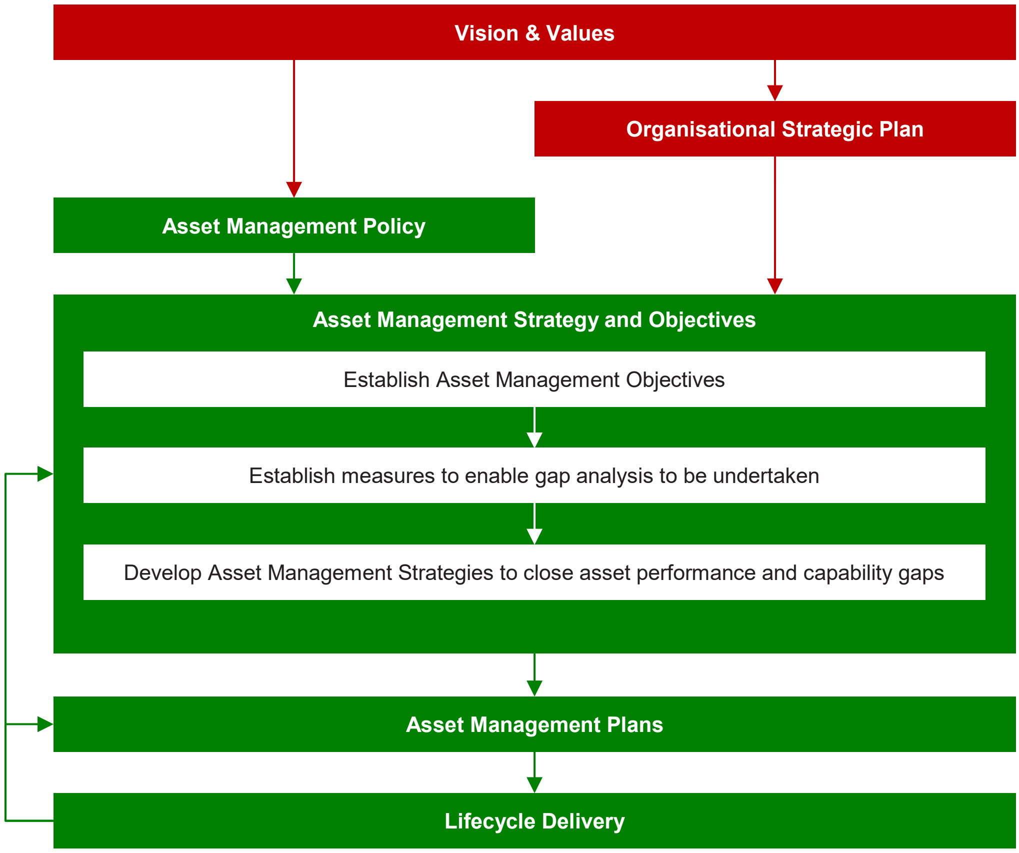

Figure 2-8: Asset Management Strategy and Objectives in the Asset Management System

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2.10.3 Processes of the Asset Management System

The Asset Management System ensures the effective implementation of the Asset Management Strategy. As shown in Figure 2-2, the AMS comprises three primary processes:

- Asset Management Planning
- Lifecycle Delivery, and
- Continual Improvement.

These processes ensure that:

- the asset strategy takes into account the lifecycle of the assets
- that the Asset Management Objectives are driving investment programmes including the AMP, and
- that costs, risks and system performance are controlled through the implementation of the AMP.

2.10.3.1 Asset Management Planning

Planning within the AMS is required to provide assurance that:

- risks to the Asset Portfolio are managed, and
- opportunities for improvement are realised.

Centralines' planning processes are well-defined and embedded in the business. They utilise asset information and apply risk management principles to ensure that decision-making is robust and fact-based. The outputs are plans that specify clear tasks and projects to be initiated and scheduled to maximise the efficiency of resource utilisation.

The desired outcome of Centralines' asset management planning is the achievement of the Asset Management Objectives specified in Table 2-3.

Because the Asset Management Objectives are explicitly selected in alignment with the Asset Management Policy and the Corporate Strategic Objectives, the asset management planning processes are also appropriately aligned.

The key output of the planning process is the Asset Management Plan (AMP). This contains the details of all major work required on the Asset Portfolio over a ten-year planning horizon. This work includes:

- capital projects
- asset refurbishments, and
- long lead-time corrective work including pole replacements.

All work proposals submitted to the AMP must meet certain information requirements, including assessment against the AMP risk schema. This ensures that an acceptable balance between cost, risk and performance can be reached, and therefore resources are efficiently and prudently deployed.

The AMP is supplemented with other plans including:

- plans for routine asset maintenance and vegetation management, and
- contingency plans that are developed collaboratively by Centralines' service providers Networks & Operations and Business Assurance groups.

Centralines utilises the majority of their asset management service providers asset planning system which is represented in Figure 2-9 below.

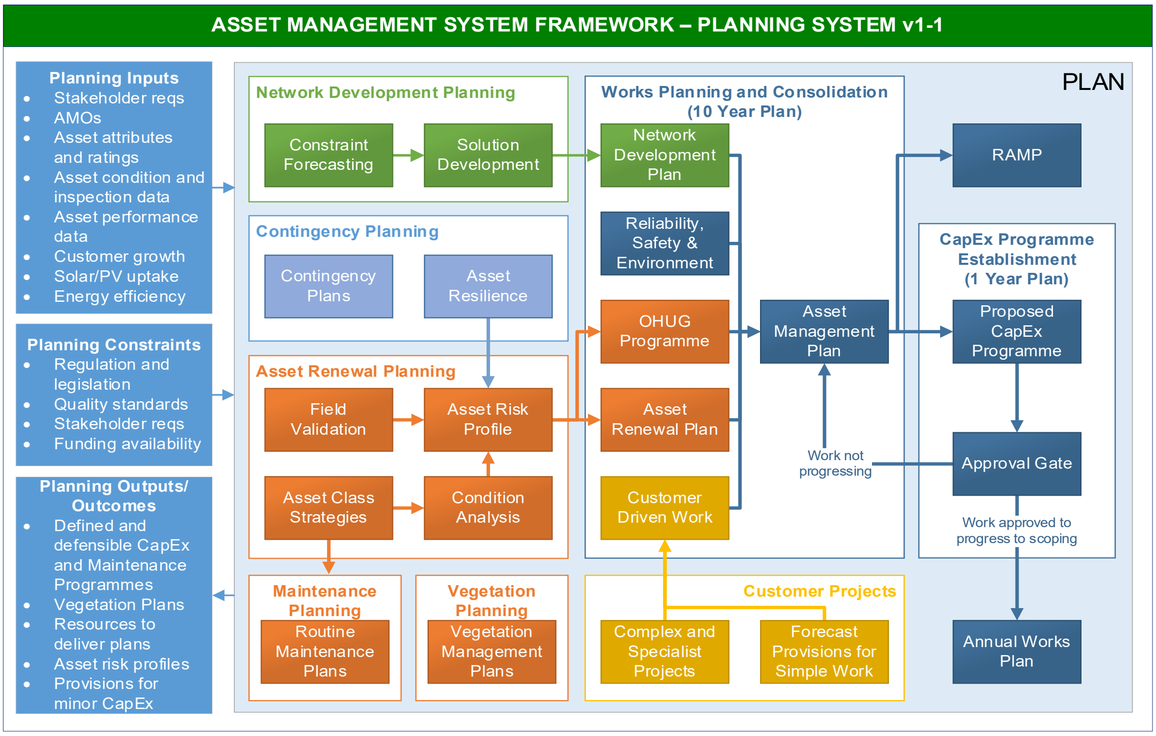

Figure 2-9: AMS Planning Systems

Figure 2-9 identifies eight sub-processes of the planning system, and these are outlined in the table below.

Process	Description
Network Development Planning	Model a range of possible future demand scenarios and identify the most plausible ones to utilise for planning. Quantify the risk associated with capability constraints in the asset relating to capacity, security and voltage compliance over a ten-year planning horizon based upon selected demand scenario(s). Specify project proposals to address high priority risks and submit these proposals to the AMP.
Asset Renewal Planning	Identify and quantify risks in the Asset Portfolio relating to asset condition. Specify project proposals to address high priority asset condition risks and submit these proposals to the AMP. Specify project proposals to improve the resilience of the Asset Portfolio based upon requirements from enterprise risk management and contingency planning processes.
Customer Projects	Forecast the volume of customer simple work over the planning period and submit proposed provisions to the AMP. Identify any Complex and Specialist projects requested by customers and submit these proposals to the AMP.

Process	Description
Works Planning and Consolidation	Coordinate the annual Works Planning and Consolidation process. Manage the AMP including supporting teams to provide submissions and closing out completed work. Quality assure submissions to the AMP to ensure submissions are complete and technically sound. Manage the optimisation of the AMP to ensure efficiencies in the plan are realised. Coordinate reporting, management review and approval processes, and provide information to support the formulation of the RAMP. Provide contracting service providers with a forward view on the required resources and capabilities to deliver the AMP.
CapEx Programme Establishment	Establish the annual CapEx programme for the following financial year by identifying the CapEx projects and budget provisions required. Introduce fiscal constraints (if any) and strategic investment criteria. Initiate the project scoping process to ensure that work requests are available to UCSL and other contracting service providers on a timely basis.
Maintenance Planning	Establish annual routine maintenance plans including preventive maintenance programmes, and asset inspection and monitoring programmes.
Vegetation Planning	Establish the annual plan for the management of vegetation, including trees encroaching on the line corridor, that represents a risk to the Asset Portfolio.
Contingency Planning	Establish contingency plans to mitigate the impact of high impact low probability (HILP) events, should they occur. Through Enterprise Risk Management (ERM) processes supported by AMS stakeholders, identify and quantify resilience risks in the Asset Portfolio.

Table 2-17: Planning System Sub Processes

2.10.3.2 Lifecycle Delivery

Lifecycle Delivery comprises the activities required to support the:

- sustainable operation and technical integrity of Centralines' network, and
- effective and efficient implementation of Asset Management Plans.

In this way, Lifecycle Delivery can be thought of as '*assets doing things and things being done to assets*' through the asset lifecycle. There are three key issues dealt with in Lifecycle Delivery:

1. Specification and Control of Work – the key activities that support network operations and implementation of Asset Management Plans and how they are controlled and risks are managed to ensure consistent quality outcomes
2. Technical Change Management – how change in the Asset Portfolio is controlled and technical integrity is maintained so that assets remain safe and fit to deliver the operational outcomes specified in the AMOs, and

3. Outsourcing – the framework by which Centralines assures itself that the Lifecycle Delivery activities that are conducted either in house or in part by third parties meet the quality requirements of the Asset Management System.

Centralines utilises the majority of their Asset Management service provider's Lifecycle Delivery Framework which is shown in Figure 2-10 below.

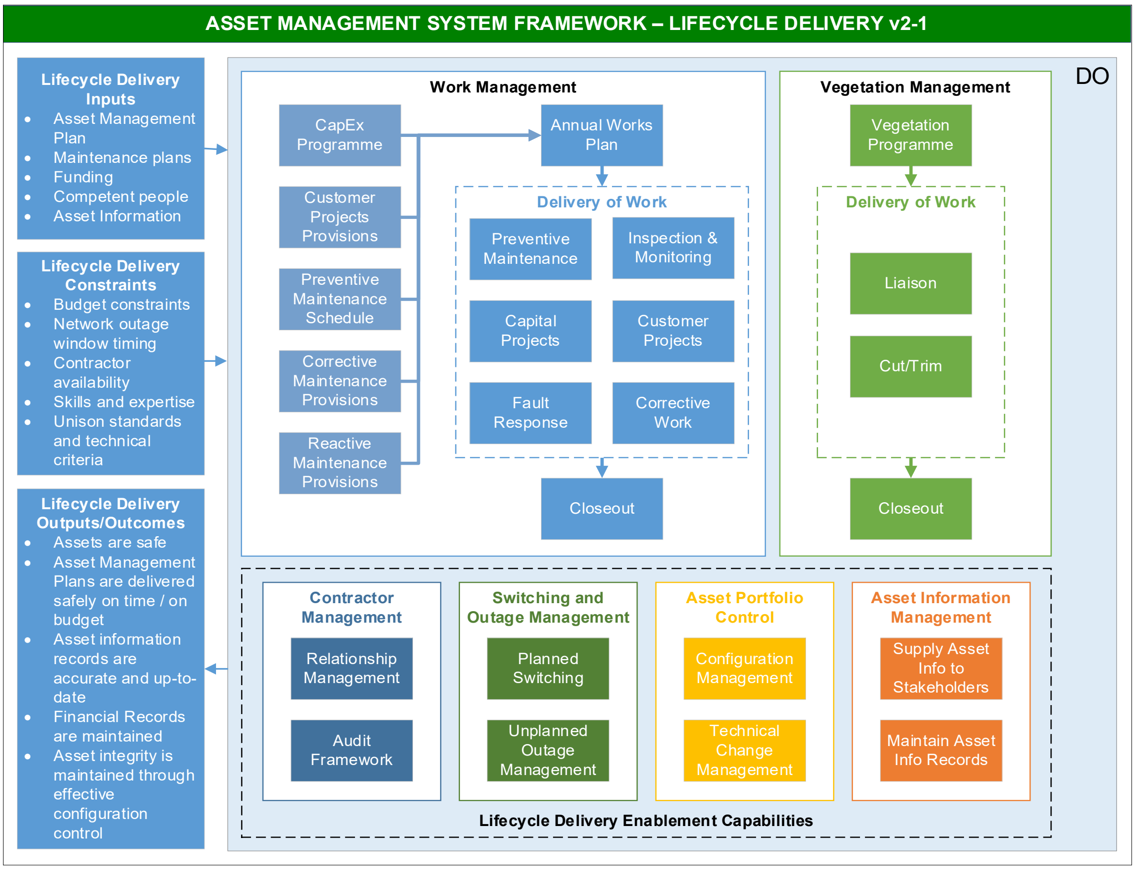

Figure 2-10: Lifecycle Delivery Framework

Further detail on the key processes within the Lifecycle Delivery Framework is provided in table below.

Process	Description
Work Management	The process by which project and maintenance work is undertaken across the network. It assists resources to be productive and effective in maximising equipment safety and reliability.
Vegetation Management	Identification of vegetation issues and securing of landowner consent for cutting work through the liaison process. Cutting and trimming of vegetation to ensure line corridors are clear.
Contractor Management	Utilise existing in-house resources or engage appropriately competent and cost-effective outsourced contracting service providers to undertake work on assets. Issue work to internal resources or contracting service providers. Measure performance of contracting service providers under contractual frameworks.
Switching and Outage Management	Develop switching plans to enable work on the network to proceed. Identify the occurrence of unplanned outages and coordinate the response, including dispatch of first responder.
Asset Portfolio Control	Maintenance of the configuration of the Asset Portfolio to ensure integrity. Technical Change Management processes to ensure that risk of change in the Asset Portfolio is effectively managed.
Asset Information Management	Record asset information generated from Lifecycle Delivery activities within asset information systems including ACTIVA and GIS. Respond to requests for asset information from Centralines teams, contracting service providers, and third parties such as other utilities.

Table 2-18: Key Processes in the Lifecycle Delivery Framework

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2.10.4 Continual Improvement

To ensure Centralines is well positioned to support the organisation to respond to the possibility of disruption in the electricity sector, continual improvement in all facets of asset management is vital.

The Continual Improvement Framework encompasses the 'Check' and 'Act' of the PDCA cycle within the Asset Management System. Therefore, the purpose of these processes is to:

- monitor and evaluate the performance of assets, asset management and the AMS
- deliver corrective action to respond to non-conformity and provide clear guidance on requirements for preventive action, and
- ensure that changes made to the Asset Management System are controlled and result in sustained improvement.

The Continual Improvement Framework developed by their management service provider has been adopted by Centralines and is shown in in Figure 2-11 below.

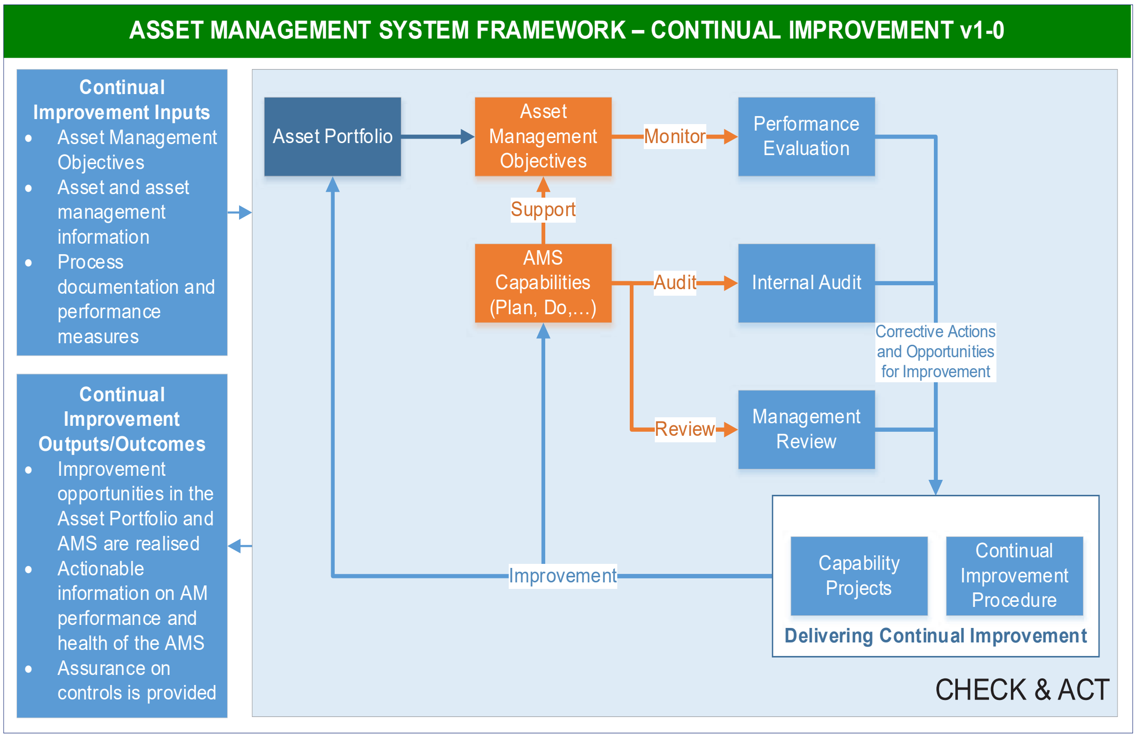


Figure 2-11: Continual Improvement Framework

Further detail on the processes supporting continual improvement are set out in table below.

Process	Description
Performance Evaluation	Establish SMART performance indicators based upon the Asset Management Objectives. Manage the Performance Evaluation Framework to measure performance against the performance indicators over time. Report on performance to stakeholders.
Internal Audit	Deliver a risk-based Internal Audit Programme against the processes of the AMS to ensure that risk controls are effective. Provide feedback to teams on the alignment of processes with ISO 55001, asset management strategy, and the effectiveness of controls. Identify corrective actions that are required. Identify opportunities for improvement.
Management Review	Systematic periodic review of the status and performance of key elements of the AMS to ensure situational awareness of the management team.

Process	Description
Capability Projects	Deliver strategic change projects to establish and enhance the capabilities within the AMS. Deliver effective change management including: • engagement of people and teams • training and competency development • controlled documentation, and • change to information systems.
Continual Improvement Procedure	Provide and manage a register of required corrective actions and opportunities for improvement (CI Register). Risk prioritise work to be undertaken and provide a planning function. Commission solutions to improve the Asset Portfolio and AMS and close-out projects in the CI Register, including: • improving identification of non-conformity and targeting of corrective action, and • implementing preventive actions to avoid non-conformity in the first place. Quality assure the work undertaken and verify its effectiveness in addressing the non-conformity or opportunity for improvement.

Table 2-19: Key Processes Supporting Continual Improvement

2.11 Overview of Systems and Information Data Management

2.11.1 Introduction to Asset Information Strategy

Information, including asset information is a key enabler of the AMS, as shown in the AMS Simplified Overview diagram Figure 2-2. Information is utilised by Centralines to support:

- the delivery of the key processes of the AMS, being planning, lifecycle delivery and continual improvement, and consequential reporting requirements
- communication to a range of stakeholders, and
- awareness of all internal stakeholders of the current performance of both the Asset Portfolio and the Asset Management System, allowing them to be effective in their role as it is relevant to asset management.

Alignment between the key types of information and the asset management processes specified in Figure 2-20 is shown in table below.

AM Processes	Information Available
Policy and Governance	Corporate Strategic Objectives Capital Investment Strategy Risk Management Framework Regulatory requirements Asset Management Policy principles Communication Plans
Asset Management Planning	Asset Management Objectives Proposals for work within the Asset Management Plan Asset class strategies including technical standards Asset health reporting and asset risk information
Lifecycle Delivery	Asset work histories Geospatial information about assets Asset risks Schedules for work on assets Maintenance programmes and procedures Asset master data and information generated through technical change management processes Budgets for work to be done and project cost information Work delivery reports
Continual Improvement	Continual improvement opportunities registered Performance against Asset Management Objectives Results of internal audits and external assessments Outcomes from management reviews Project Plans for Capability Projects

Table 2-20: Asset Management Processes Alignment to Information Requirements

To ensure that information is fit for purpose to meet the requirements above, Centralines asset management service provider has developed **AMS-0007 AMS Asset Information Strategy**. The strategy has four top-level goals:

1. Know what asset information is important to achieving which business goals
2. Know what asset information is held and where it is stored
3. Know the state (quality, completeness, etc) of the asset information held, and
4. Make informed decisions about asset information that appropriately balance the trade-off between asset performance, cost and risk.

There are two main areas that are currently being targeted in the implementation of the strategy:

- identifying and documenting the specific data requirements of key asset management processes, clarifying roles and responsibilities and establishing a Data Quality Dashboard in respect of these, and
- providing a data assurance framework to Capability Projects to support their successful implementation and sustainment.

2.11.2 Responsibility for Asset Information

Centralines' Management service provider's Asset Information Governance Group (AIGG) is a committee established to implement the Asset Information Strategy. They set direction and priorities for asset information improvement. The AIGG is primarily composed of Centralines' Management service provider's Networks and Operations Managers and is chaired by their Asset Information Manager.

The transactional processes for managing asset information are the responsibility of the Asset Information Team within the Asset Management Team. This includes the maintenance of asset attribute information following asset change and management of asset location and connectivity data within Centralines' Management service provider's geospatial information system (GIS).

The responsibility for the maintenance and management of asset information systems and the supporting hardware resides with Centralines' Management service provider's Information Management Group (IMG). There is close collaboration between the asset information and IMG to ensure alignment between the teams. IMG has a representative on the Asset Information Governance Group (AIGG).

2.11.3 Identification of Asset Information requirements

Subordinate to the Asset Information Strategy are the Asset Information Management procedures. These procedures are summarised in Figure 2-12, where each block represents a procedure implemented in the organisation. Together the Asset Information Strategy and procedures represent a well-integrated system for managing asset information to support the achievement of Centralines' AMOs.

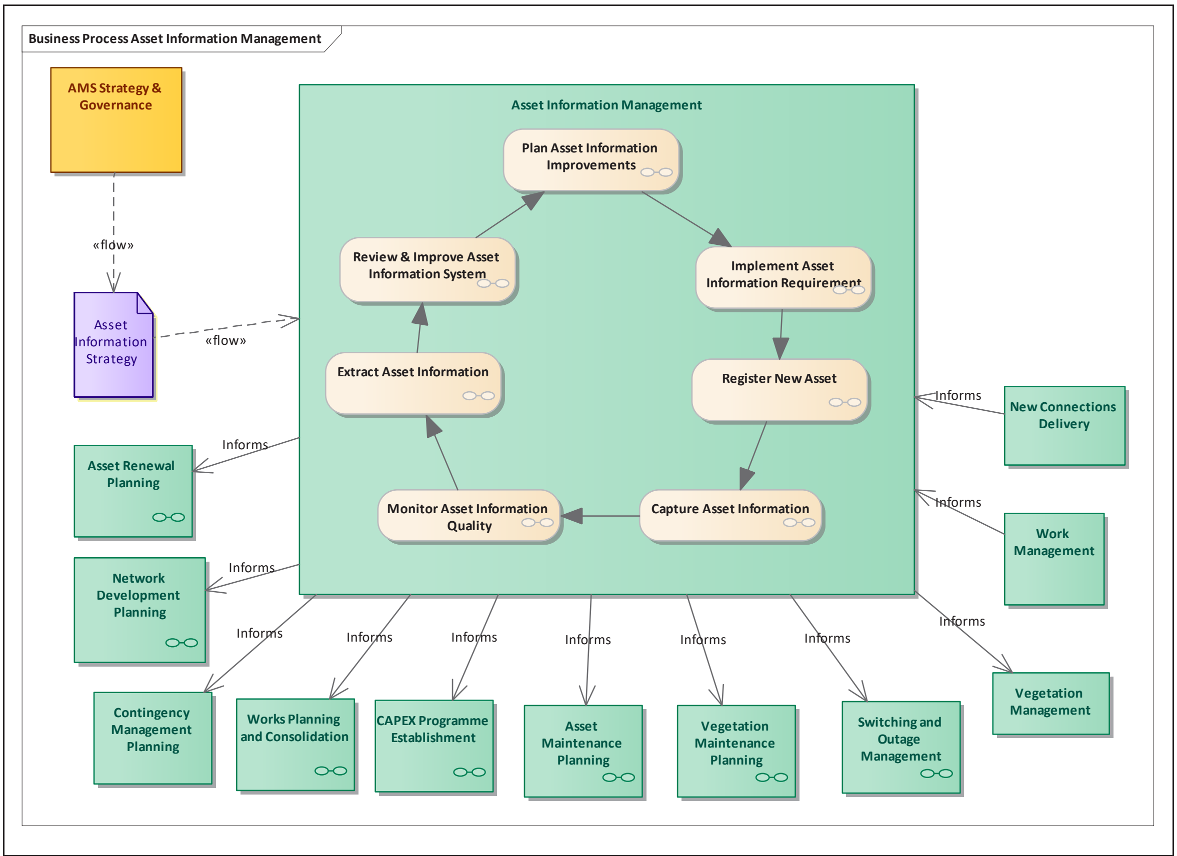


Figure 2-12: Asset Information Management Procedures

The 'Plan Asset Information Improvements' procedure is utilised to identify new asset information requirements to support the lifecycle management of assets. Diagrams for this procedure, and the following procedure that sees new requirements implemented are provided below.

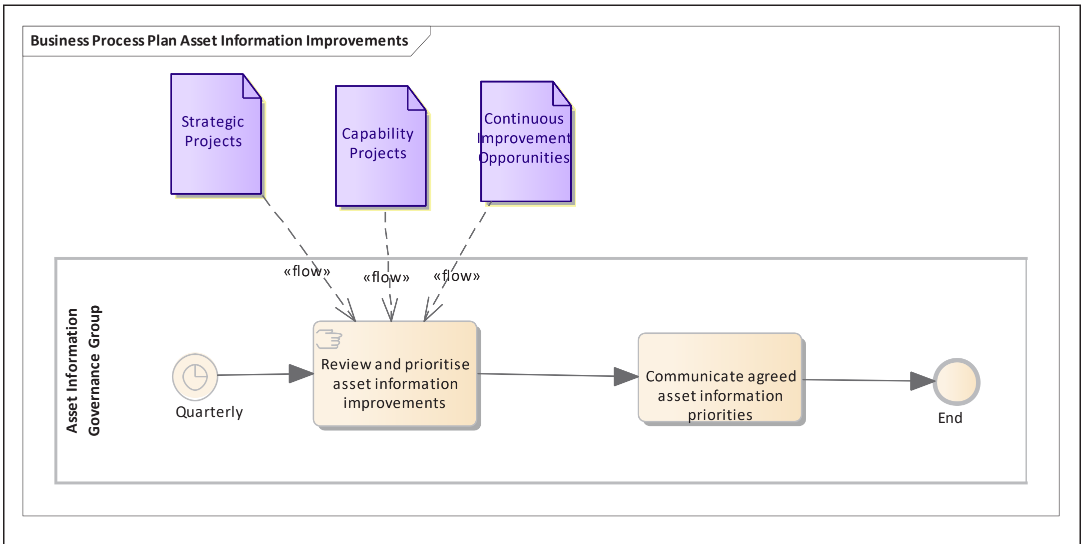


Figure 2-13: Plan Asset Information Improvements

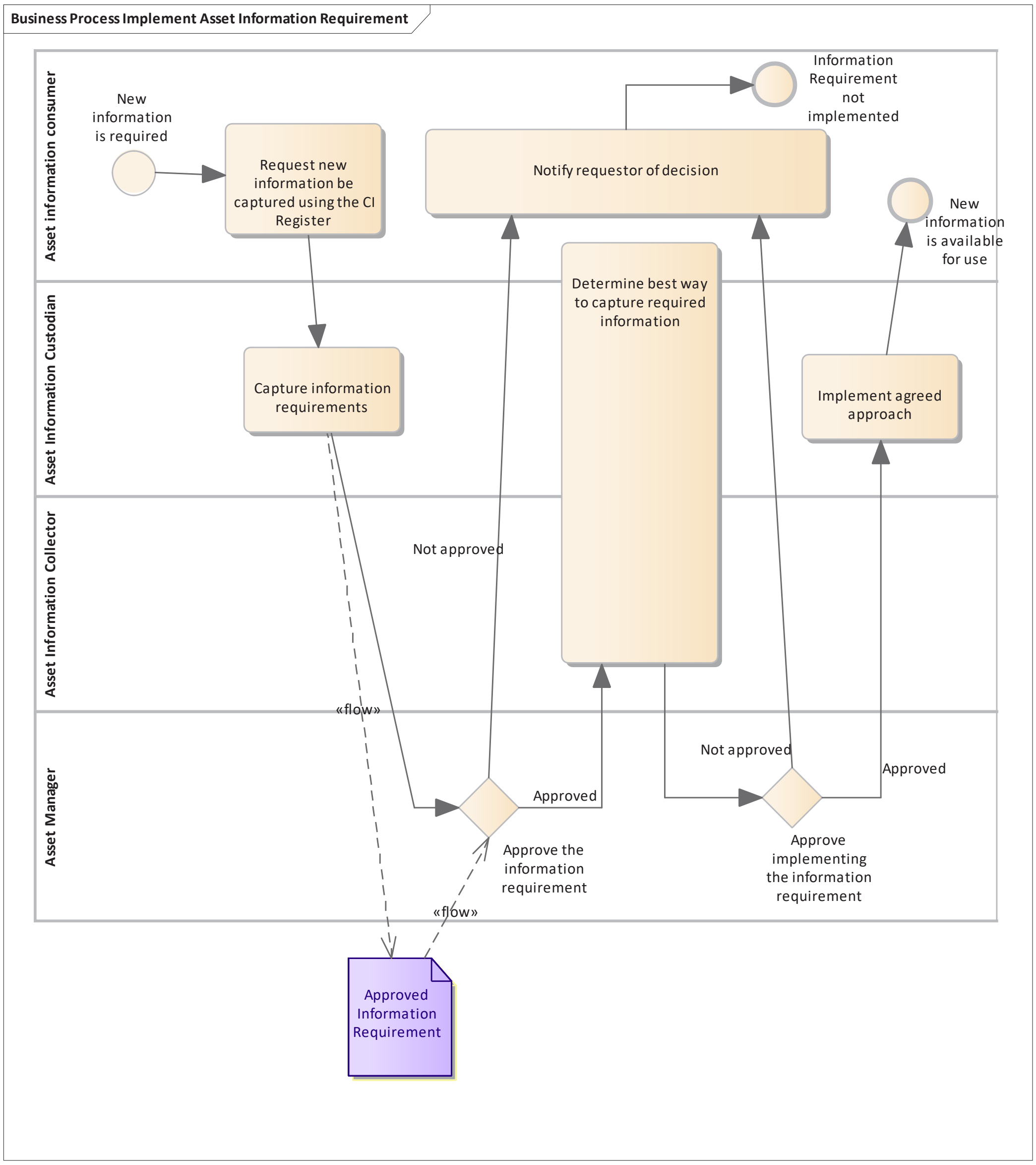


Figure 2-14: Implement Asset Information Requirement

2.11.4 Information Systems

Centralines and their Management service provider utilises a number of systems as repositories for information relevant to asset management, as set out below.

Name of System	Description
ACTIVA EAMS	ACTIVA is Centralines' Management service provider's Enterprise Asset Management System (EAMS). It is built on the BASIX platform provided by EMS solutions. ACTIVA houses 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. ACTIVA also provides works management functionality. This integrates with the asset register module of ACTIVA allowing the recording of asset management interventions against asset records. Finally, ACTIVA masters the interface and interactions with the mobile inspection platform Kern Mobile.
GE Smallworld GIS	The Geographic Information System (GIS) stores records of network assets according to their location and electrical connectivity. This includes the electrical connectivity within substations. 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. ADMS also provides a platform to activate self-healing network schemes. Network optimisation and analysis provides the ability to optimise the state of the network. It identifies 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.
SharePoint DocStore	Document management system used to track, manage and store documents while keeping a record of the various versions created and modified by different users. DocStore houses all controlled documents including standards, and capital project files.

Name of System	Description
OSISoft PI Historian	PI is the primary tool used 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 recorded in PI include switching events, transformer oil temperature, and current and voltage values at measuring points.
Exonet	Centralines stand-alone financial system which is totally independent from Centralines' Management service provider's financial system.
Gentrack	Gentrack is Centralines' Management service provider's Customer Relationship Management (CRM) information system. It provides a platform for consumption and ICP based network billing. Gentrack also manages the new connections and decommissioning process, network tariffs and registry updates.

Table 2-21: Information Systems

These systems provide essential data for risk assessments, investment decision making and performance monitoring functions in the AMS. A range of tools are used to both report from these data sources and to extract data for further analysis. This data and information is of particular importance for Capability Projects.

In addition, staff also manage a number of key spreadsheets with essential asset data, such as issues and future projects to address those issues. Here such spreadsheets are considered critical for the business, then the spreadsheet will:

- have a nominated owner to manage input into the document, and
- be managed within the DocStore system to allow universal internal access to view the data.

Management of the spreadsheet will be specified and controlled within an AMS procedure. One example of this is the Asset Renewal Plan owned by the Asset Manager.

2.11.4.1. Integration of Information Systems

The integration of the key information systems set out above is shown in Figure 2-15. The arrows represent the flow of data and information from one system to another.

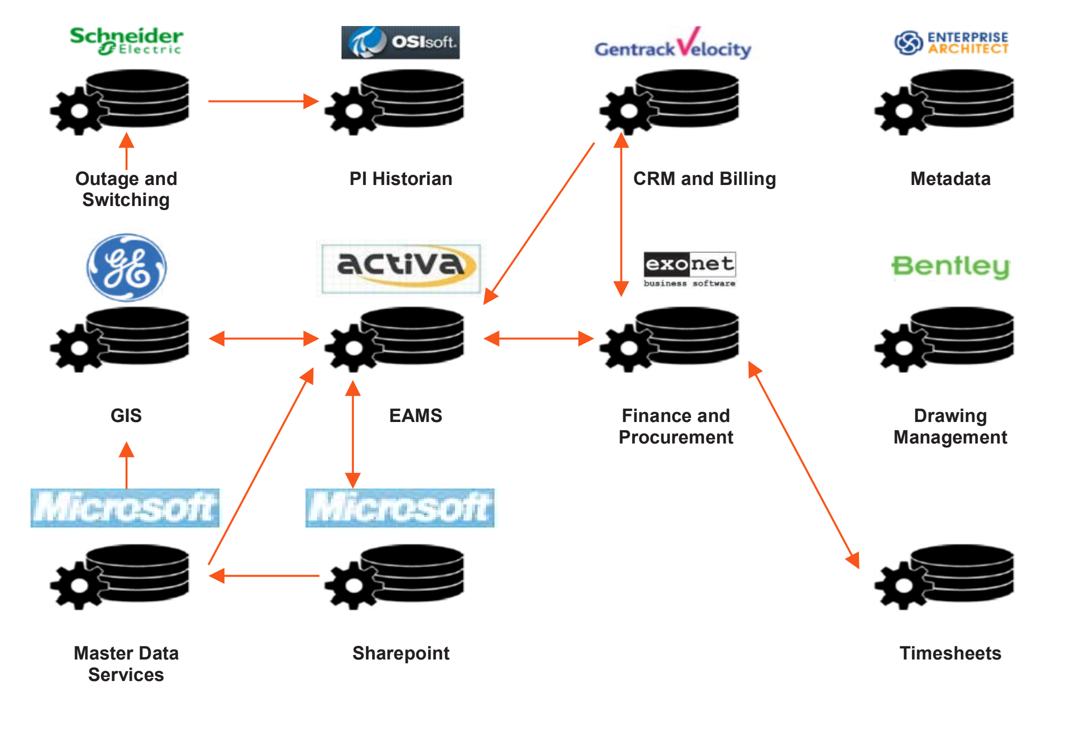


Figure 2-15 Integration of Information Systems

2.11.5 Assuring the Quality and Accuracy of Asset Management Information

To assure that data is suitable for achieving Centralines' business goals, from time-to-time it is 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 this data assurance.

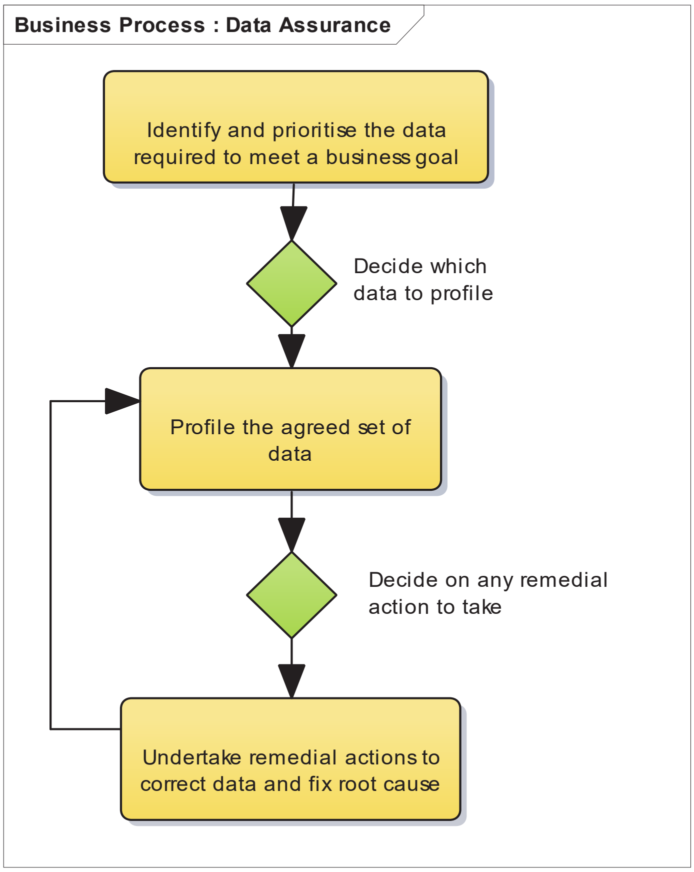


Figure 2-16: Data Assurance Process

When new data requirements are established, part of the procedure for implementing these new requirements is to establish a means of monitoring the quality of the information on an ongoing basis. This is part of the 'Determine best way to capture required information' block in Figure 2-14.

2.11.6 Limitations of Asset Management Data

In order to provide a top-level view of the health of asset information in terms of quality and accuracy, a Data Quality Dashboard (DQD) has been developed. This tool is available on the service provider's intranet, and provides a view of the quality of the information supporting each element of the Asset Management System.

The state of asset information is only known for seven of the 14 capabilities under the 'Plan' and 'Do' sections of the AMS. Once all capability areas are completed, then a holistic view of asset information quality will be available to inform decisions about where to focus improvement efforts.

2.12 Asset Management Processes

2.12.1 Asset Inspections

Inspections and Monitoring Programmes involve the acquisition of information about the condition of assets to enable informed, risk-based decisions about their ongoing maintenance and eventual replacement to be made. As well as this, physical inspections are in some cases required by legislation to provide assurance of the safety and integrity of Centralines' network.

The primary objectives of Inspection and Monitoring Programmes are to:

- Ensure the safety of assets:
  - many of Centralines' assets are situated in public areas, meaning regular inspection is required to ensure that assets are free from damage and are secure, and
  - meet legislative requirements.
- Improve network reliability:
  - reduce unplanned/forced outages affecting customers
  - enable planned repairs or replacement prior to an asset failing in service, and
  - improve network performance.
- Extend asset life:
  - reduce permanent damage to parts, components and equipment, and
  - detect and correct problems as they occur.
- Optimise lifecycle costs and increase return on capital invested:
  - reduce repair and operating costs
  - prevent catastrophic costs
  - reduce overtime
  - reduce parts inventory requirements, and
  - reduce insurance premiums.

Inspections and Monitoring Programmes generate both measurement data as well as metadata (i.e. data about the measurement data). The measurement data may be:

- qualitative data (e.g. condition grades)
- single measurements
- tables of measurements, for example, over an observation period
- commentary about what was observed (e.g. a patch of rust), or
- photographs and other digital imagery.

The metadata may include:

- where the measurements were collected from – this can be either where samples were obtained from or where direct measurements were taken
- when the measurements were collected – the date and time and ambient conditions, and
- who collected the information – the individual, the monitoring device, the specific measurement instrument utilised.

An overview of how an Inspection and Monitoring Programme is developed is provided in Figure 2-17 below.

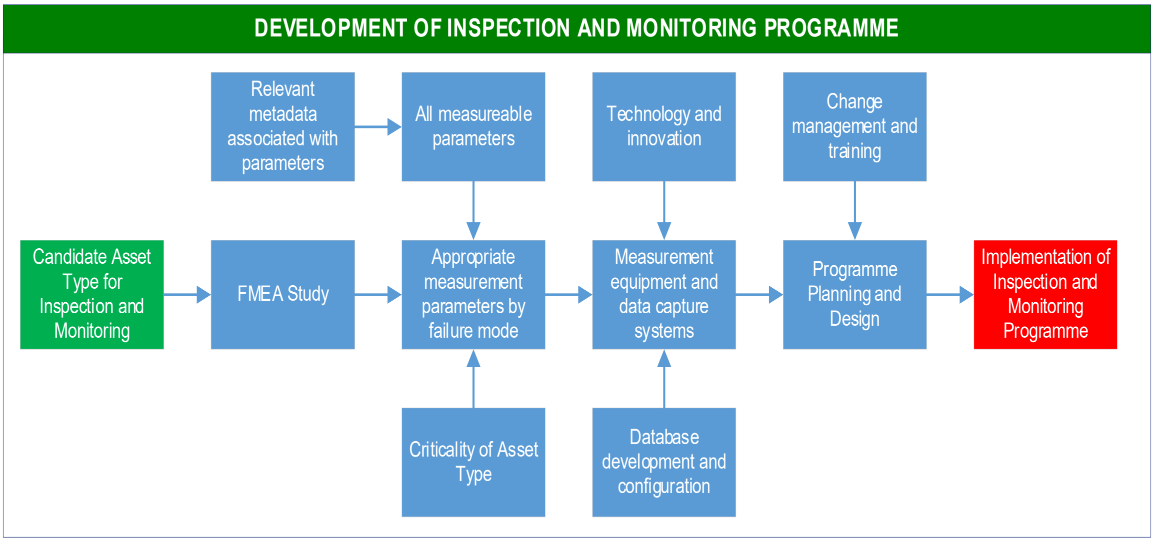


Figure 2-17: Development of Inspection and Monitoring Programme

When considering the Inspection and Monitoring approach for a class of equipment, the following should be considered:

- the design and characteristics of the asset including why inspection and monitoring is required, and what should be monitored in terms of failure modes and consequences
- information about techniques and methodologies that can be used for advanced inspection and condition monitoring, including library information and what is available in the marketplace
- how measurements can be utilised to support condition assessment and estimation of remaining life, and
- the benefits of the overall approach in terms of return on investment and savings associated with prevention of failure.

Where people are required to obtain data, they require standard maintenance procedures (SMPs) which specify the:

- tasks
- quality to be achieved, and
- expectations of what they will deliver when undertaking these tasks.

Examples include the need for cleanliness when taking oil samples for dissolved gas analysis and where to position probes for partial discharge assessment.

Centralines' current Inspections and Monitoring Programmes are summarised in Table 2-22.

Programme	Description
Cable Testing	Tan delta equipment is utilised for diagnostic testing of cables.
Earth Testing	Testing of earthing to ensure the safety and compliance of Centralines' installations.
Feeder Patrols	Inspections of 33kV and 11kV feeders to identify asset degradation as well as vegetation encroachment. Feeder patrols may:

Programme	Description
	• utilise thermo-vision and acoustic technology to supplement visual methods, and • be undertaken from the ground (by vehicle or on foot) or from the air by helicopter.
Ground Mounted Inspections (GMIs)	Inspection of ground mounted assets including distribution transformers and ring main units, including partial discharge testing.
Pedestal Inspections	Inspection of pedestals which may house fuses, joints, communications equipment or sensors to ensure safety and security.
Power Transformer Condition Monitoring	A combination of online monitoring and field-based tests and inspections to maintain awareness of the condition of power transformers.
Zone Substation Inspections	Regular checks of zone substations. There are two levels of inspection that differ in frequency and degree of invasiveness. Techniques including partial discharge testing are utilised.

Table 2-22: Inspections and Monitoring Programmes

2.12.2 Preventative Maintenance

Preventive maintenance is work to ensure that assets continue to fulfil their intended functions in their present operating context, resulting in their service life being optimised. Preventive maintenance procedures are developed through a well-defined analysis involving considerations of the equipment, how it is being operated, and its environment. The successful implementation of preventive maintenance programmes result in the following benefits:

- assets perform consistently through their service lives
- the rate of unexpected failures is minimised
- the service life of assets is optimised
- safety performance is improved with workplace injuries avoided
- SAIDI and SAIFI performance impacts are minimised, and
- legislative requirements are satisfied, including safety, environment and sustainability.

The last benefit is a function of not only avoiding unscheduled downtime, but also optimising the percentage of time an asset is in downtime. It should also be appreciated that preventive maintenance procedures and their application are an essential means for Centralines to assure safe and reliable operations.

The development of preventive maintenance procedures requires:

- an assessment of asset criticality that ranks the criticality of individual assets and components, based on relevant financial and non-financial business consequences of failure modes
- a routine means of identifying which procedures need review or assets are missing appropriate tactics, based on the consequences of equipment failure modes
- the ability to track progress on completing and implementing the procedures needed
- an adequate level of expertise to undertake reviews of the procedures
- engagement with field resources and equipment specialists to cross-check and advise improvements to preventive maintenance procedures, and

- a timely and efficient process to update systems with improved procedures.

The effectiveness of preventive maintenance procedures is assessed by equipment work history and considers:

- the rate of urgent repairs and frequency and duration of scheduled downtime
- the availability of condition information so that condition-based actions may be triggered as needed, and
- the proportion of preventive maintenance is adequate when compared to the need for repairs and condition-based interventions.

2.12.3 Network Development Projects Processes

2.12.3.1 Planning Network Development Projects

The role of Network Development Planning (NDP) is:

- to identify and prioritise risks and opportunities in the network associated with changes in demand, and other customer behaviours and expectations, and
- to propose projects to respond in a way that balances these risks and opportunities with cost and performance over the long term.

Network Development Planning (NDP) has both a strategic and tactical dimension.

Strategically NDP ensures:

- the network is developed according to architectural standards that are robust to uncertainty in future electricity use scenarios and balance cost, risk and performance based upon available information
- customer expectations relating to resilience, quality and demand are understood and translated into appropriate planning criteria, and
- demand-side technology trends are understood along with the implications for the network.

Tactically NDP ensures:

- customer demand at peak periods is met without compromising asset integrity (i.e. thermal overload)
- Centralines' security standards are met
- customers receive conforming power quality (including both under and over voltage, power factor and harmonics), and
- prudent project proposals are identified and specified according to the information requirements of the AMP including:
    - the work to be done on the assets
    - the timing of the work
    - the estimated cost of the work, and
    - the justification for the work, both tactically and strategically.

NDP has two key components:

- Constraint Forecasting, and
- Solution Development.

Constraint forecasting estimates the timing of one or more constraints arising in assets and asset systems, and quantifies the impact of the constraint in financial terms. The resulting risk profile supports the Network Planning Team to develop appropriate project proposals to mitigate risks identified.

Solution development is the process for addressing forecast constraints to ensure the Asset Portfolio can continue to meet stakeholder requirements. The process includes:

- verification of the constraint
- root cause analysis, and
- identification, selection and costing of a suitable solution.

Solutions may be:

- network-based, i.e. acquiring new assets or upgrading existing assets, or
- non-network, i.e. identifying alternative means of addressing constraints.

Non-network solutions may include network reconfiguration or demand-side management.

An overview of the Network Development Planning process is provided in Figure 2-18, showing the two key components. This process is discussed in further detail in the Network Development Planning Section.

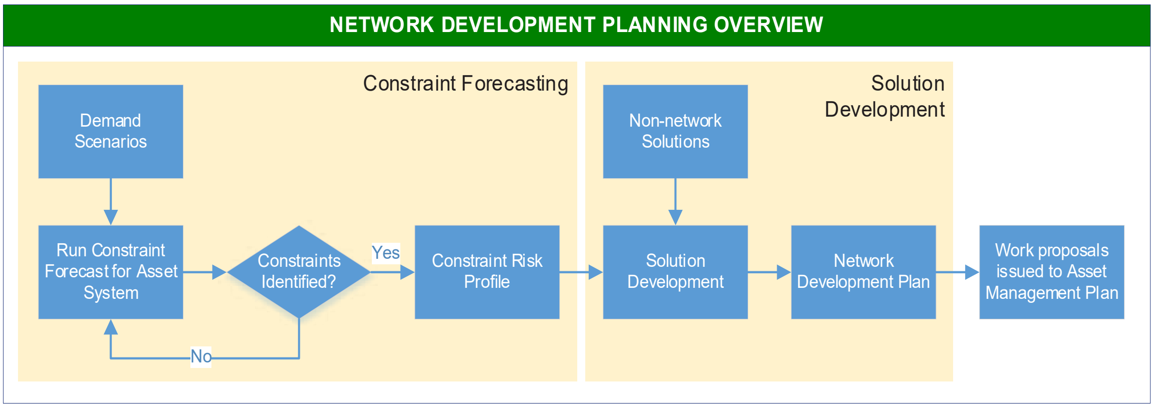


Figure 2-18: Network Development Planning Overview

2.12.3.2 Process for Delivery of Capital Projects

The implementation of Centralines' Capital Projects follows the generic process shown in Figure 2-19.

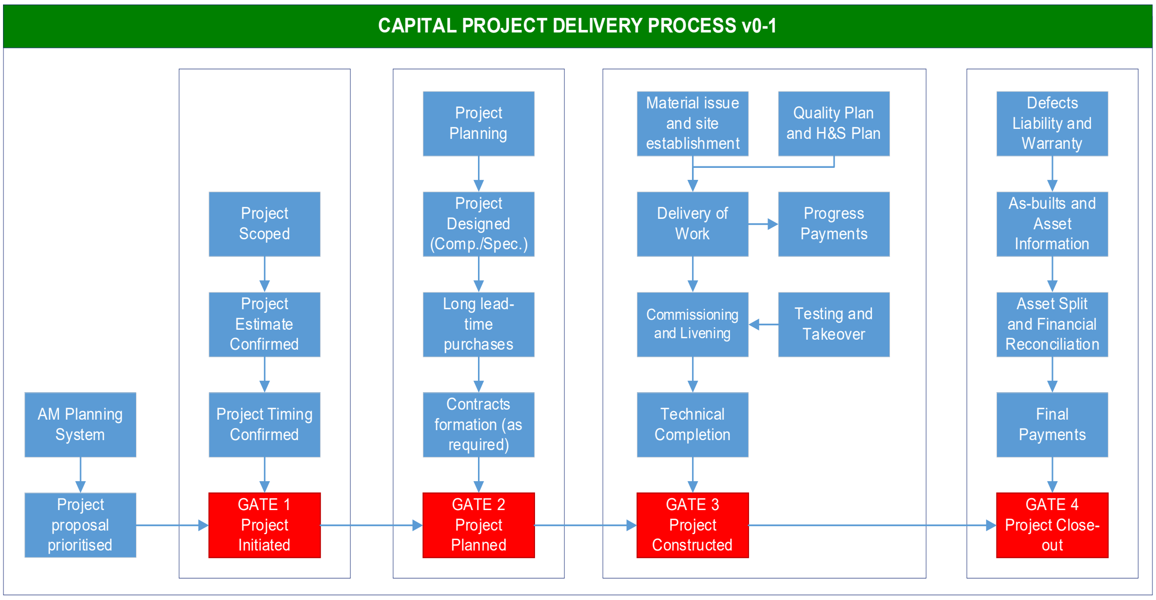


Figure 2-19: Process for Delivery of Capital Projects

This process has the following requirements:

1. A project estimate must be registered in the Asset Management Plan with a reasonable estimate of scope, costs, resources and timeframe.
   a. Before a project may be technically approved, its benefits must be quantified and be credible/justified.
2. A project may proceed to detailed planning once the requirement has been approved by delegated managers of Centralines' Management service provider.
   a. Resources to plan a project may be internal or external, but in any case, will represent a cost incurred in the project budget.
3. A project must be planned and approved before the budget period in which it starts, or special approval to expedite the work must be approved by the General Manager Commercial.
   a. When a project is expedited, a risk assessment is required to determine potential problems with its scope, budget or timeframe for delivery.
   b. When the project costs are approved, the project forms part of the budget for the site in the year in which it commences.
   c. The detailed scope must cover the potential impact on operations.
4. The project will have a project manager appointed.
   a. The Project Manager is required to resource the project, secure resources, confirm the budget and the project schedule.
   b. The Project Manager is accountable for the safety of the project, its environmental compliance, and managing a Safety Plan.
   c. The Project Manager is accountable for the quality of the project and the strategy for commissioning the works at the completion of technical work.
   d. The Project Manager must develop a communications plan, advising stakeholders of the progress of the work plus any requirement for their involvement.
   e. The Project Manager is accountable that a risk register is kept up-to-date, and records all risks and their controls as they become known. This can include all environmental, operations and sustainability risks.

5. The Commissioning Plan must be communicated to all relevant stakeholders well before the scheduled time of commissioning. Stakeholders must have provided their feedback and agreement.
   a. When the project requires change to the configuration of the site, then the Commissioning Plan will cover how the information systems and site procedures will be updated.
6. A review of the quality of the project, including its planning and delivery plus the outcomes in terms of assets and systems commissioned, is required before the project can be closed out.

2.12.4 *Measuring Network Performance*

During 2016/17 the Schneider Advanced Distribution Management System (ADMS) was livened for the Centralines' network. The process for measuring network performance utilising this system is set out below.

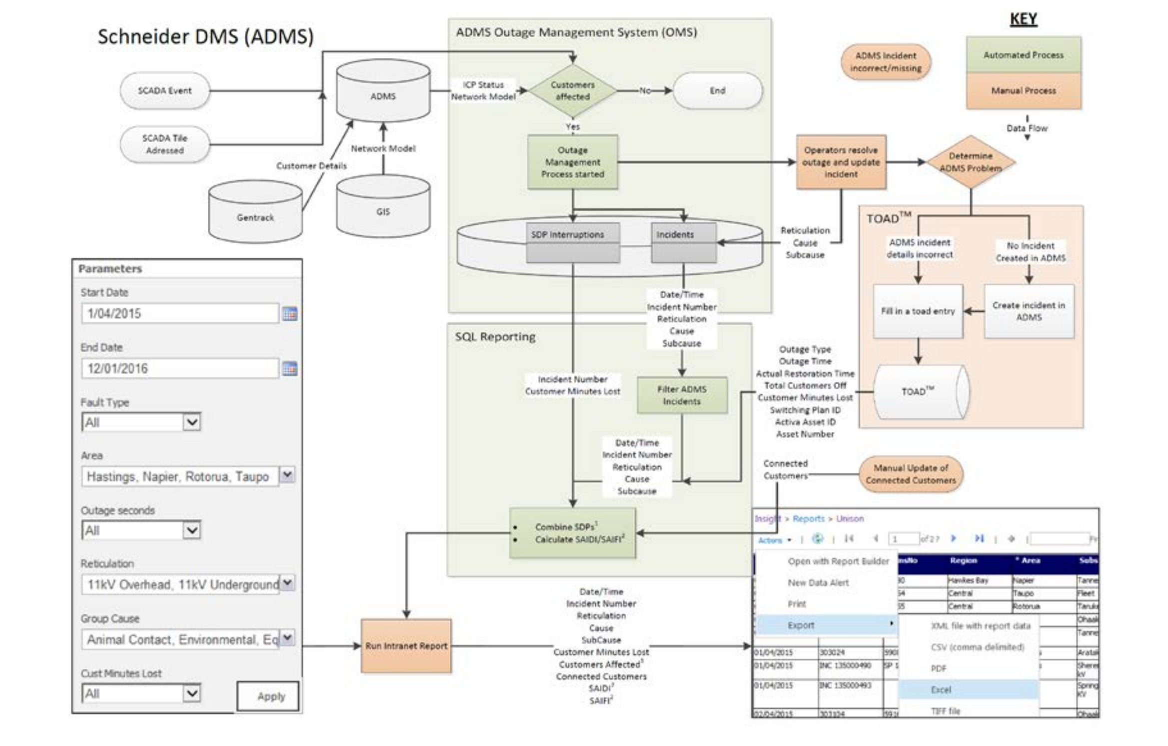


Figure 2-20: Measuring Network Performance

2.13 Documentation, Controls and Review Processes

2.13.1 *Documentation*

Centralines has adopted and utilises the majority of their Management service provider's suite of controlled documents to support effective management of the organisation. The Controlled Document System and associated processes ensure that documents are accessible, current and appropriate for use. The Controlled Document System is a specially managed environment within the Document Management System, DocStore. This system is managed by the Centralines' Management service provider's Technical Documentation Specialist within the Business Assurance Group.

A controlled document may be modified, or a new one added when a gap is identified to define a specific asset management process or procedure.

Internal audit processes require access to these documents. They are used to baseline any difference between what Centralines intends by way of asset management, and what is actually happening within the organisation.

Corporate documented information is held within the Controlled Document System in the following categories:

- Asset Management System governance (AMS series)
- Commercial (CM series)
- Contracting (SD series)
- Corporate (FC series)
- Emergency Plans
- Health and Safety (HS series)
- Information Management (IT series)
- Network Standards (NK series)
- Operating Standards (OS series), and
- Standard Operating Procedures (SOPs).

Key asset management documents including the Asset Management Policy, and the subordinate documents that specify AMS processes such as Asset Management Planning are managed within the AMS series. These documents along with key technical standards, plans and reports are set out in the AMS document framework in Figure 2-21.

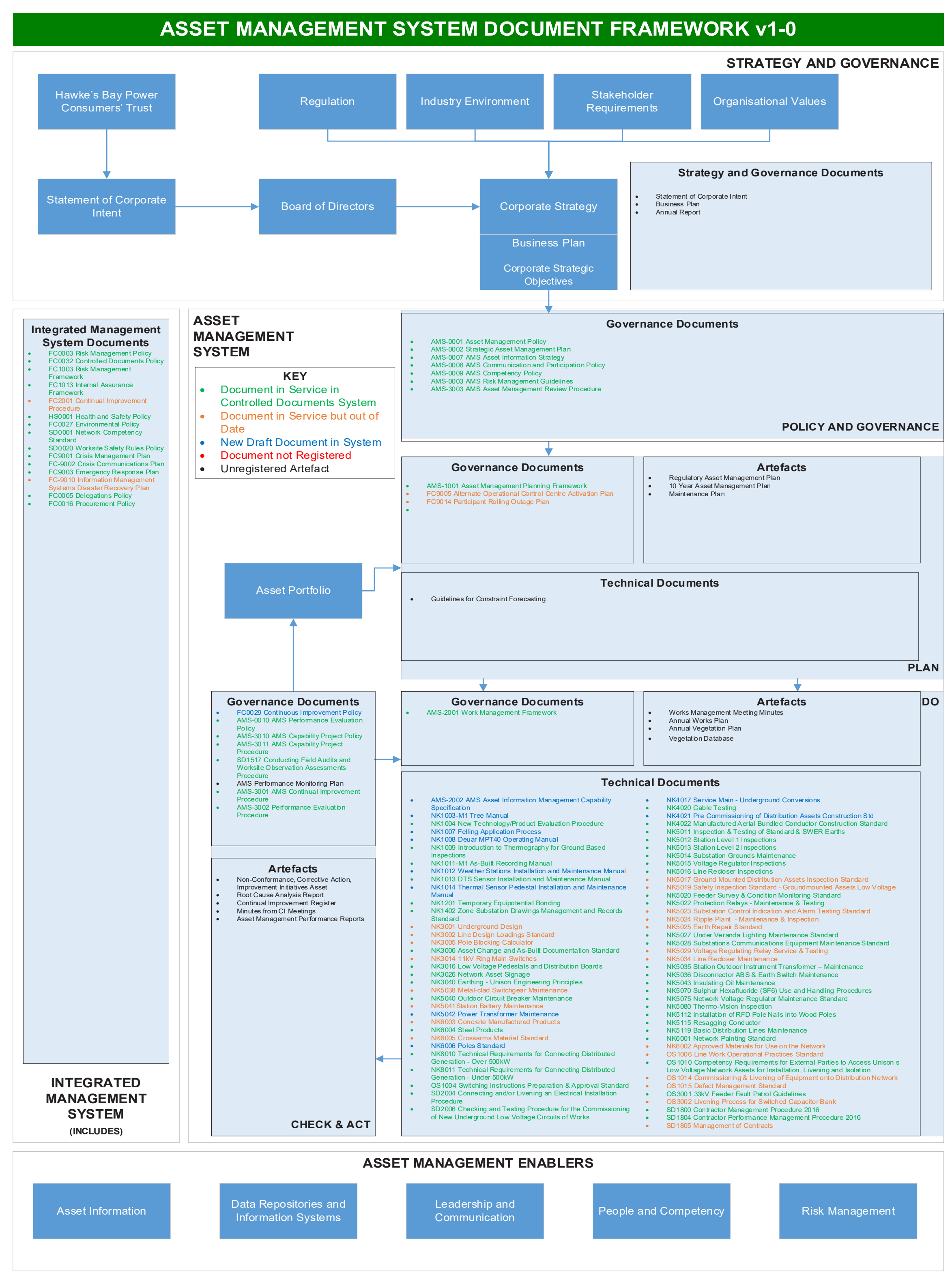


Figure 2-21: AMS Documentation Framework

Technical documents including network policies and standards and operating standards are managed within the NK, OS and SD series. These documents are supplemented with SOPs and Safety Alerts, which are often issued as an interim measure before changes are incorporated within primary technical documentation.

The Centralines' Management service provider's Networks Standards Team, within the Asset Management Team are responsible for the development, maintenance and continual improvement of technical documents, as well as associated communication and training requirements.

The Networks Standards Team work in close collaboration with the Technical Documentation Specialist to ensure conformance of technical documents with **FC0032 Controlled Documents Policy**.

The Centralines' Management service provider's Asset Performance Manager chairs the AMS Controlled Document Governance Group. This group ensures AMS controlled documents are fit for purpose and resources are efficiently deployed to manage these documents.

Registration of issues in the Continual Improvement Register referred is the process by which the Network Standards Team is notified of a requirement to add or adjust technical documents.

Documents of external origin relevant to the AMS fall into four main categories. The management process for each category is specified in table below.

Document Category	Management Process
External standards	Managed through a subscription with SAIGlobal for the standards required by the Centralines' Management service provider's Networks Standards Team.
Legislation, regulation and codes of practice	Managed through a subscription with LexisNexus by the Management service providers' Senior Legal Counsel. Centralines' employees are advised to access current legislation and subordinate regulation through the New Zealand Government service at www.legislation.co.nz.
Contracts, consents, easements and other binding documents	Managed through service providers contracts register by the Administration Team.
Original equipment manufacturer (OEM) documentation	Electronic records are stored with the project file on DocStore by the responsible Project Engineer. New hardcopy and legacy documentation is filed in the East Wing of the service provider's offices by the service provider's Asset Specialists Technical Lead.

Table 2-23: Documents of External Origin

2.13.2 Control of Processes

Control of processes within the Asset Management System is achieved as follows:

- Each process has an assigned Process Owner who is accountable to the General Manager Networks and Operations for its:
  - specification and documentation
  - implementation
  - monitoring for compliance, and

  - continual improvement.
- The Process Owner is supported through delegation to the management representative for the AMS.
- Subject Matter Experts (SMEs) who are people who work in the process, are called upon to develop, review and improve controls such as standards and procedures, training materials and performance measures.
- The Process Owner has the mandate to initiate a review of process controls as well as internal audit of processes. Each of these tasks is delegated to the management representative for the AMS for coordination. A review of process controls involves an evaluation of whether the controls are appropriate, given the risk profile of the process. Internal audit involves an assessment of how well the process is performing and whether procedures are being conformed to. The approaches to review of process controls and internal audit is set out in a simplified form in Figure 2-22: Control of the Asset Management Process.

These processes apply both to internal and outsourced processes of the AMS.

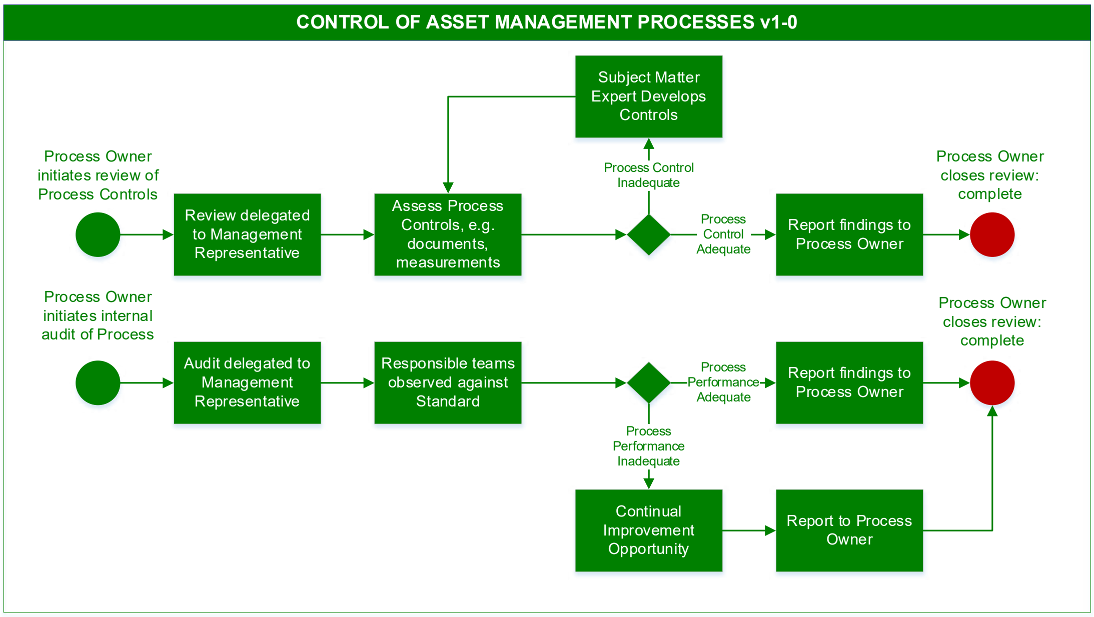


Figure 2-22: Control of the Asset Management Process

Where conformance issues or other process performance shortcomings are identified, then a Continual Improvement Opportunity may be raised in the Continual Improvement Register.

2.13.3 Management Review

Regular top management review of the various components of the AMS is undertaken to assure its ongoing fitness-for-purpose and effectiveness. The service provider's General Manager Networks and Operations is responsible for management review, with coordination delegated to the service provider's Network Strategy Manager. The process for management review is documented in **AMS-3003 AMS Management Review Procedure**.

The following items are subject to management review:

1. the health of the AMS
2. continuing suitability of the Asset Management Policy
3. continuing suitability of the Asset Management Objectives
4. the Asset Management Strategy
5. changes in external and internal issues and risks relevant to the AMS
6. incidents that have occurred and remedial actions that have been taken
7. the Asset Management Plan
8. Lifecycle Delivery performance, including the quality of, and progress through works programmes
9. the Continual Improvement Register
10. the performance of active Capability Projects
11. outcomes from recent internal audits
12. assessments and audits by external bodies
13. customer and other stakeholder feedback, including complaints, and
14. recommendations for improvement including other factors, such as resources and training.

The 14 items listed above are addressed through five management review meetings of varying frequency, as specified in Table 2-24.

Meeting	Frequency	Chair	Items Covered
AMS Governance Meeting	Annually	General Manager Networks and Operations	1, 2, 3, 4
AMP Review Meeting	Six-monthly	Network Investment and Delivery Manager	7
N&O Strategic Risk Committee Meeting	Quarterly	Network Strategy Manager	5, 6
Work Management Monthly Meeting	Monthly	Network Investment and Delivery Manager	8
Continual Improvement Meeting	Monthly	Network Strategy Manager	1, 9, 10, 11, 12, 13, 14

Table 2-24: Summary of Management Reviews

Meeting documents including briefing notes, performance information and minutes are stored within the Management Review SharePoint library at the address provided under Other References below.

2.13.4 Internal Audit

The Centralines’ Business Management System Framework (BMSF) referred to earlier includes a strong audit capability within the Internal Assurance Framework. This framework from Centralines’

Management service provider is applied to some of the key business processes that have been adopted and are being used by the organisation. In the Asset Management System, this capability has three main purposes.

1. Assess the competency of the various teams in their functional roles within the AMS.
2. Test conformance to planning and decision-making processes and the execution of activities.
3. Provide a basis for identification of corrective actions and continual improvement opportunities.

The Internal Audit process is set out below.

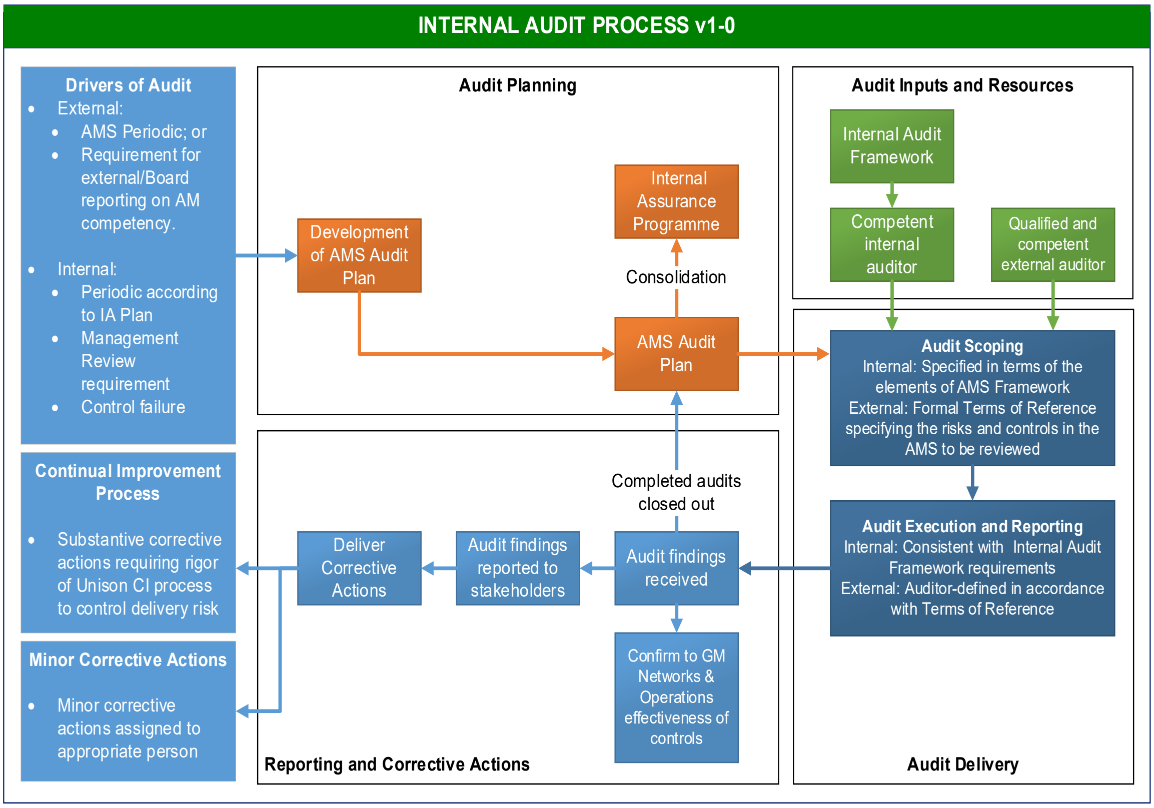


Figure 2-23: Internal Audit Process

A three-year Internal Audit Plan has been developed collaboratively between the service providers:

- Group Risk Manager who is responsible for enterprise internal assurance, and
- the Network Strategy Manager who is the management representative for the AMS.

This plan links planned internal audits to the controlled documentation specifying processes of the AMS, and the relevant clause of ISO 55001.

The scope of the periodic internal audit is limited to conformance of teams with the specified processes. This is appropriate given that the processes have been developed to meet the requirements of ISO 55001, and that this is tested through the External Audit process for certification to the standard.

For each of the internal audits specified in the plan, audit tools are progressively being developed. The audit tools include checklists and open-ended questions that probe the effectiveness of the implementation of processes and systems, and support capabilities, including training and resourcing.

2.13 4.1 Reporting of Internal Audit Outcomes

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

The Asset Management Policy is part of Centralines' controlled document framework and therefore is available on the corporate intranet. Any updates to the policy are communicated to the business.

2.13.4.2 Reporting of Internal Audit Outcomes

The outputs of all internal audits are presented to the service provider's Network Strategy Manager. If the Network Strategy Manager is satisfied that the audit has fulfilled the Audit Plan or Terms of Reference the report will be issued to relevant stakeholders, including the Centralines' Management service provider's Group Risk Manager. Where the driver for the audit has been Executive Management, the Board or external stakeholders, the service provider's Network Strategy Manager will engage with the service provider's General Manager Networks and Operations to establish the next steps for reporting.

Process Owners of the process being audited are responsible for raising corrective actions and opportunities for improvement in the Continual Improvement Register.

2.14 Communication of Asset Management Strategy and Objectives

Asset management outcomes are communicated formally at Centralines through the mechanisms listed below.

- 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.

2.15 Determination Reference Mapping Table

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

Table 2-25: Determination Reference Mapping Table

3

SERVICE LEVELS

CONTENTS

3. SERVICE LEVELS

3.1 Introduction to this Section

Centralines uses monitoring, measurement and analysis processes to evaluate its performance as an asset manager. This provides a check on whether stakeholder requirements are being met, and therefore value is being realised from the Asset Portfolio. It also supports continual improvement of the Asset Portfolio and asset management.

The Asset Management Objectives (AMOs) and associated performance measures specified in Section 2 provide coverage of stakeholder requirements and expectations. They are therefore utilised as the basis for identifying what must be measured and monitored to ensure performance levels are appropriate.

3.2 Performance Evaluation Overview

The purpose of performance evaluation is to:

- determine what needs to be monitored and measured
- determine the best frequency and method of measurement, and
- determine how and when the results will be analysed and evaluated.

Performance evaluation covers the evaluation and reporting of:

- asset performance
- asset management performance, and
- the effectiveness of the Asset Management System (AMS).

In summary, performance evaluation reports on whether the needs and expectations of stakeholders of the Asset Management System are met.

3.3 Service Levels Overview

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

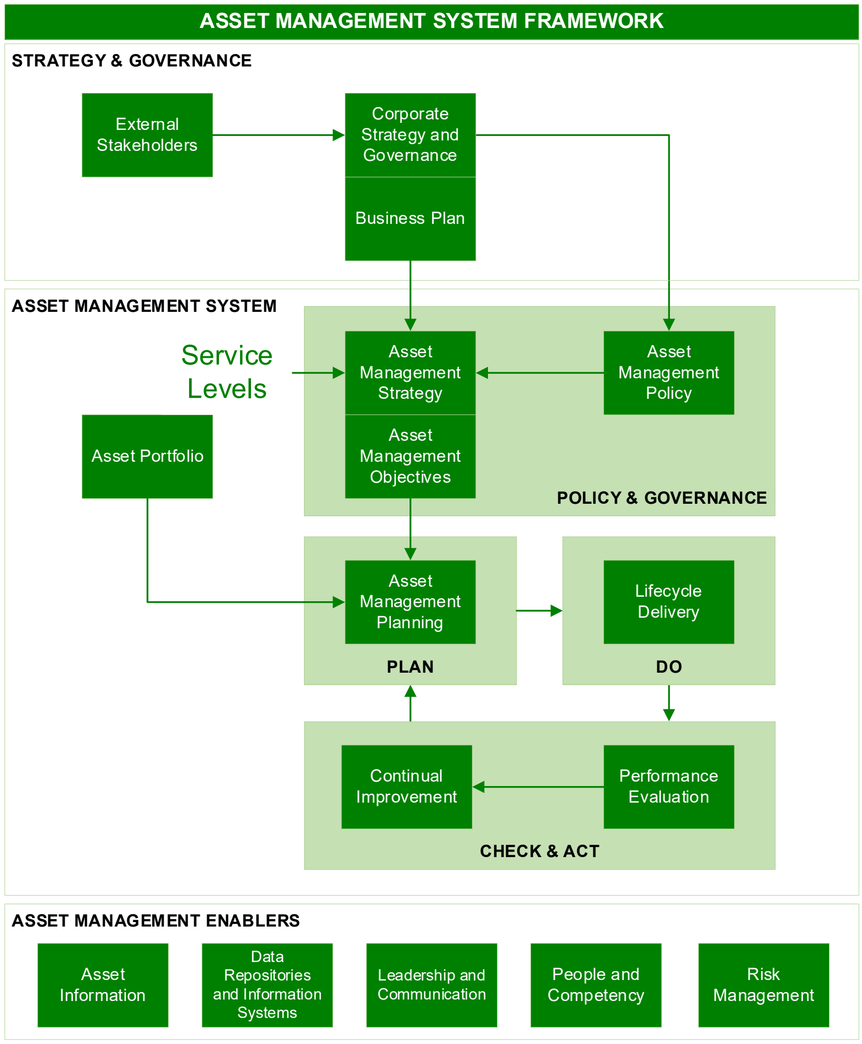


Figure 3-1: AMS Framework

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
- directly aligned to Centralines' 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 any requirements contained within the Electricity Distribution Information Disclosure Amendments Determination 2017.

3.4 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.

Figure 3-2: Service Level Planning and Development

3.5 Service Level Framework

Asset Management Objective	Service Level	Unit/Type	Service Level Targets				
			2018/19	2019/20	2020/21	2021/22-22/23	2023/24-27/28
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

Asset Management Objective	Service Level	Unit/Type	Service Level Targets				
			2018/19	2019/20	2020/21	2021/22-22/23	2023/24-27/28
	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)	$1,710	$1,710	$1,710	$1,710	$1,710
	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	≥ 2 rolling	≥ 2 rolling	≥ 2 rolling	≥ 2 rolling	≥ 2 rolling
	Operating expenditure per ICP	$ (nominal)	$474	$474	$481	$488-$495	$502-$530
	Faults per 100km of network	Total	6.4	6.4	6.4	6.4	6.4

Table 3-1: Service Level Framework

3.6 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.

3.6.1 Accidents Causing Harm to a Member of the Public

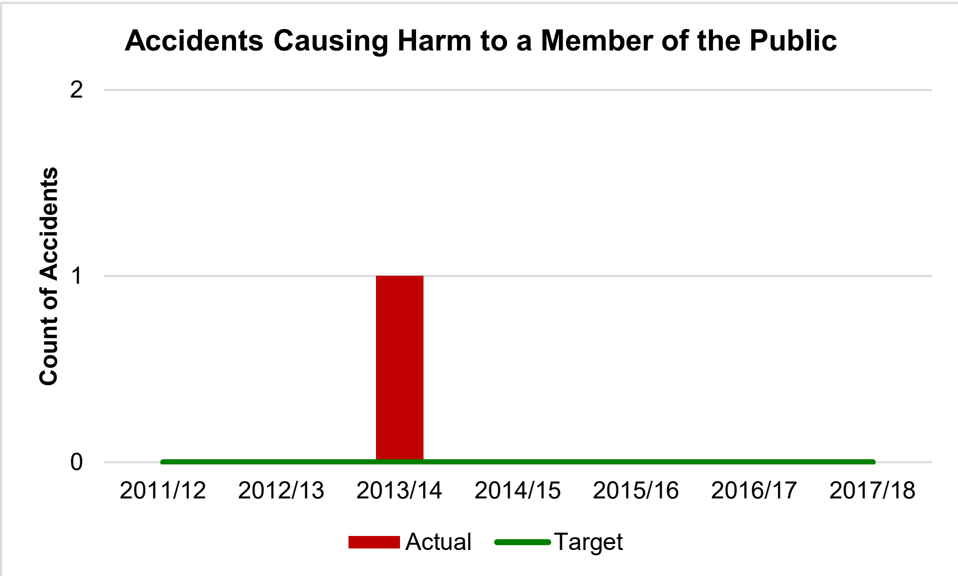
Type of Service Level	Health and Safety
Description	Health and safety is Centralines' foremost consideration, and the business is constantly striving to improve its performance in this area through initiatives including: • the upgrading of its health and safety management systems • training of employees 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.
Justification for targets	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.
Historical context	 *Figure 3-3: Historical Context for Accidents Causing Harm to Member of Public Service Level Target*

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

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

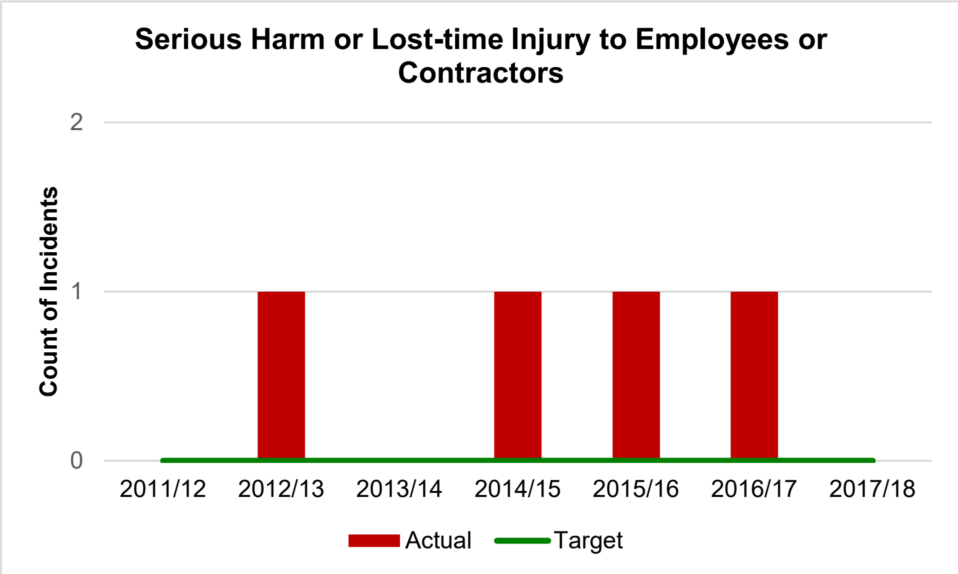
Type of Service Level	Health and Safety
Description	This service level has been implemented to measure the number of serious harm or lost-time injuries (LTIs) incurred by Centralines' employees or contractors.
Justification for targets	Centralines strives to provide a safe and healthy workplace for its 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

3.6.3 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).

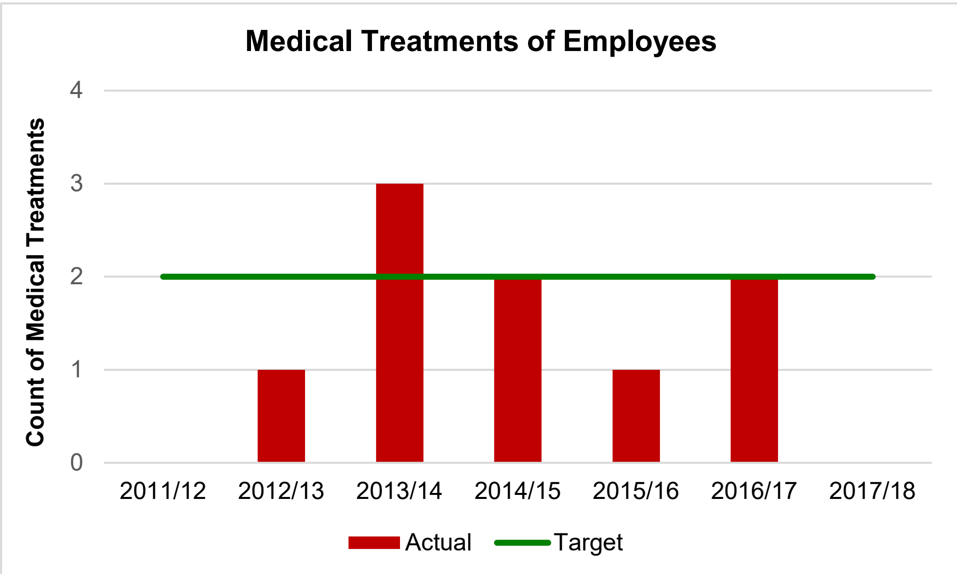
The definition of medical treatments in the Centralines’ context is recorded in the controlled document HS5000 Incident Accident Management Procedure.
</td></tr>
<tr><td>Justification for targets</td><td>The targets for this service level are based upon Centralines’ corporate goal of zero LTIs and to 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>

3.6.4 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 its 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

3.6.5 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 139.3 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.

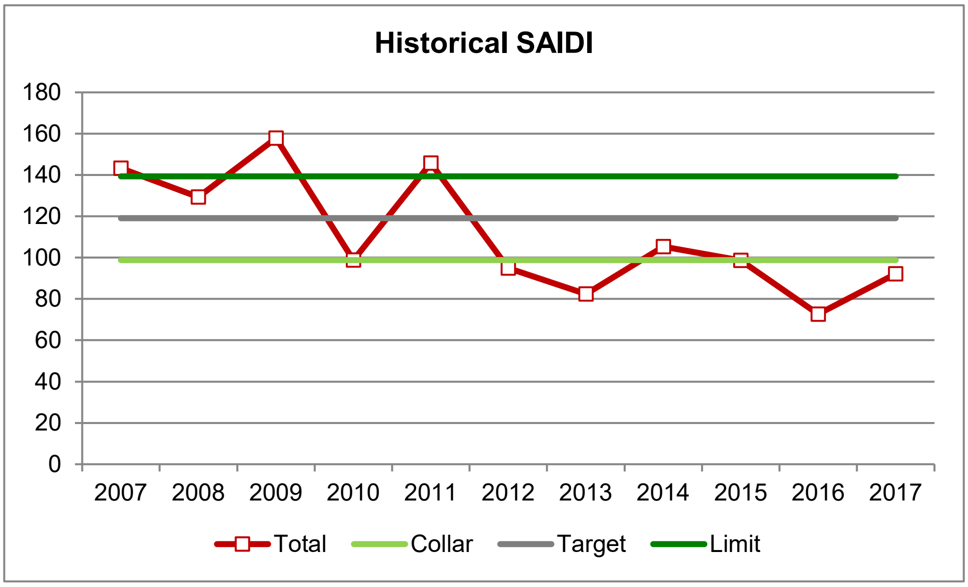
Type of Service Level	Consumer Oriented and Asset Performance, Efficiency and Effectiveness
Historical context	The beginning of the new regulatory period in 2015/16 saw a number of changes to the DPP in relation to quality regulation. One of these changes was that the impact of planned outages is now 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 3-6.  *Figure 3-6: Historical Context for SAIDI Service Level*

Table 3-5: SAIDI

3.6.6 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 4.20 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

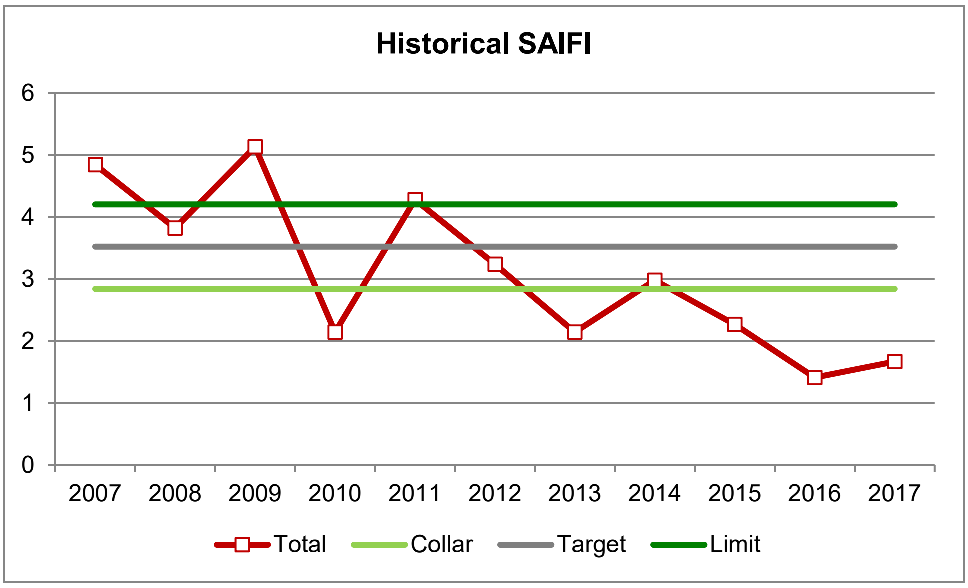
Type of Service Level	Consumer Oriented and Asset Performance, Efficiency and Effectiveness
	poorer network performance than required. On the other hand, SAIFI performance consistently below the collar might imply that the EDB is over-investing to deliver performance in excess of what customers require. 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

3.6.7 Revenue per ICP

<table>
<tr><th>Type of Service Level</th><th>Consumer Oriented and Asset Performance, Efficiency and Effectiveness</th></tr>
<tr><td>Description</td><td>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.</td></tr>
<tr><td>Justification for targets</td><td>Centralines' 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).</td></tr>
<tr><td>Historical context</td><td>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).

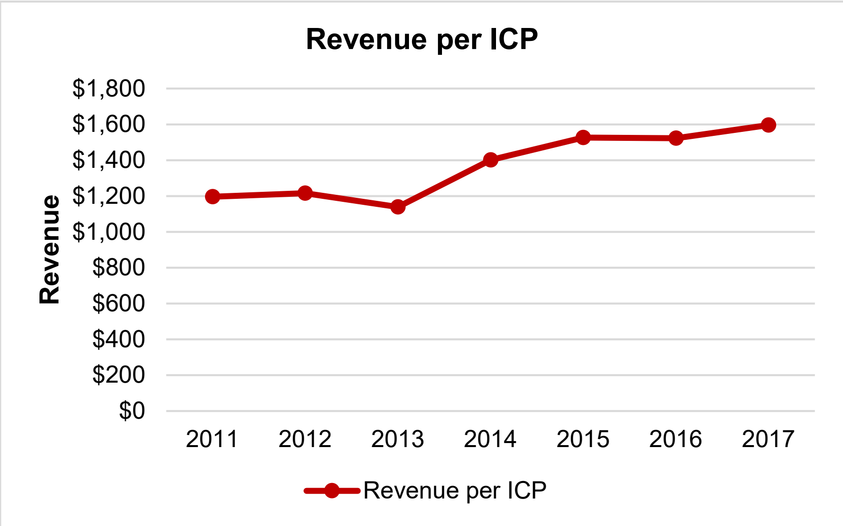



Figure 3-8: Historical Context for Revenue per ICP Service Level</td></tr>
</table>

Table 3-7: Revenue per ICP

3.6.8 Restoration of Supply for Unplanned Interruptions

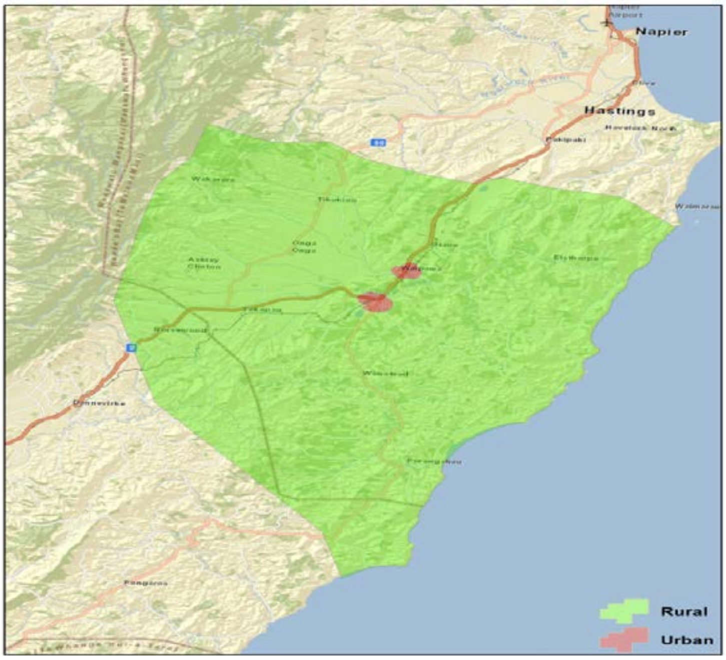
Type of Service Level	Consumer Oriented
Description	This service level is a measure of the speed of Centralines' response to unplanned interruptions that do occur. The service level considers the number of outages that exceed a certain duration threshold per annum. The targets for this service level 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

3.6.9 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 confirmed two-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

3.6.10 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 (excluding sponsorship and business development costs) 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

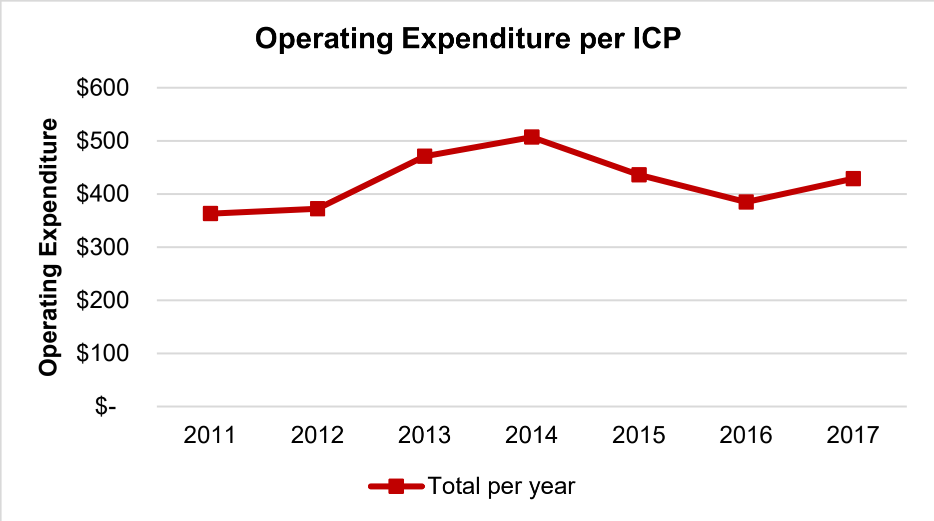
Type of Service Level	Asset Performance, Efficiency and Effectiveness
	material values of avoided or deferred investment and reduced maintenance requirements.
Historical context	Over the last five years, Centralines has invested in additional activities that will produce longer-term cost efficiencies. 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

3.6.11 Faults per 100km of Network

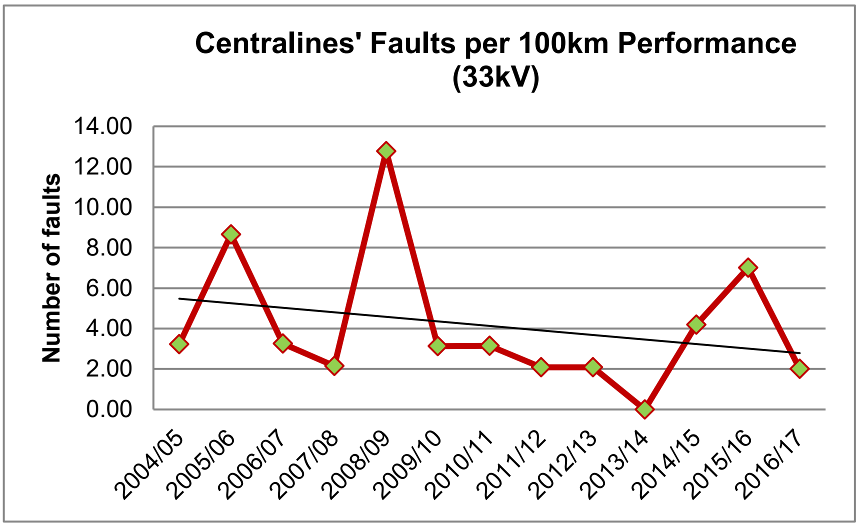
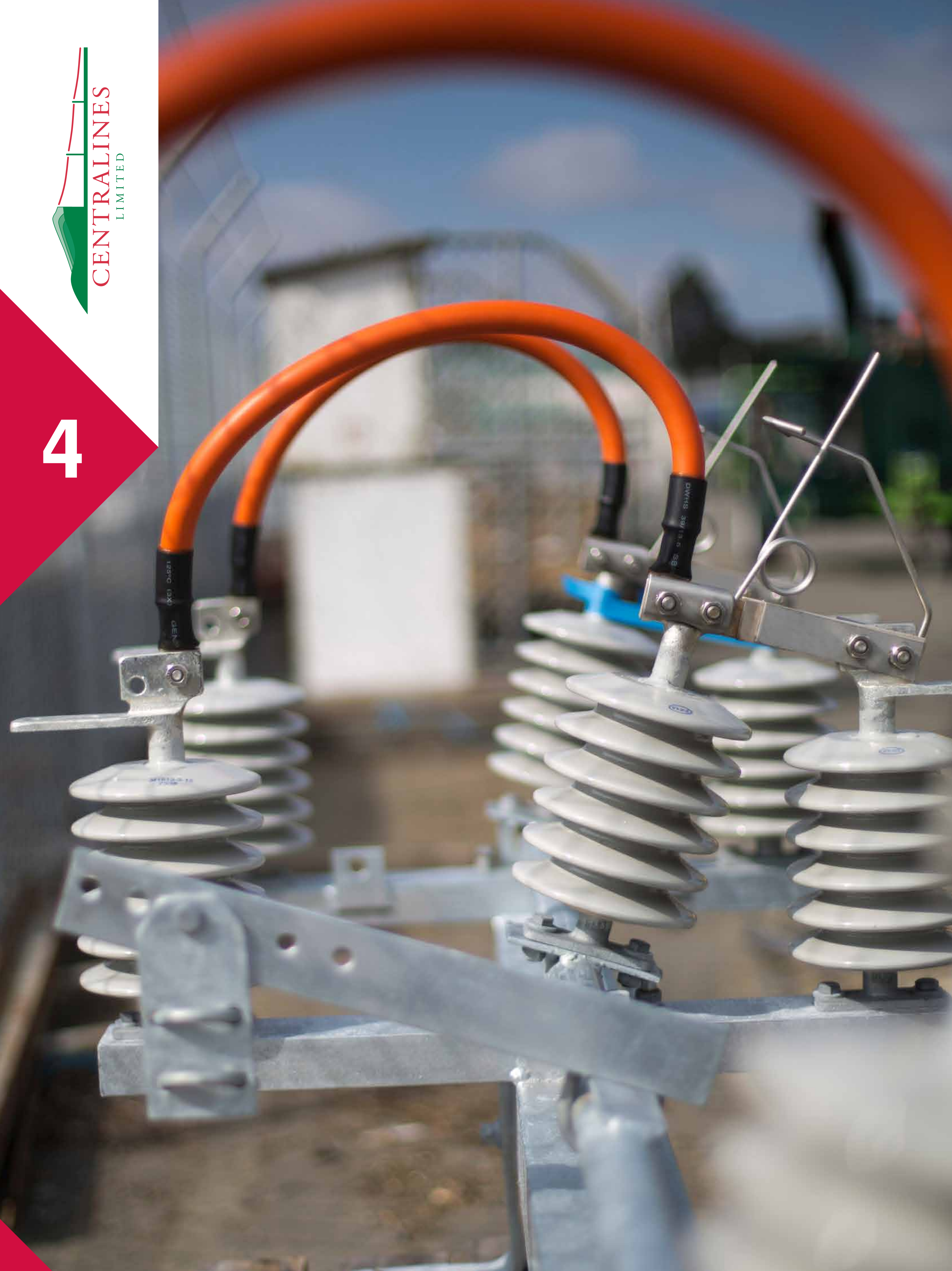
Type of Service Level	Asset Performance, Efficiency and Effectiveness
Description	Faults per 100km of network is a service level that provides a measure of the reliability of Centralines' networks, and therefore the quality of its asset management practices. Reducing the number of faults occurring directly 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 Performance Evaluation Overview 3.3 Service Levels Overview 3.4 Service Level Planning and Development 3.5 Service Level Framework	5, 6, 7 including 7.1, 7.2
3.6 Further Detail on Service Levels	8, 9, 10

Table 3-12: Determination Reference Mapping Table



4

NETWORK DEVELOPMENT PLANS

CONTENTS

4. NETWORK DEVELOPMENT PLANS

4.1 Introduction to this Section

This section provides an overview of how Centralines conducts network development planning and continually improves its network development programme. It demonstrates 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.

4.1.1 Network Overview

Centralines owns and operates network assets across the Central Hawke's Bay region. These assets cover an area of 3,334 km^2, aligning with the boundaries of the Central Hawke's Bay District Council, and serve approximately 8,500 customers. Supply is received via a single Transpower Grid Exit Point (GXP) at Ongaonga.

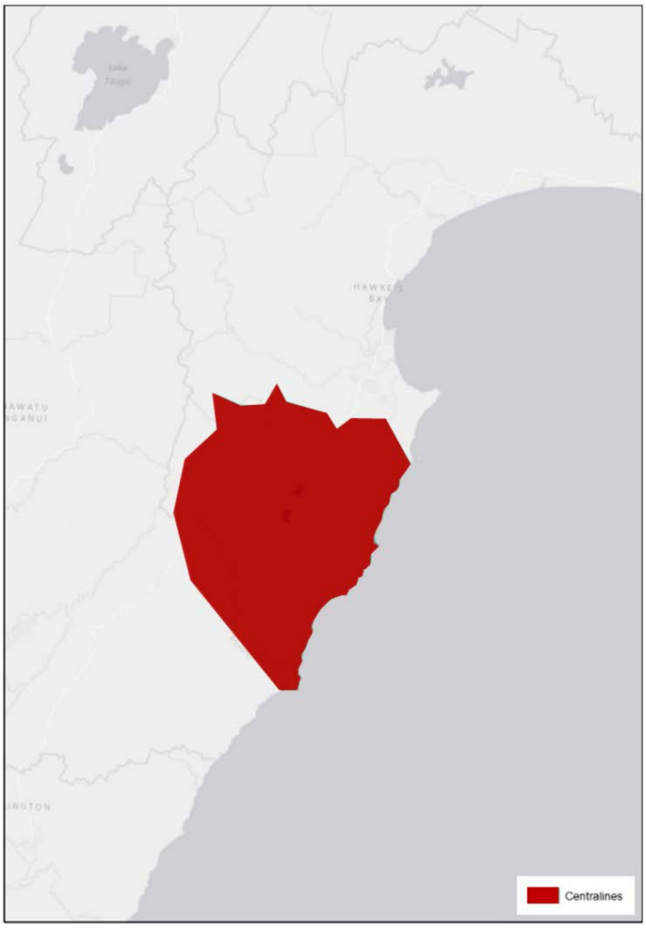


Figure 4-1: Map of the Centralines' Network

4.1.1.1 Load Characteristics

The load is a mix of agricultural, industrial, residential and commercial. Because 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 1% of customers currently have distributed generation connected to the grid. At these levels it does not have a material impact on the load.

4.1.1.2 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 has two large customers that represent approximately 25% of the demand on the network. These are Silver Fern Farms at Takapau and Ovation Limited at Waipukurau.

4.1.1.3 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 30MVA 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.

4.1.1.4 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 4-1: Peak Demand and Total Energy Delivered Measured at GXP

4.1.1.5 Sub-transmission Network

Urban areas are supplied by a meshed sub-transmission network that provides 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 4-2 provides geographical views of the sub-transmission network. Table 4-2 lists the capacity and security of the zone substations across the network.

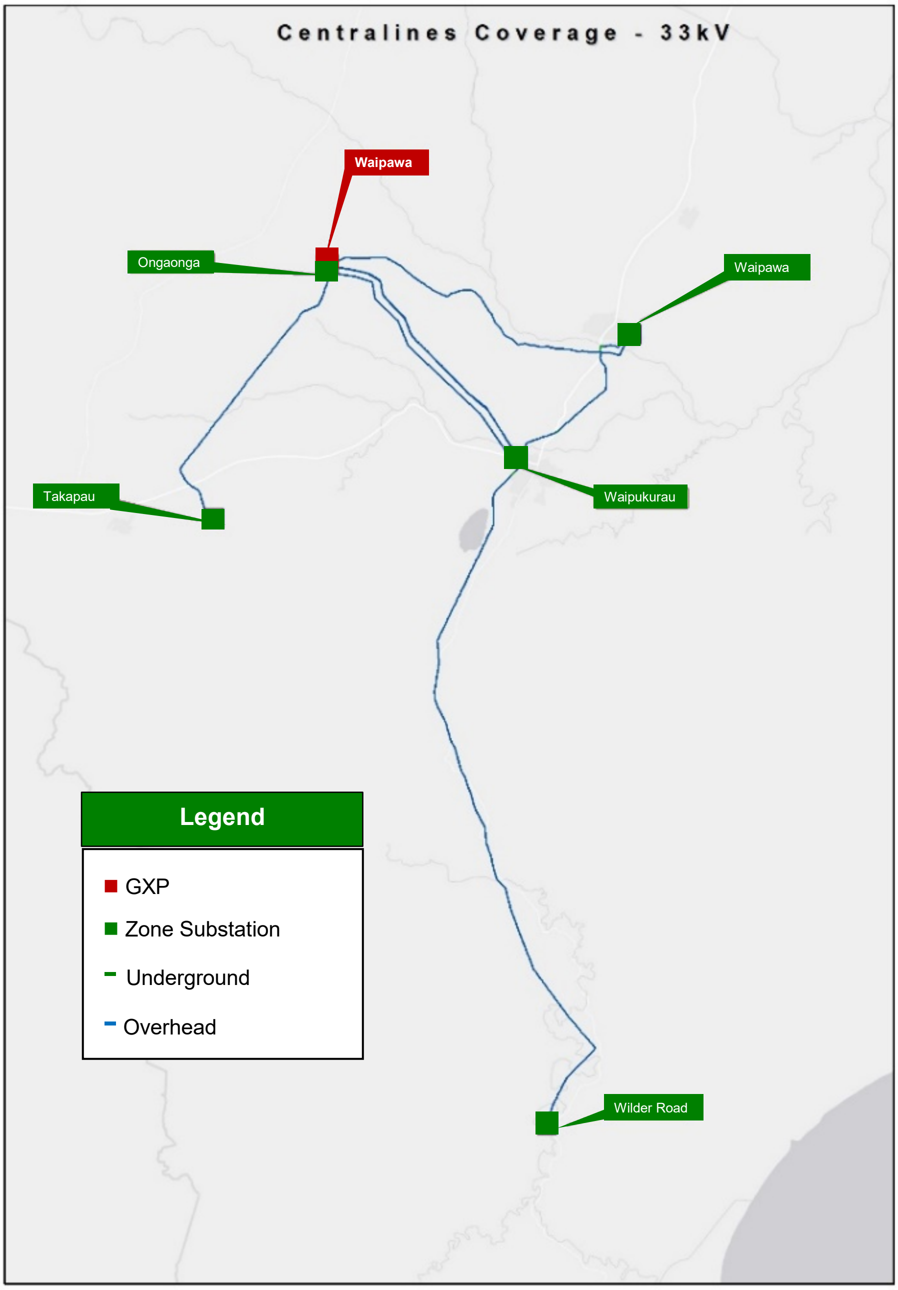


Figure 4-2: 33kV Sub-transmission and Point of Supply Network

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
Takapau	33kV	n(1)	15	n-1

Table 4-2: Zone Substation Capacity and Security

(1) Two transformer substations, supplied by a single 33kV circuit.

4.1.1.6 Distribution Network

Undergrounding across the distribution (11kV and 400V) networks is completed when appropriate as part of Centralines' lifecycle asset management processes. Table 4-3 details the current portion of the networks that are underground.

Network Type	Portion of the Network Underground
11kV Network	2.3%
400V Network	28.4%

Table 4-3: Portion of Distribution Network which is Underground

4.1.1.7 11kV Network

The 11kV network in urban areas has a high level of interconnectivity and provides considerable flexibility during contingency events. This results in a high level of security in these areas.

The 11kV network in rural areas is predominantly overhead radial feeders with concrete poles and timber crossarms. 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 covered in Section 5.

4.1.1.8 400V Network

The 400V network in the urban area has interconnectivity between adjacent distribution transformers.

The 400V network in the rural and remote rural areas is predominately radial overhead conductors with concrete poles and timber crossarms and the transformers are sized to the customer's requirements unless a sub-division is connected.

4.2 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.

4.2.1 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.

4.2.2 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 their 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 4-4.

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 4-4: Power Quality Parameters and Limits

4.2.2.1 Voltage Regulation

Centralines designs and operates the network to ensure supply voltage to customers in accordance with the regulatory limit of 230V +/-6% when measured at the Point of Supply. 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.

4.2.2.2 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.

4.2.2.3 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.

4.2.2.4 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.

4.2.3 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 4-5 and 4-6. 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 minutes remainder within 45 mins N-2 – 50% restored within 60 minutes remainder within 3 hours Bus fault – 50% restored within 60 minutes 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

Security of Supply Restoration Times	
Class A2 – Rural up to 1MVA	N-1 – 50% restored within 2 hours
Class A1 – Rural up to 500kVA	No targets

Table 4-5: 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 4-6: Security of Supply Classification and Compliance by Substation

4.2.4 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

Criteria	Target
	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 4-7: Summary of Contingency Event Performance Standards

4.2.5 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.

4.3 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 4-3.

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 4-3: Macro-environmental and Future Network Impact for Centralines

4.3.1 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. 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.

4.3.2 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 1% 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 continued need for the distribution network. It 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.

4.3.3 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 needs 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.

4.4 Network Development Planning Assumptions

Centralines' network development planning assumptions are informed by the macro-environmental assumptions detailed in Section 4.3. Network planning assumptions are:

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

4.4.1 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.

4.4.2 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. 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.

4.4.3 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 home energy management systems. 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, both as an alternative solution for supplying customers on low density lines (so-called ‘uneconomic’ lines), and as a tool to offset periodic peaks on rural feeders affected by variable irrigation loads, with the objective of maintaining voltage and deferring investment.

4.4.4 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 4.5.1.

4.5 Network Development Planning Process

Network Development Planning (NDP) is an important part of Centralines’ Asset Management System.

The purpose of network development planning is to ensure that Centralines’ Asset Management Objectives are achieved on an ongoing basis by:

- identifying risks in the network associated with changes in demand and how customers utilise electricity, and
- proposing projects to address these risks.

So that:

- customer demand at peak periods is met without compromising asset integrity (i.e. thermal overload), and
- customers receive compliant voltage (avoiding both over and under voltage).

With the central objective of striking an optimal balance between risk, performance and value.

The Network Development Planning process is completed twice a year and incorporates improvement measures to ensure the best possible balance is achieved. The process is reviewed regularly, and possible improvements identified, scoped and developed.

The diagram below Figure 4-4 outlines the key elements of Network Development Planning. This section will be structured in line with this diagram. References to the sections for each process stage are included in the diagram.

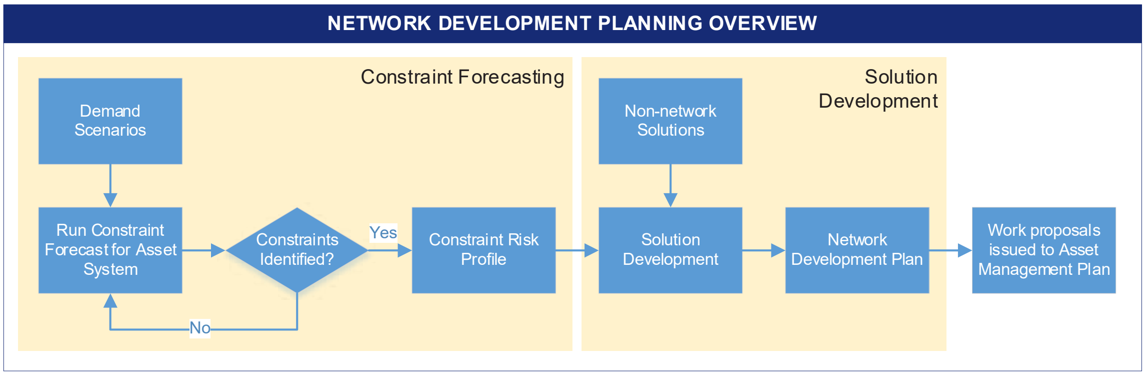


Figure 4-4: Overview of Network Development Planning Process

Constraint Forecasting (CF) is an engineering framework for:

- estimating the timing of one or more constraints arising in the asset, and
- quantifying the impact of the constraint in financial terms.

The resulting risk profile supports the Network Planning Team to develop appropriate project proposals to mitigate risks identified.

Solution Development (SD) is the process for addressing any identified constraints to ensure the network can meet its expected requirements. The process includes:

- verification of the constraint
- Root Cause Analysis, and
- the identification, selection and costing of a suitable solution.

4.5.1 Constraint Forecasting

Constraint Forecasting involves the development and application of a network model that defines the capabilities of assets and asset systems, catering to the complexities inherent in a network with meshed configurations. The model is tested against a range of future demand scenarios.

Power flow modelling is undertaken in DigSilent Power Factory, a software package that supports electricity load flow and contingency analysis. The results of the power flow modelling provide both the timing and magnitude of potential constraints. Each constraint is assessed in terms of its likelihood (timing) and consequence to form a wholistic risk profile on the issue. This risk profile can then be used to justify investment.

Constraint Forecasting is used in the Network Development Team on an ongoing basis to manage risk in the Asset Portfolio. It is also available to be used for ad-hoc requests, e.g. analysing the impact of particular types of technology uptake. The CF process is complete when:

- constraints on a specific asset system have been identified
- the risks associated with the constraints are quantified, and
- the expected timing is confirmed.

The figure below outlines the key elements of Constraint Forecasting.

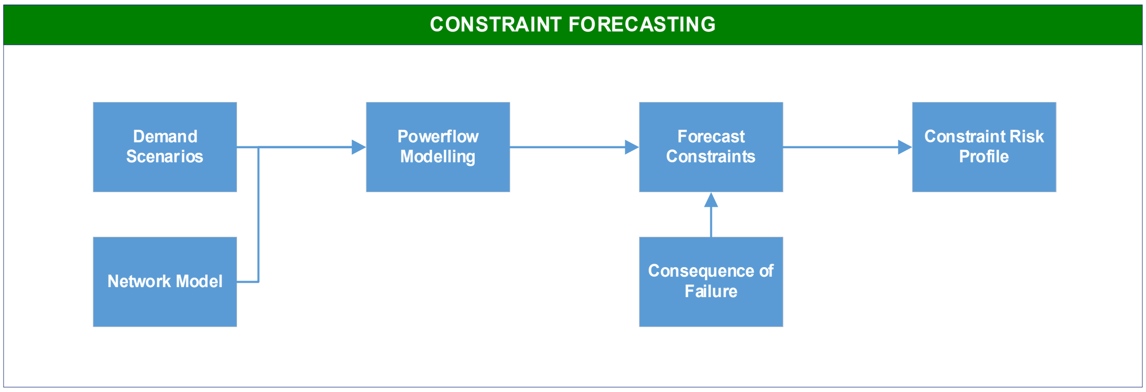


Figure 4-5: Overview of Constraint Forecasting Process

The key inputs into CF are set out below.

Input Category	Input
Historical Load Data	• ICP demand • Feeder loads
Network Model	• Connection of assets • Open points
Asset Attribute Information and Master Data	• Impedance • Maximum rating
Economic Projections	• GDP • Population • Number of dwellings
Consequence of Failure	• Financial information about assets and potential penalties

Table 4-8: Constraint Forecasting Input Categories

The key output of CF is a risk profile of all network development constraints, enabling the Network Planning Team to prioritise the development of solutions to resolve these constraints.

The four core elements of network planning inputs are:

- Network Overview – the topology and characteristics of the network
- Demand Analysis – the collective electricity demands that customers are expected to place on the networks
- Capacity – the amount of load that the system can deliver at all relevant points on the network, and
- System Impedance – the effective resistance to electricity flow between source and load.

4.5.1.1 Demand Analysis

Centralines' Load Forecast Tool (LFT) is updated annually and estimates the expected demand over the planning period. The tool calculates future peak demand based on historic demand and several key economic indicators to a 20-year horizon. Projections are made for each 11kV feeder based on simplified models of the domestic, commercial and industrial sectors. These are then aggregated 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 4.5.

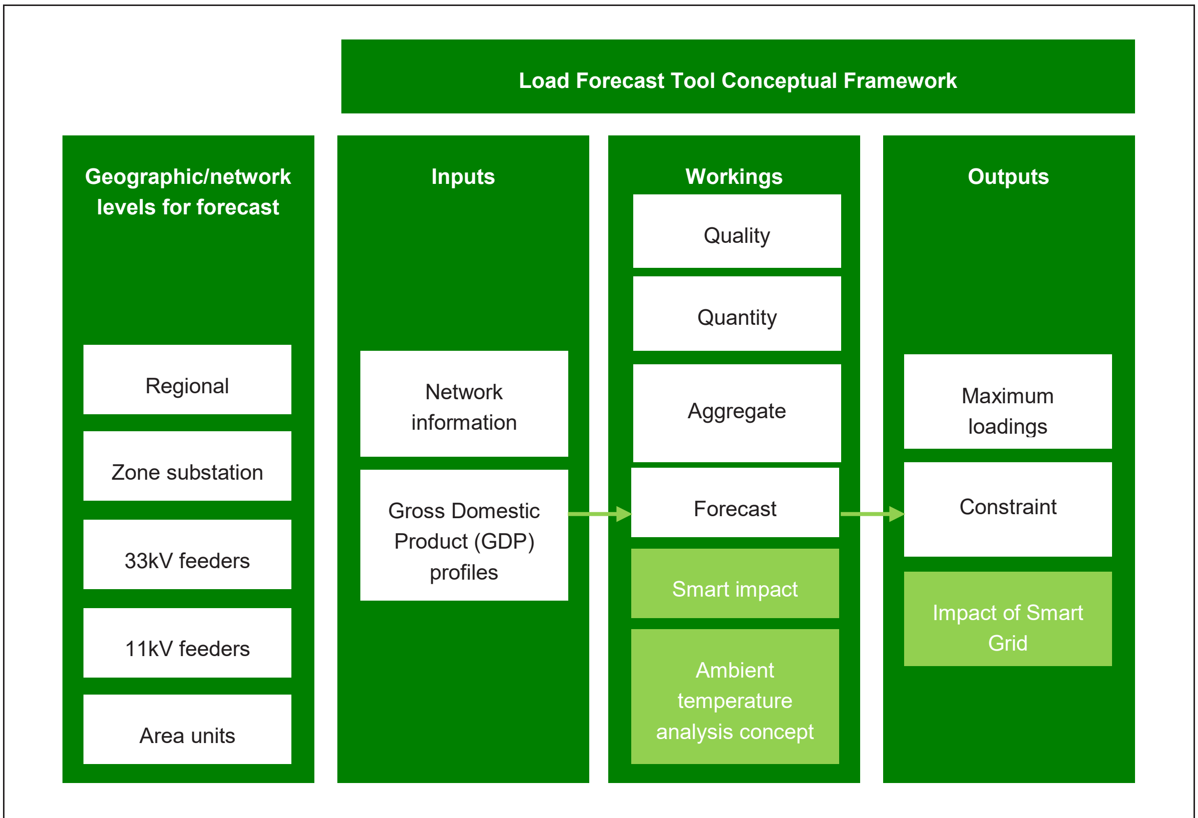


Figure 4-6: Load Forecast Tool

4.5.1.2 *Demand Assumptions*

The key assumptions behind the plan are detailed below.

Residential demand will be in proportion with population

Residential load is assumed to be in proportion to population, which is represented by using independent forecasts for population and household numbers provided by New Zealand Institute for Economic Research (NZIER), using the latest available census data. This data is updated every three to five years.

Industrial and Commercial will be in grow proportion with economic activity

Industrial and Commercial load is assumed to be in proportion to economic activity, which is represented by Gross Domestic Product (GDP) as part of the independent forecasts provided by NZIER, using the latest available census data. This data is updated every three to five years.

Distributed generation impact is assumed to be constant

Distributed generation (DG) is incorporated within the historical peak demand values. A small number of industrial customers have larger scale DG installed which tends to match the peak on-site demand. As these resources have limited availability they are not considered a substitute for capacity.

Small scale DG uptake per annum has been constant since 2013 and it is assumed that the DG impact on the peak demand in the future will be similar to that in the past and no further adjustments are made.

When reliable DG is connected to Centralines' network, it is considered a viable substitute for network capacity and is included in 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 contracted to be commissioned and there is confidence in its availability.

Only DG with reliable energy resources and multiple units are included for planning purposes. This is because DGs using such resources as wind, solar, and hydro as their fuel source are intermittent. All of these, along with single unit generator sites, have output levels that cannot be guaranteed.

Embedded generation impact is assumed to be constant

There are no large scale embedded generators on Centralines' network. Residential scale distributed generators do not materially impact the load forecast, as they are *de facto* included already in historical actual feeder loads.

Developments and large customer projects are included

Any substantial activity that Centralines is notified of by councils, developers, and existing or new large customers that is scheduled for completion within the planning period is included. From experience, the loading levels provided for these projects are typically accurate, though timing can vary. The projects are reviewed and updated annually by consultation with respective parties. The plan will be adjusted to include or exclude these projects dependent on the project staging.

The list of large customer developments (over 1MVA) from committed projects is currently included in the plan. Centralines is also aware of the impact from potential projects, but these are excluded from the plan at this stage.

Committed projects

There are currently no customer initiated projects where a contract has been signed.

Potential projects

These are projects where the customer has expressed an intention to complete development but no formal agreement is yet in place. These projects are included in the planning process to assess the possible impact, but not included in the ten-year plan as they will require formal agreement to proceed and be substantially funded by the customer.

Load transfer projects are included in the load forecast

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

Demand-side management impact is assumed to be constant

Centralines' load control capability is currently predominantly via a legacy ripple control system, operated with several relatively old ripple injection and load control sets. Centralines does not, however, own the ripple control receivers at the customers' premises and has limited ability to ensure they remain fully functional. As a result, ripple control effectiveness has been slowly reducing. Centralines recognises the potential of demand-side management in achieving more benefit.

For planning purposes, it is assumed that the present level of contribution and influence by demand-side load control on load forecast will be maintained.

No demand change for households

There are conflicting drivers affecting household load. The increasing efficiency of devices (e.g. LED TVs and lights) and improved household insulation have been decreasing demand per connection by approximately 0.5% per annum. However, the increasing affordability of devices (resulting in more devices per household) and the conversion of open fires to heat pumps is also increasing demand. Overall at this stage Centralines does not consider the net impact to be material.

Constant power factor over the planning period

Centralines assumes a constant power factor of 0.95 at all points of the network where specific data is unavailable. Centralines utilises the sensors installed across its network to monitor the reactive power flow (VAr) in its 11kV and 400V networks and reassess this assumption.

4.5.1.3 Load Inputs

Network

Household data, network connectivity, peak loads for the last 12 months, and installation capacity are 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 the running of the tool.

Demand profiles

GDP projections and population forecasts for the next 20 years are the mid-point projection provided by NZIER using the latest census data from 2013. This data is updated every three to five years.

GDP forecasts are further split by regions, areas and industrial types. Primary and manufacturing categories are grouped into the industrial category for LFT processing. Residential demand is calculated from population projections. The industrial, commercial and residential forecasts are combined to form the demand profile.

4.5.1.4 Demand Calculation Workings

The network information is combined with the industrial, commercial and residential 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. Installation capacity is used as a proxy for load to determine these proportions. This results in a unique demand projection for each 11kV feeder.

Zone substation demand projections are calculated by applying a diversity factor to the sum of the 11kV feeder projections. Similarly, the GXP/POS demand projection are calculated by applying a diversity factor to the sum of the zone substation projections. It is at this stage that large customer projects and the load transfer projects are added to produce final results.

4.5.1.5 Load Forecasting Tool Outputs

The LFT forecast extends out to a 20-year horizon for each month on each 11kV feeder. The Network Development Planning process considers the first ten-year outlook of load forecast for planning purposes and the ten-year-plus outlook for longer term trend consideration.

Below are the expected zone substation loads for Centralines.

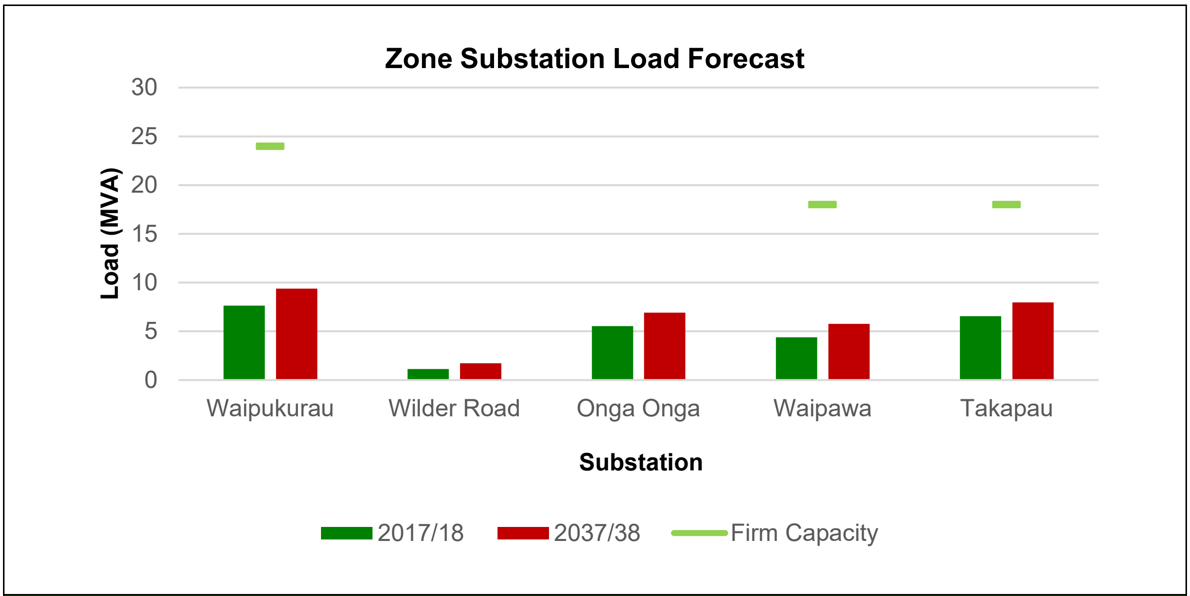


Figure 4-7: Zone Substation Load Forecast

4.5.1.6 Load Forecasting Review

Centralines has recently enhanced the load forecasting methodology, input, workings, and output. This re-evaluated the previous load forecast methodology, identified factors with material impact on load forecasting and developed a new approach along with supporting tools and systems. This new system allows the potential impact from disruptive technologies to be considered under numerous scenarios to determine the level of risk resulting from various levels of adoption of these technologies.

4.5.2 Solution Development

The purpose of Solution Development (SD) is to identify and specify optimal solutions that address the risks in the network. These risks are identified by the Constraint Forecasting process for inclusion in the AMP. Solution Development commences when:

- a constraint has been identified
- the risk has been quantified, and
- the risk is sufficient that action should be taken to control it.

Solution Development involves identifying the most optimal control for the risk, considering the key asset management drivers of cost, risk and performance.

Solution Development is completed when an appropriate solution has been identified and this solution has been proposed as a capital project to the AMP, or work has been issued out of an OpEx provision.

Figure 4-8 outlines the key elements of Solution Development.

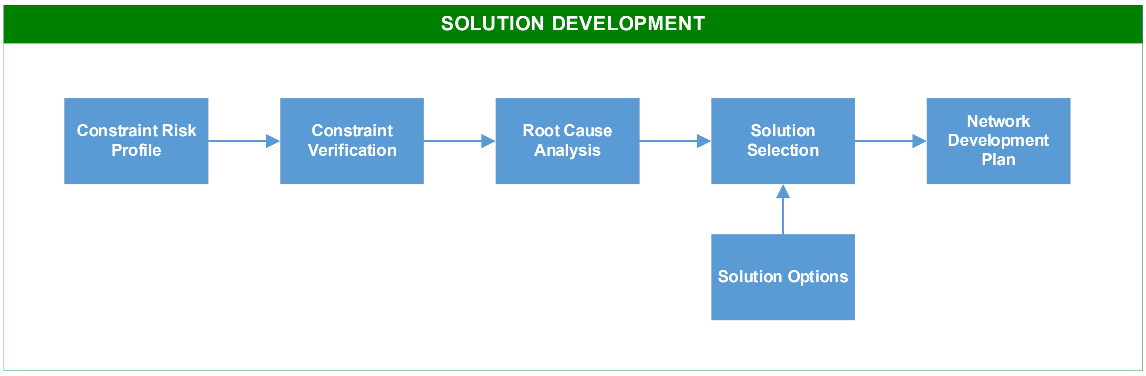


Figure 4-8: Overview of Solution Development Process

The key inputs to Solution Development are set out below.

Input Category	Input
Constraint Forecast	ICP demand Feeder loads
Network Model	Connection of assets Open points
Asset Attribute Information and Master Data	Impedance Maximum rating
Solution Options	Approved equipment Rating methodologies Accurate template costs
Network Field Data	Voltages and currents at key locations

Table 4-9: Overview of Solution Development Process

The key output of SD is the Network Development Plan. This plan represents the Network Development Team's proposed work programme over the ten-year planning horizon to manage the risk of:

- thermally overloading assets, and
- breaching voltage compliance limits.

While ensuring:

- efficient deployment of capital to manage network development risks
- realisation of opportunities to utilise non-network solutions, to support the organisation to manage broader strategic risks of industry disruption
- the completion of work at the right time to avoid hazards, such as assets failing and disrupting supply, and customer equipment being damaged, and
- clear specification and planning of required work so resources can be mobilised.

For any given network constraint, a range of potential solutions are selected from the Solutions Toolbox. 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, which 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 needs in the vicinity of the constraint.

4.5.2.1 Solutions Toolbox

The available solutions in the 'solutions toolbox' to address the identified network constraints are summarised in Table 4-10. Centralines is actively exploring possible expansion of the solutions toolbox using new technologies to further enhance the efficiency of the network.

Constraint	Network Solution	Non-network Solution
Voltage	Upgrade conductor Install feeder Install voltage regulator	Reactive VAr compensation Fast transfer scheme Network reconfiguration (existing asset)
Continuous current capacity	Upgrade conductor Install feeder Install transformer Establish substation	Reactive VAr compensation Fast transfer scheme Demand-side management Real-time monitoring Cyclic ratings (selected asset classes) Network reconfiguration (existing asset)
Fault current capacity	Asset upgrade	Decrease fault rating by: • substation earthing compensation, and • network reconfiguration (existing asset).
Quality of supply, e.g. dips harmonics flicker	Install feeder Install transformer	Ground fault neutraliser Network reconfiguration (existing asset) Behind the meter solutions Distributed generation Energy storage

Constraint	Network Solution	Non-network Solution
Network security	Install feeder Install transformer Establish substation Install recloser	Dynamic ratings (selected asset classes) Fast transfer scheme Reactive VAr compensation Demand-side management Network reconfiguration (existing asset) Self-healing scheme Distributed generation Energy storage
Network reliability	Install feeder Install recloser Overhead to Underground asset conversion	Network reconfiguration (existing asset) Substation earthing compensation Fast protection Ground fault neutraliser Self-healing scheme Distributed generation Energy storage

Table 4-10: Solutions Toolbox

4.5.2.2 Network Options

Network solutions are based on a traditional network reinforcement approach and typically provide technically sound long-term solutions. Examples are power transformer, pole and cable upgrades. To ensure traditional network solutions are designed to be as energy and economically efficient as possible, 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. Where possible, cost estimates are based on typical costings based on engineering knowledge or actual costing from completed works.

Standardised designs

Where possible, Centralines utilises standardised designs for assets to maximise cost efficiencies throughout the asset management lifecycle. Standardisation of design in different asset types are summarised below.

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 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 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 outdoor circuit breaker used is an Alstom GL107 unit.
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 the Cooper Nova recloser for outdoor use.
Zone substation buildings and equipment	Due to the value and low number of new constructions of zone substations 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 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.
11kV and 400V lines	Standard drawings, design and construction methodologies are in place. Standard materials used include ACSR, AAC, AAAC, ABC conductors and Busck poles. These are available as standard designs in Design Manager for planners' cost estimates and for designers.
11kV and 400V cables	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 planners 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 Cooper Nova reclosers, ENTEC RCS, Schneider ABSs, S&C 11kV fuses (DDOs). These are available as standard designs in Design Manager for planners' cost estimates and for designers.

Asset	Standardisation
Distribution Switchgear – Ground Mounted Switches and Ring Main Units	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.
Communications	Standard equipment used includes Silver Springs mesh radio, Tait/MiMOMax UHF (rural). Mesh radio is available as standard designs in Design Manager for planners' cost estimates and for designers.

Table 4-11: Standardisation Across Assets

4.5.2.3 Non-network Options

Centralines has recognised the significant benefits from non-network solutions by utilising new technologies to increase the overall network efficiencies and effectiveness. Several legacy network and monitoring (SCADA) applications have been replaced with the Advanced Distribution Management System (ADMS) operating on a ubiquitous communications platform. This is a key enabler to realise the full benefits from non-network solutions implemented to date and into the future.

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 in voltage profile. Where possible, cost estimates are based on typical costing based on engineering knowledge or actual costing from completed works.

4.5.2.4 Solution Toolbox Enhancement Initiatives

Centralines is continuing its proactive approach to realise significant benefits from new technologies as 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. There are two key elements to this initiative - ripple control of hot water and off-grid systems.

Ripple control

Centralines has utilised ripple control of hot water demand as a demand-side response for many years. It has historically been used primarily to manage regional peak demand. This initiative will explore and trial this and other demand-response technologies to define and develop Centralines' demand response philosophy, policy and strategy.

Off-grid systems

Centralines recognises off-grid systems as a disruptive technology with the potential to reduce the cost of serving its remote rural customers. This is considered as a high priority opportunity due to the increasing maturity of the technology and the potential benefits from their application on the network. This initiative will explore and trial off-grid systems, medium to large scale energy storage systems, mobile and fixed DG. Supporting management philosophy, operation and maintenance policies and strategies will also be developed.

4.5.2.5 Selecting the Preferred Solution

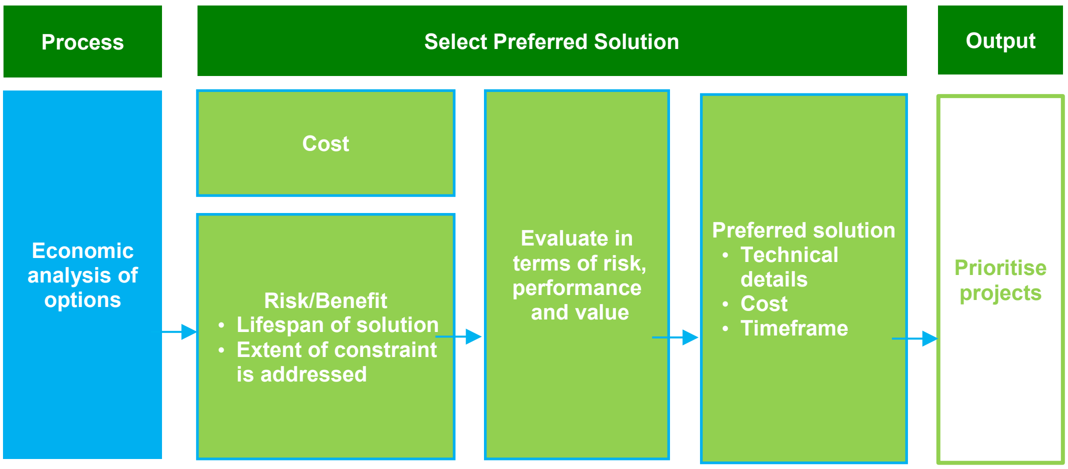


Figure 4-9: Select Preferred Solution Process Stage

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

4.6 Network Development Projects

Projects greater than $250k are considered material and will be discussed to a greater level of detail. For completeness all projects (material and non-material) planned for 2018/19 and all material projects proposed for 2019/20-2027/28 have been included.

Customer-driven projects where a contract is not in place are not included.

Details of projects for the ten-year planning period are outlined below.

#	Constraint	Category	Cost	Section
2018/19 Material				
1155	Wilder Road Substation Upgrade	Other Reliability Safety and Environment	$515k	4.6.1
2018/19 Non-Material				
1144	Seismic strengthening of the Takapu Zone Substation building	Quality of Supply	$55k	4.6.2
1150	Upgrade ABS to Remote switch, ABS 493, Feeder 4	Quality of Supply	$50k	4.6.2
1151	Upgrade ABS to Remote switch, ABS 570, Feeder 4	Quality of Supply	$50k	4.6.2
1152	Upgrade ABS to Sectionaliser, ABS 617, Feeder 4	Quality of Supply	$50k	4.6.2
1153	Upgrade ABS to Remote switch, ABS 562, Feeder 4	Quality of Supply	$50k	4.6.2
1154	Upgrade ABS to Remote switch, ABS 521, Feeder 4	Quality of Supply	$50k	4.6.2
3011	Power Quality	Quality of Supply	$100k	4.6.2
3012	Unplanned RS&E	Other Reliability Safety and Environment	$20k	4.6.2

Table 4-12: Material and Non-Material Projects for 2018/19

#	Constraint	Category	Cost	Section
2019/20 to 2022/23 Material				
1145	Install 14.3km ADSS Arial Fibre circuit between Waipawa GXP and Takapau	Quality of Supply	$475k	4.6.3
1148	Voltage Constraint Feeder 2 West	Quality of Supply	$350k	4.6.3
1156	Voltage constraint Feeder 2 North	Quality of Supply	$350k	4.6.3
1157	Voltage constraint Feeder 18	Quality of Supply	$350k	4.6.3

#	Constraint	Category	Cost	Section
2023/24 to 2027/28 Material				
1183	Voltage constraint Feeder 86	Quality of Supply	$350k	4.6.4
1189	Voltage constraint Feeder 19	Quality of Supply	$350k	4.6.4
1194	Voltage constraint Feeder 46	Quality of Supply	$350k	4.6.4
1200	Voltage constraint Feeder 88	Quality of Supply	$350k	4.6.4
1205	Provisional sum for 11kV feeder upgrade	System Growth	$350K	4.6.4

Table 4-13: Material Projects for 2019/20 to 2027/28

4.6.1 Projects for 2018/19

4.6.1.1 Project 1155, Wilder Road Substation Upgrade

Environmental and safety issues have been identified at Wilder Road Zone Substation.

Wilder Road Substation is a single bank 2MVA 33kV to 11kV substation supplying Porangahau and surrounding rural area. Back up supply is provided via 11kV from adjacent zone substations. The following constraints have been identified.

Issue BABFADAEC4: The power transformer on site is not bunded.

The existing power transformer is not bunded and presents an environmental risk where oil could be discharged to earth during a fault. Industry best practise has power transformers situated in oil containing bunds.

Solution Options:

Class	Description	Advantages	Disadvantages	Cost
Network	Install bunded containment pad	Complies with required environmental policies. Reduces risk of oil spill.	Investment required to mitigate risk.	$115k
Network	Dry type (or alternative) Transformer	No risk of oil contamination.	Prohibitive cost. New technology requiring alternative asset management strategies	$800k+
Non-Network	Do nothing	No cost.	Does not resolve issues.	$0

Issue ZEN4SANXV7: Voltage constraint during contingency events.

During loss of 33kV supply to Wilder Road Feeder 19 is used to back feed via Feeder 45. In this configuration voltage violations are predicted on Feeder 46.

Solution Options:

Class	Description	Advantages	Disadvantages	Cost
Network	Duplicate 33kV supply	Increased operational flexibility. Less disruption to existing network and area. Compliant voltage during the loss of a single line.	Capital cost is largely prohibitive for the risk involved.	$7,000k
Network	Reconfigure existing 11kV and upgrade voltage regulator	Increased construction flexibility. Compliant voltage during contingency events. Moderate investment requirement.		$200k

Class	Description	Advantages	Disadvantages	Cost
Non-Network	Install generator	Compliant voltage during contingency events.	Will require significant logistics and maintenance activities. Resource consent required. Significant investment required.	$600k
Non-Network	Battery	Less disruptive to existing network.	High cost to obtain capacity sufficient for full support.	$2,700k
Non-Network	Do nothing	Lowest cost.	Does not resolve issues.	$0

Issue 7ENCUITDYW: 11kV bus separation distances.

The separation of live components is non-compliant with modern standards.

Solution Options:

Class	Description	Advantages	Disadvantages	Cost
Network	Indoor bus	Completely removes outdoor bus risk. Has synergy with other 11kV reconfiguration.	Significant investment in new board. Significant investment in additional building/land requirements. Existing assets will have to be reconfigured with cable terminations into board. Requires new risk assessment/controls and maintenance on site.	$300k+
Network	Rebuild outdoor bus to modern standards	Moderate investment required. Resolves separation issue. Has synergy with other 11kV reconfiguration.	Outdoor switchyards are inherently prone to external interference.	$200k
Non-Network	Admin controls	Low cost.	Does not remove root cause. Admin controls would need to be maintained and are easily bypassed. Restricts normal activities that can be undertaken.	$0
Non-Network	Do nothing	Lowest cost.	Does not resolve issues.	

Preferred Solution

The preferred solution is to rebuild the existing Wilder Road Substation with bunded transformers, an upgraded regulator and a rebuilt outdoor 11kV switchyard. These three projects have overlap and synergy and if staged correctly will reduce the total security risk to customers. The combined project cost is estimated at $612,000.

Targeted Service Levels

Power Quality

Reliability

Project Description

Project #1155, Substation Upgrade, Wilder Road.

4.6.2 Non-Material Projects for 2018/19

A summary table describing the confirmed non-material projects for the 2018/19 year is included in Section 4.6.

#	Project	Constraint Description	Options	Cost	Preferred Solution
1144	Seismic strengthening of the Takapu Zone Substation building	Issue C2D055CDFC Consultants have assessed the seismic strength of the Takapu Zone Substation building at 15% of Importance Level 4. Well below the minimum strength required for a building of this type and importance.	Strengthen building Do nothing	$55k	Strengthen building. Strengthening the building will raise building to required level of security and increase remaining life. Doing nothing will not address unacceptable seismic risk.
1150	Upgrade ABS to Remote switch, ABS 493, Feeder 4	Issue B325614FA8 ABS 493 is currently one of the paralleling points between Feeder 4 and Feeder 75. The travel time to ABS 493 is approximately half an hour following dispatch.	Upgrade ABS Replace with CB Do nothing	$50k	Replacing ABS 493 with a RCS will allow faster response time and reduction in SAIDI and SAIFI under backstopping conditions.
1151	Upgrade ABS to Remote switch, ABS 570, Feeder 4	Issue 784AF5F5AD ABS 570 is currently one of the paralleling points between Feeder 4 and Feeder 76. The travel time to ABS 570 is approximately 20 minutes once a crew is dispatched.	Upgrade ABS Replace with CB Do nothing	$50k	Replacing ABS 570 with a RCS will allow faster response time and reduction in SAIDI and SAIFI under backstopping conditions.
1152	Upgrade ABS to Sectionaliser, ABS 617, Feeder 75	Issue 2533B9B049 ABS 617 is currently one of the paralleling points between Feeder 4 and Feeder 75. The travel time to ABS 617 is approximately 20 minutes.	Upgrade ABS Replace with CB Do nothing	$50k	Replacing ABS 617 with a sectionaliser will allow faster response time and reduction in SAIDI and SAIFI under backstopping conditions.
1153	Upgrade ABS to Remote switch, ABS 562, Feeder 4	Issue 76598FE74C ABS 562 is currently the paralleling point between Feeder 4 and Feeder 19. The travel time to ABS 562 is approximately 10 minutes. CAPEX DB ID: 5654.	Upgrade ABS Replace with CB Do nothing	$50k	Replacing ABS 562 with a RCS will allow faster response time and reduction in SAIDI and SAIFI under backstopping conditions.

#	Project	Constraint Description	Options	Cost	Preferred Solution
1154	Upgrade ABS to Remote switch, ABS 521, Feeder 4	Issue CB46B5E34C ABS 521 is currently an isolating point on Feeder 4 and Feeder 19. The travel time to ABS 521 is approximately 10 minutes. CAPEX DB ID: 5655.	Upgrade ABS Replace with CB Do nothing	$50k	Replacing ABS 521 with a RCS will allow faster response time and reduction in SAIDI and SAIFI under backstopping conditions.
3011	Power Quality Provisional Sum	Provisional sum for improvements to Power Quality identified by customer feedback.	As required	$100k	As required.
3012	Reliability, Safety and Environmental. Unplanned	Provisional sum for improvements to Reliability, Safety and Environment identified in post event reports.	As required	$20k	As required.

Table 4-14: Non-Material Projects for 2018/19

4.6.3 Material Projects for 2019/20 to 2022/23

#	Constraint	Constraint Description	Options	Cost	Solution
1145	Communications between Waipawa GXP and Takapau Zone Substation	Issue C55E54C967 Communication to Takapau Substation is not reliable enough for modern protection and SCADA systems.	Network: Fibre to site Non Network: Do nothing	$475k	Fibre to site is required to enable installation of modern protection equipment.
1148	Voltage Constraint Feeder 2 West	Issue 4132BAA529 Under-voltage indicated in constraint report. The report indicated that 79 transformers (126 ICPs) down Wakarara Road are already breaching or will breach the LV regulatory voltage levels in the next ten-years. Annual risk for the group, $103,530.	Network: Voltage Regulator Network: reconductor Non Network: Do nothing	$350k - $1250k	Voltage regulator.
1156	Voltage constraint Feeder 2 North	Issue 031EEEC8FE Under-voltage indicated on Feeder 2 North - SH50 (Tikokino), Holden Road, Matheson Road and Smedley Road: The report indicated that 92 transformers (239 ICP's) are already breaching or will breach the LV	Network: Voltage Regulator Network: reconductor	$350k	Voltage regulator.

#	Constraint	Constraint Description	Options	Cost	Solution
		regulatory voltage levels in the next ten years. Annual risk for area, $108,000.	Non Network: Do nothing		
1157	Voltage constraint Feeder 18	Issue 23D2B61BBA Under-voltage indicated in constraint report. Feeder 18 - Farm Road. The report indicated that 38 transformers (72 ICP's) are already breaching or will breach the LV regulatory voltage levels in the next ten-years. Total risk for the area, $43,215	Network: Voltage Regulator Network: reconductor Non Network: do nothing	$350k	Voltage regulator.

Table 4-15: Material Projects for 2019/20 to 2022/23

4.6.4 Material Projects for 2023/24 to 2027/28

All projects for 2023/24 to 2027/28 are in the initial identification stage. High level solutions have been identified and costs have been estimated for the solutions 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 solutions 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 customer-driven works and are not included here.

Customers have indicated that the trade-off between 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 currently experiencing poor reliability on feeders are progressively upgraded.

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
1183	Voltage constraint Feeder 86	Issue 2DE5DCE8B9 Voltage constraint predicted on Feeder 86.	Network: Reconductor Network: Voltage Regulator Non Network: Do nothing	$0-$350k
1189	Voltage constraint Feeder 19	Issue 8D1D3364E7 Voltage constraint predicted on Feeder 19.	Network: Reconductor Network: Voltage Regulator	$0-$350k

#	Title	Constraint Description	Options	Cost
			Non Network: Do nothing	
1194	Voltage constraint Feeder 46	Issue F2BB2193E7 Voltage constraint predicted on Feeder 46.	Network: Reconductor Network: Voltage Regulator Non Network: Do nothing	$0-$350k
1200	Voltage constraint Feeder 88	Issue C68983F2B8 Voltage constraint predicted on Feeder 88.	Network: Reconductor Network: Voltage Regulator Non Network: Do nothing	$0-$350k
1205	Provisional sum for 11kV feeder upgrade	To accommodate future growth in the rural areas a provisional sum has been proposed for network reconfiguration.	Network: New feeder Non Network: Load Balance Non Network: Demand side response Non Network: Do nothing	$0-$300k

Table 4-16: Material Projects for 2023/24 to 2027/28

4.7 Determination Reference Mapping Table

Section 4 Reference	Determination Reference
4.1 Introduction to this Section	11
4.2 Network Development Planning Objectives and Criteria	11.1, 11.2
4.3 Macro-environmental and Future Network Context	11.1, 11.2
4.4 Network Development Planning Assumptions	4.1 including 4.1.1-4.1.4, 4.2 including 4.2.1-4.2.5, 4.3, 11.1, 11.6, 11.8 including 11.8.1, 11.8.2, 11.8.4, 11.11
4.5 Network Development Planning Process	11, 11.3, 11.4, 11.4.1, 11.4.2,11.5, 11.6, 11.7. 11.8.3, 11.12, 11.12.1, 11.12.2
4.6 Network Development Projects	11.7, 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

5

ASSET MANAGEMENT PLANNING

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.

A table that maps the requirements of the Electricity Distribution Information Disclosure Determination to the information provided is available at the end of the section to support assessment of compliance.

Note: Centralines' Asset Management service provider Unison, in March 2018 gained certification to ISO 55001 which is the international standard that contains the requirements specification for an integrated, effective management system for asset management. It is expected key processes and continuous improvements associated with asset management planning, including asset renewal and maintenance planning, developed as part of this certification process, will be fully adopted over time to manage Centralines' asset fleet. This will result in the enhancement of processes described in this section.

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 in order to meet Centralines' Asset Management Objectives. To achieve this purpose, Centralines aims to optimise the cost of asset management while meeting network performance service levels, and not increasing the risk profile to the business. Centralines' LCAM objectives are to:

- ensure no assets cause health and safety risks to the public, employees or contractors
- optimise Asset Renewal CAPEX over the planning period
- optimise 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 on Centralines' assets will ultimately lead to realised value. This section of the Regulatory Asset Management Plan, Lifecycle Asset Management Planning, includes components of the system highlighted in green below.

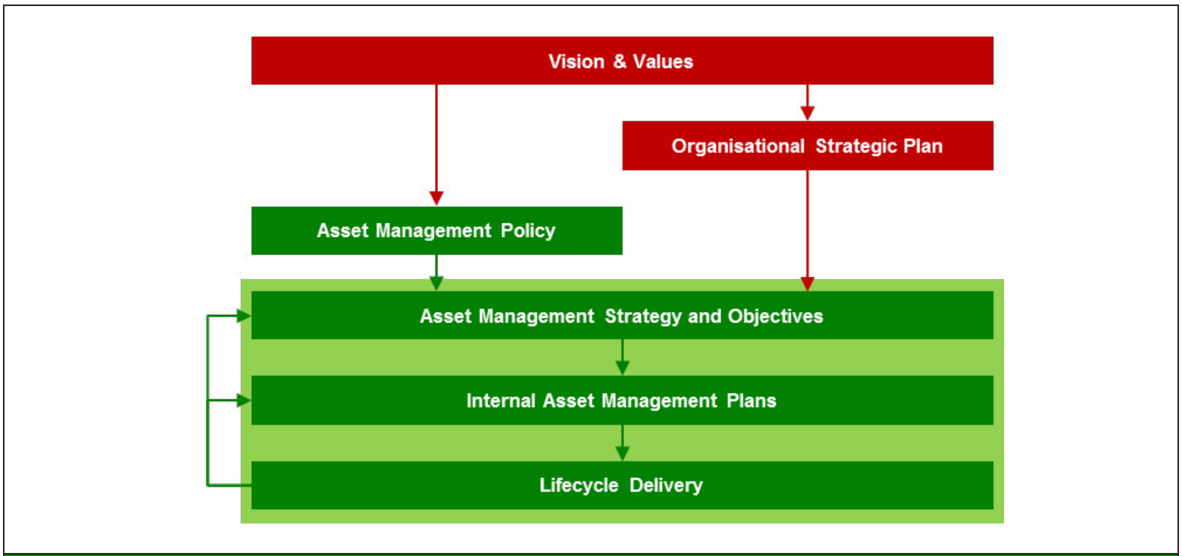


Figure 5-1: Asset Management System

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.

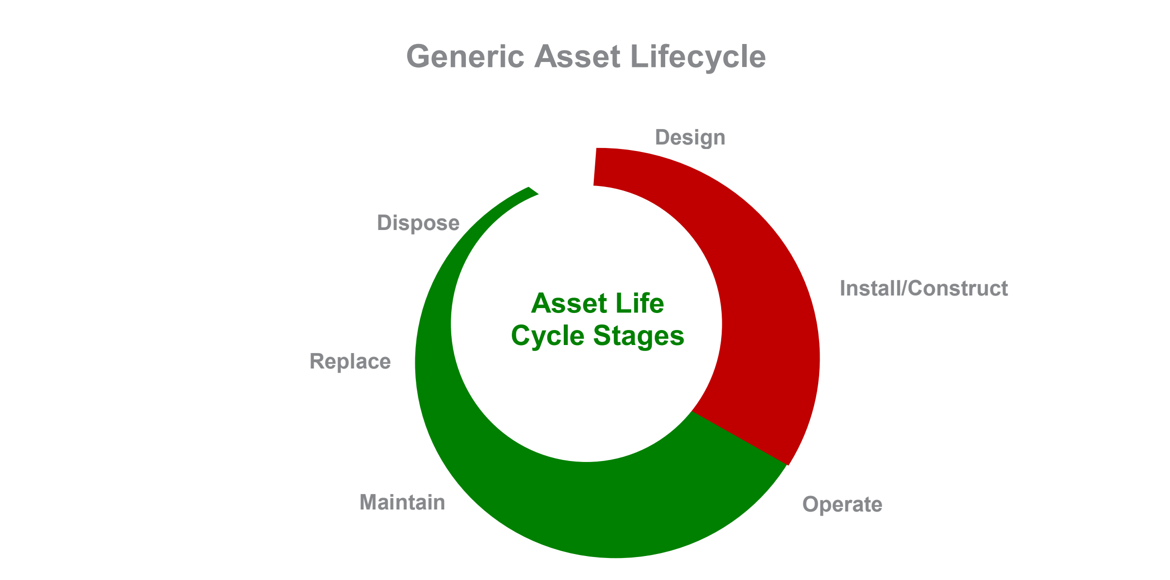


Figure 5-2: Generic Asset Lifecycle

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. Lifecycle asset management gives each level equal weighting and targets efficiencies not only within the levels, but also between them.

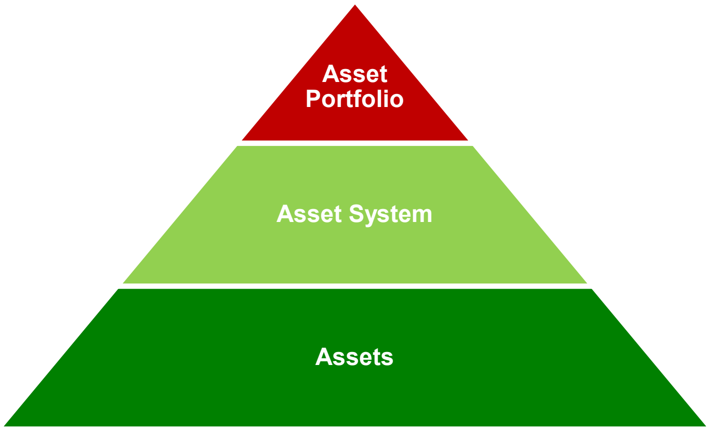


Figure 5-3: Asset Hierarchy

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.

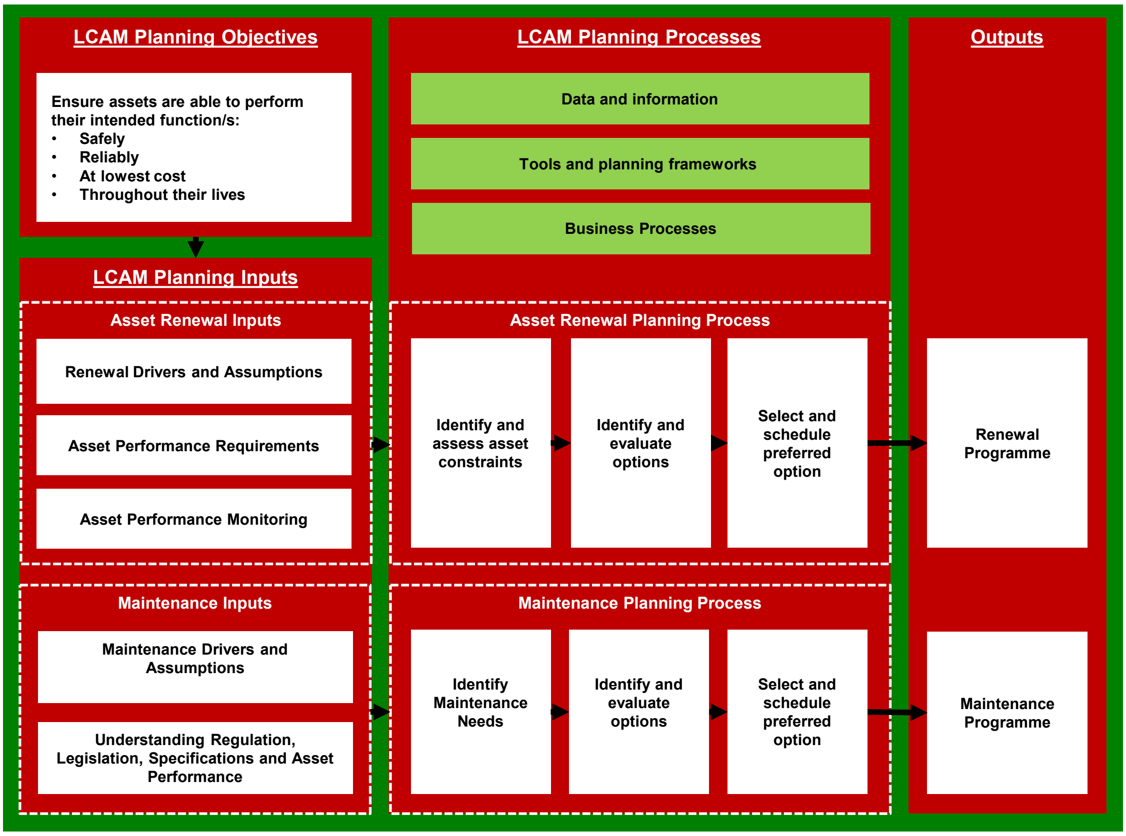


Figure 5-4: LCAM Planning Approach

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 • optimise Asset Renewal CAPEX over the planning period • optimise 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 the Management service provider's asset specialists of regulations, legislation, manufacturer specifications and asset performance requirements.
LCAM Planning Processes (Data and Information)	Centralines has extensive condition monitoring, inspection and testing regimes across the majority of its asset classes. The data and asset information collected is made available to asset specialists in order to

Process Element	Description
	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 is 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 the required work.
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 ten-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 ten-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 Centralines' 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 optimising 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' Management service provider 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 (where appropriate) 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 material 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.

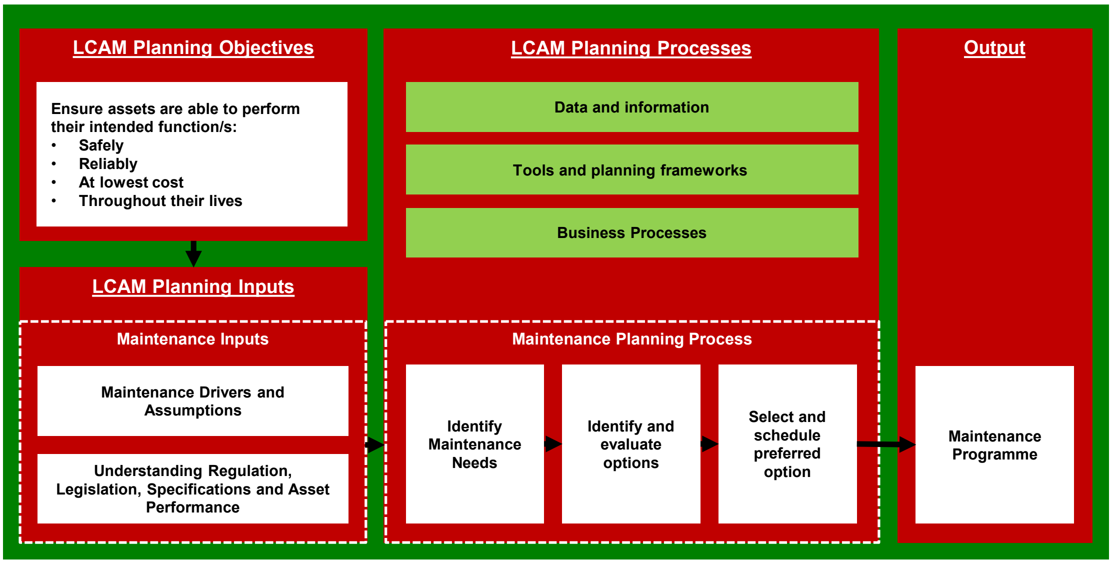


Figure 5-5: Maintenance Planning Approach

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 any associated risks to 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

Group	Element	Description
		process that contractor resourcing and budgeting is taken into consideration.
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 ten-year period. Types of maintenance included in the Maintenance Programme are described in Section 5.3.5.

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 continuing to move towards 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 management 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 challenge of quantifying and combining all relevant variables is in many cases complex. 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.

Centralines' Renewal Drivers
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.

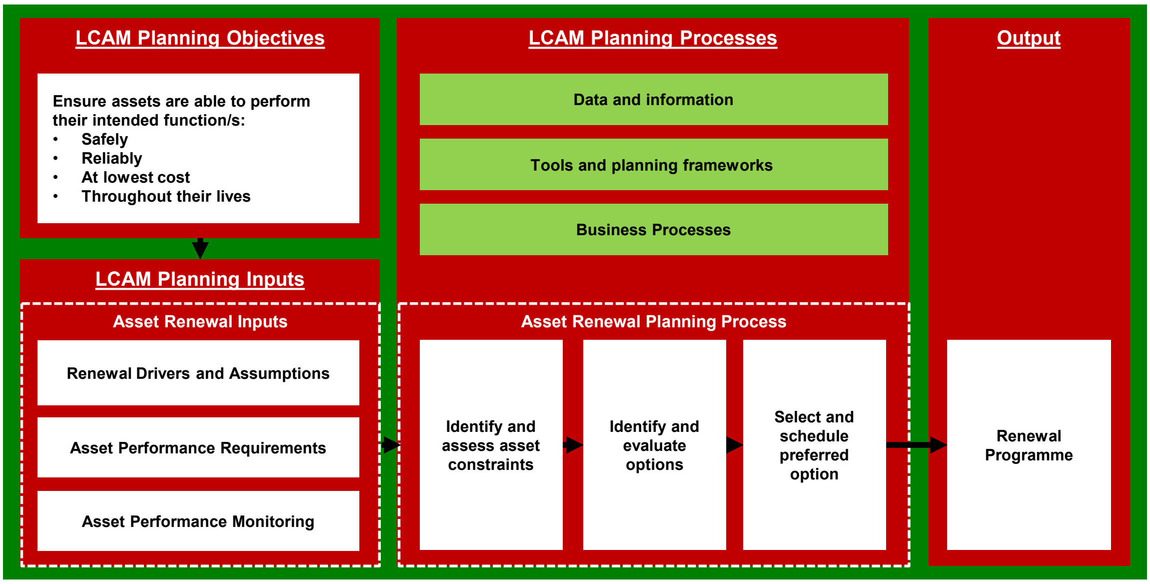


Figure 5-6: Renewal Planning Process

Group	Element	Description
Renewal Inputs	Drivers and Assumptions	Maintenance drivers and assumptions are balanced qualitatively by the Management service provider's 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).
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
	Select and Schedule Preferred Option	

Group	Element	Description
		with long term network growth, security and quality plans. Detailed further in 5.4.7.
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 ten-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 provide this top-down budget view which is then combined and compared with the bottom-up list of constraints (projects). An exercise is then undertaken as part of the asset management planning process to integrate and optimise these two views by balancing cost, risk and performance drivers in alignment with Centralines' Business and Asset Management Objectives.

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 benefit:cost ratio in turn is strongly dependent on the ratio of reactive to preventative replacement cost for assets, by asset class. A recent exercise in Centralines has seen key input data for the RE reviewed and updated, including reactive to preventative replacement cost ratios, replacement cost values and remaining life expectancies. The latter values were informed by all available information on asset condition.

The RE offers two additional modes of operation which are sometimes used for top-down renewal budgeting purposes, namely:

- fixed annual renewal investment, in which case the RE calculates the aggregate network remaining life expectancy over the planning horizon, and
- fixed aggregate remaining life expectancy for the network, in which case the RE calculates the annual renewal investment required over the planning horizon.

It is proposed to undertake a review of the RE tool over the next 12 months with a view to enhancing the accuracy of the tools outputs.

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.

Reactive (post-failure) renewals are budgeted for each year based on historical 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 either replace, refurbish or repair an asset can be complex. Key inputs included in this decision-making process are:

- the cost of each solution
- standard life expectancy of the asset
- expected increase in life expectancy of the asset, and
- annual maintenance cost of the asset.

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 Substations: 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

Asset Class	Section Reference
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.

<table>
<tr><th>Sub-section Heading</th><th>Information Provided</th></tr>
<tr><td>Asset Group Category Description</td><td>Where a group of assets has been broken down, a general description of the high-level category is provided.</td></tr>
<tr><td>Asset Description and Quantity</td><td>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.</td></tr>
<tr><td>Asset Condition and Performance</td><td>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.</td></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>H1</td><td>Replacement recommended.</td></tr>
<tr><td>H2</td><td>End of life drivers for replacement present, high asset related risk.</td></tr>
<tr><td>H3</td><td>End of life drivers for replacement present, increasing asset related risk.</td></tr>
<tr><td>H4</td><td>No drivers for replacement, normal in-service deterioration.</td></tr>
<tr><td>H5</td><td>As new condition – no drivers for replacement.</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>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>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>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>4</td><td>Good quality data is available for all of the assets in the category.</td></tr>
</table>
</td></tr>
</table>

Sub-section Heading	Information Provided
Asset Age Profiles	Asset age profile graphs based largely on 2017 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.
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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
Sub-transmission: 33kV conductor			47%	47%	6%	3	

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

5.7.4 *Asset Age Profile: 33kV Overhead Lines*

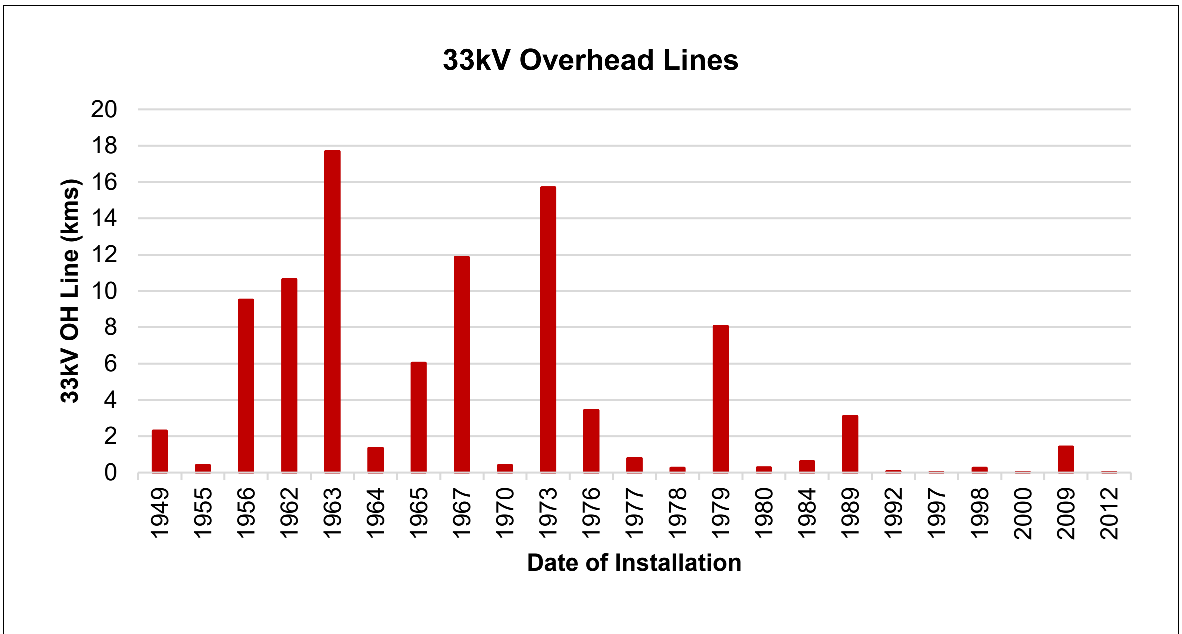


Figure 5-7: Asset Age Profile: 33kV Overhead Lines

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 Management 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 1.79 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 $35mm^2$ to $400mm^2$ and include both single and three core cables.

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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
Sub-transmission: 33kV XLPE cable					100%	3	

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

5.8.4 Age Profile: 33kV Underground Cables

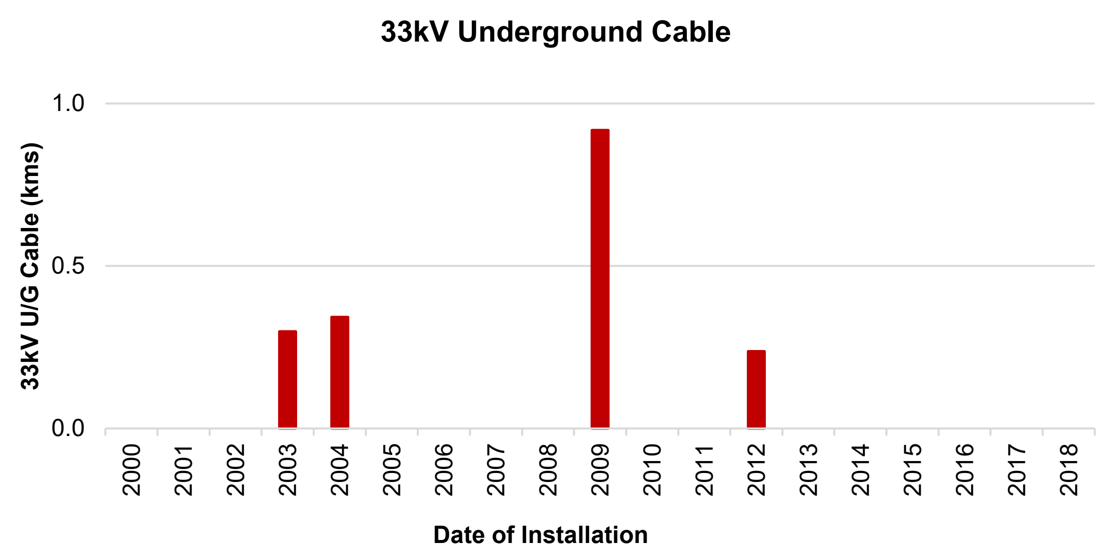


Figure 5-8: Asset Age Profile: 33kV Underground Cables

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
Diagnostic cable testing is currently being undertaken on 33kV underground cables to determine baseline condition for future comparison and to determine frequency for future testing.	TBD

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 RAMP 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 Management Standard

Controlled Document Reference	Controlled Document Description
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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
Zone Substation: Power Transformers			14.3%		85.7%	4	

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

5.10.4 Asset Age Profile: Zone Substation Power Transformers

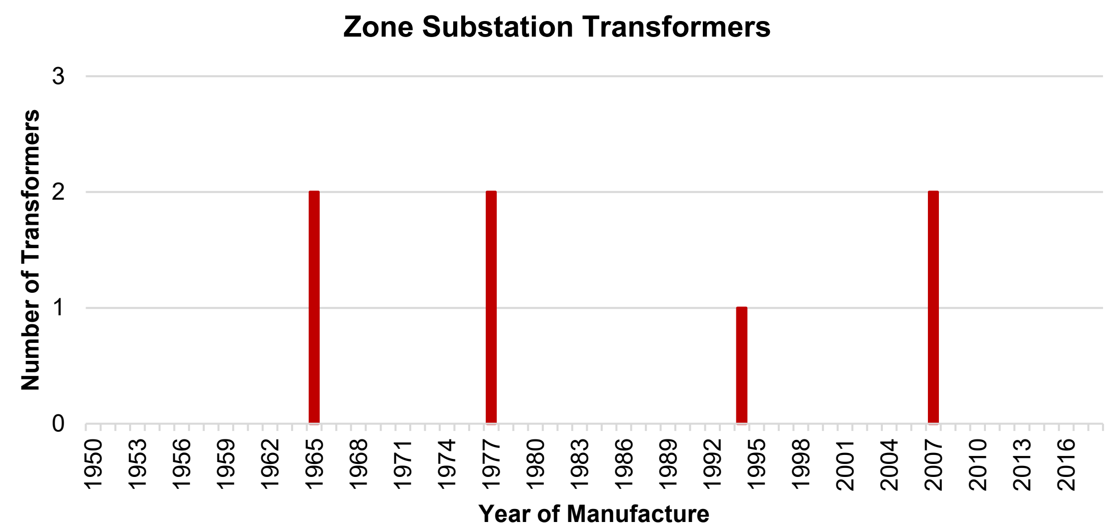


Figure 5-9: Asset Age Profile: Zone Substation Power Transformers

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.

This includes 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 is 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 also undertaken 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

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 RAMP 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 Management 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
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

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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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% 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

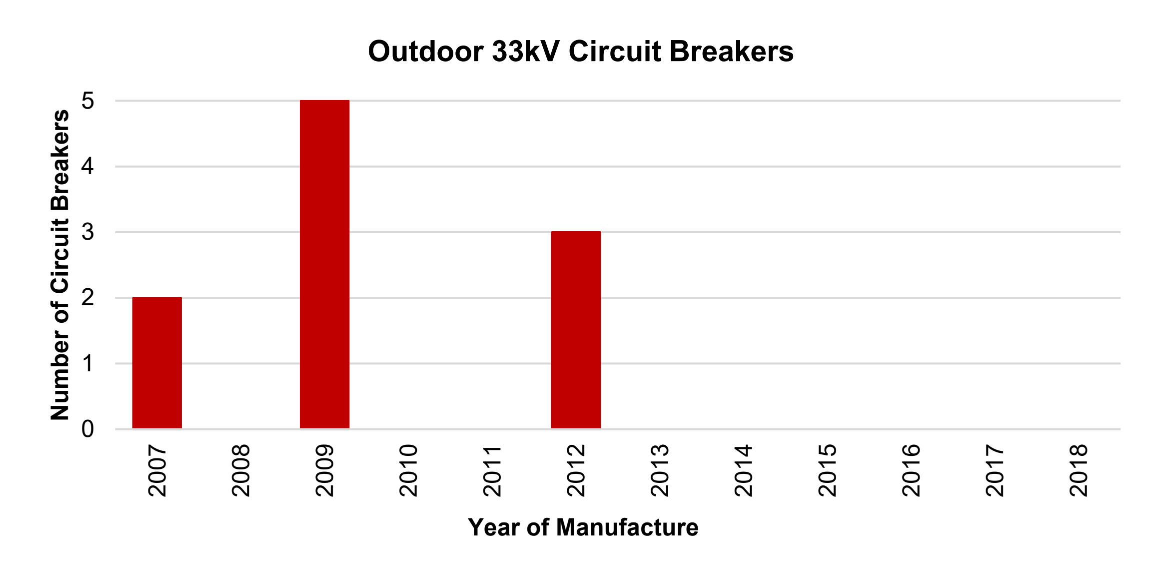

Figure 5-10: Asset Age Profile: 33kV Circuit Breakers

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 RAMP 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 Management Standard
SC2010	Service Code - Outdoor Circuit Breaker Minor Service

Controlled Document Reference	Controlled Document Description
SC2013	Service Code - Outdoor SF_6 Circuit Breaker Service
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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
ZS: 11kV Ground Mounted CBs		3.7%	44.4%	18.5%	33.4%	4	
ZS: 11kV Pole Mounted CBs					100%	4	

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

5.12.4 Asset Age Profile: 11kV Circuit Breakers and Switchboards

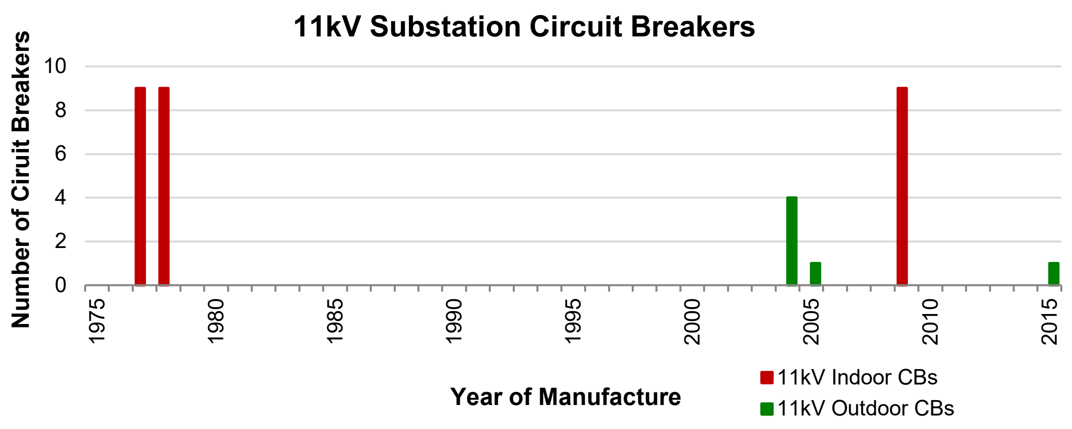

Figure 5-11: Asset Age Profile: 11kV Circuit Breakers and Switchboards

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. While typically Centralines' 11kV circuit breakers are in good condition, it is currently planned to replace the Waipawa indoor 11kV switchboard and protection relays commencing in the 2023/24 financial year. 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 Management 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 was developed to strengthen all Centralines' substation buildings to building importance level four of the new building standard. This category relates to structures with special post disaster recovery functions. Work on the Waipukurau and Waipawa buildings has been completed and Takapau is scheduled for the 2018/19 financial year.

5.13.3 Asset Condition Assessment: Zone Substation Buildings

Asset Type	Grade H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
Zone Substation Buildings			16.5%	16.5%	67%	3	

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

5.13.4 Asset Age Profile: Zone Substation Buildings

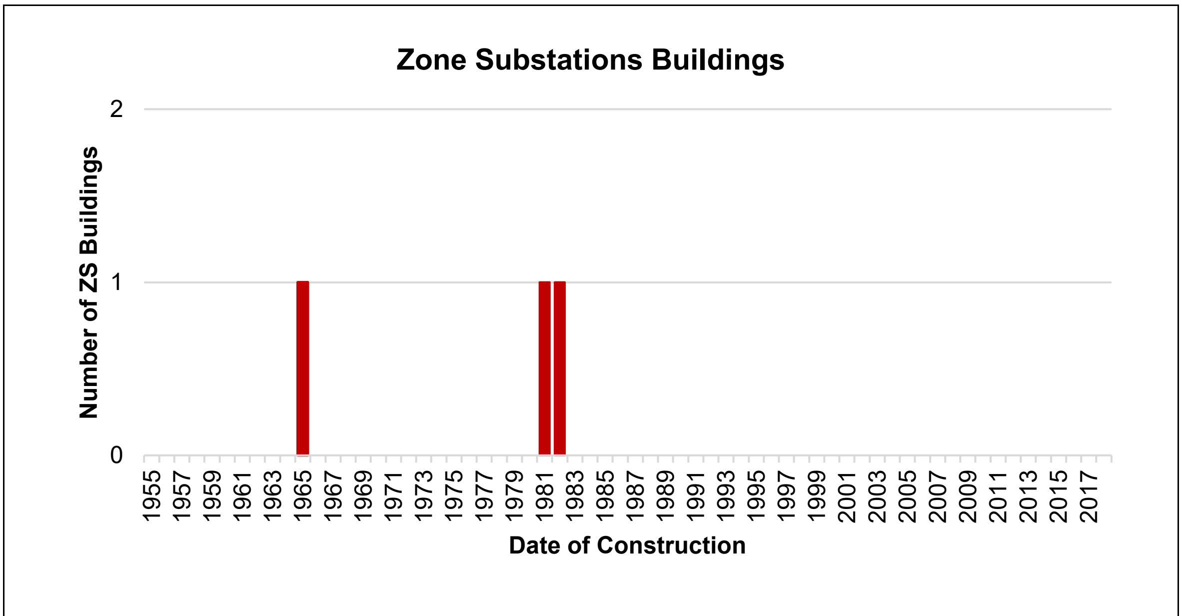

Figure 5-12: Asset Age Profile: Zone Substation Buildings

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, starting in the 2021/22 financial year with Waipukurau, 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 Centralines' Management service provider's Network Operations Centre 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 RAMP planning period. As discussed, a seismic strengthening programme will be completed on all substation buildings by the end of the 2018/19 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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
Load Control Plant					100%	4	

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

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 (L+G).

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

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 RAMP 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

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 Management 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 19,750 network poles which are predominantly concrete.

Pole Type	Number
Wood	218
Concrete	19,520

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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
Poles: Concrete and steel structures		0.5%	32.25%	32.25%	33%	3	1%
Poles: Wooden		18%	38%	38%	6%	3	20%

Table 5-40: Asset Condition Assessment: Poles

5.15.4 Age Profile: Poles

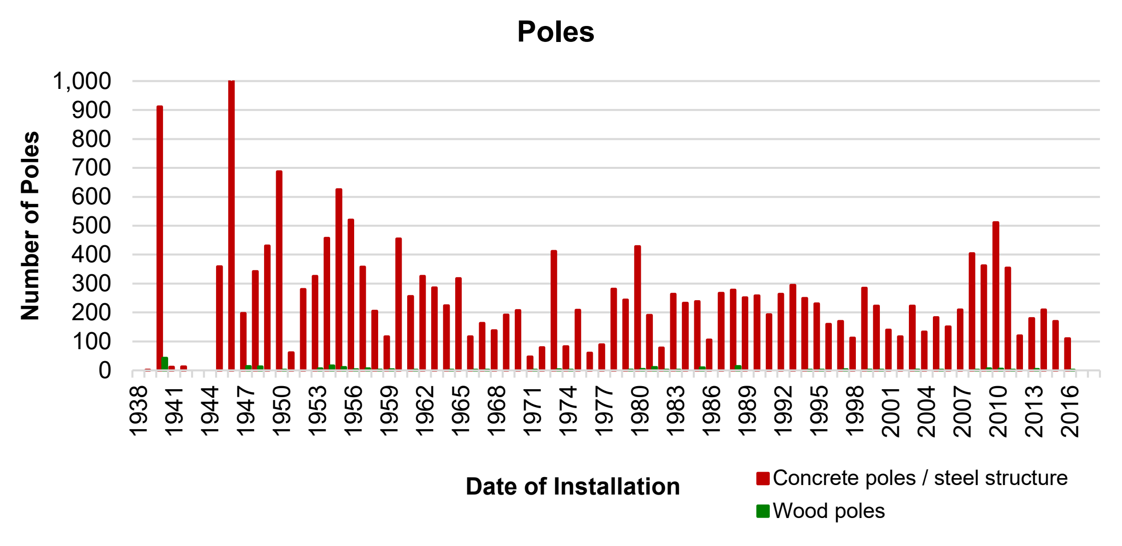

Figure 5-13: Age Profile: Poles

5.15.5 Maintenance Plan: Poles

Safety risks posed to the public and employees by pole failures are recognised by Centralines as significant. 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
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 1,394 kilometres of 11kV distribution lines and approximately 247 kilometres of low voltage lines which includes 151 kilometres of distribution mains, 51.5 kilometres of hot water conductor and 44 kilometres of streetlight conductor. 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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
Distribution OH Open Wire Conductor		1%	47.5%	47.5%	4%	2	1%
LV OH Conductor		0.5%	44.75%	44.75%	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

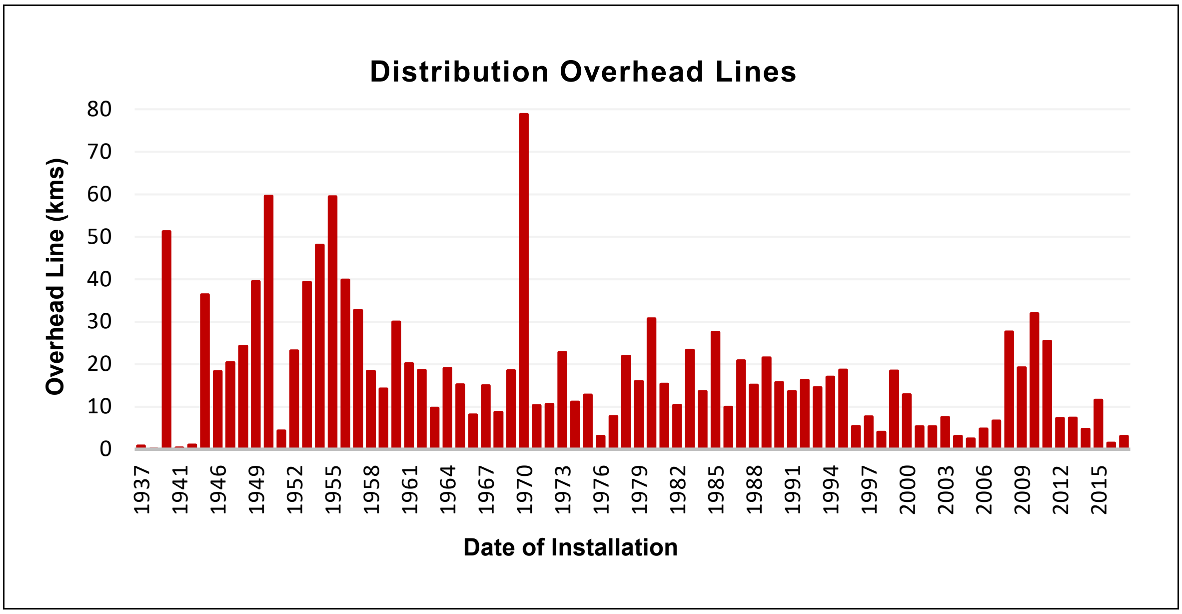

Figure 5-14: Asset Age Profile: Distribution Overhead Lines

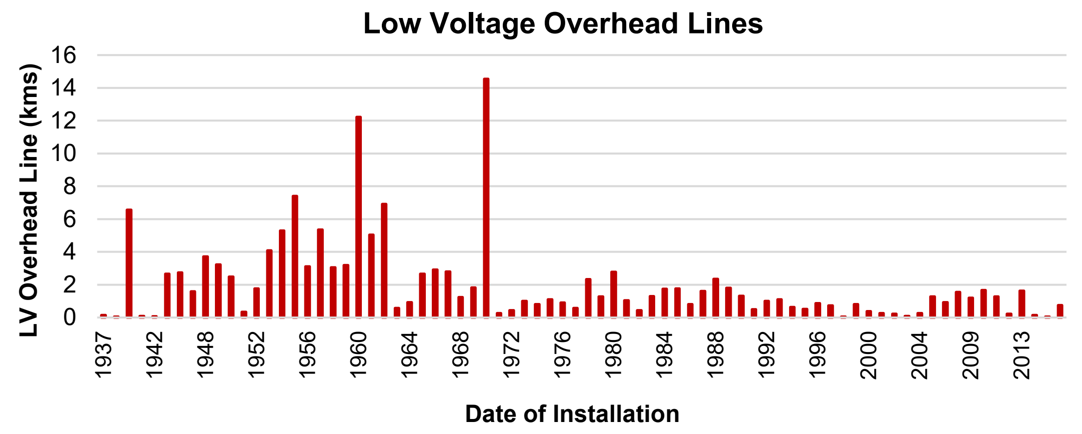

Figure 5-15: Asset Age Profile: Low Voltage Overhead Lines

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

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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
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 Management 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 approximately 35 kilometres of both XLPE (32km's) and PILC (3km's) 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 approximately 90 kilometres of cable including 62.5 kilometres of distribution mains, 21 kilometres of street lighting cabling and seven kilometres of hot water 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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
Distribution UG XLPE and PVC			2.5%	2.5%	95%	3	
Distribution UG PILC			2.5%	2.5%	95%	3	
LV UG Cable			13.5%	13.5%	73%	2	
LV UG Streetlight Circuits			13.5%	13.5%	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

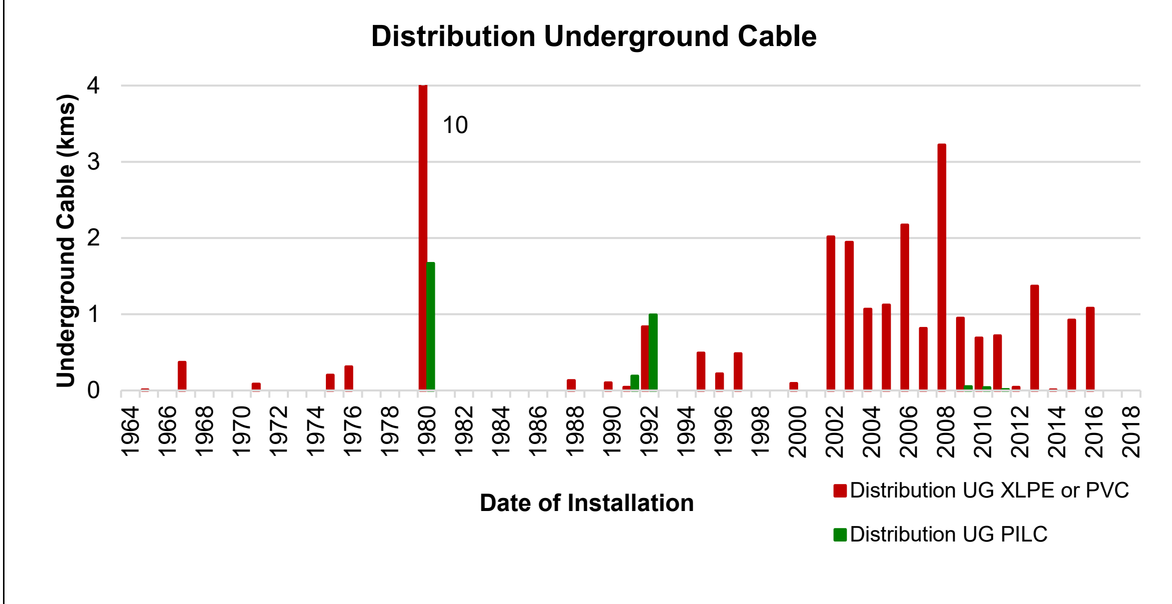

Figure 5-16: Asset Age Profile: Distribution Underground Cable

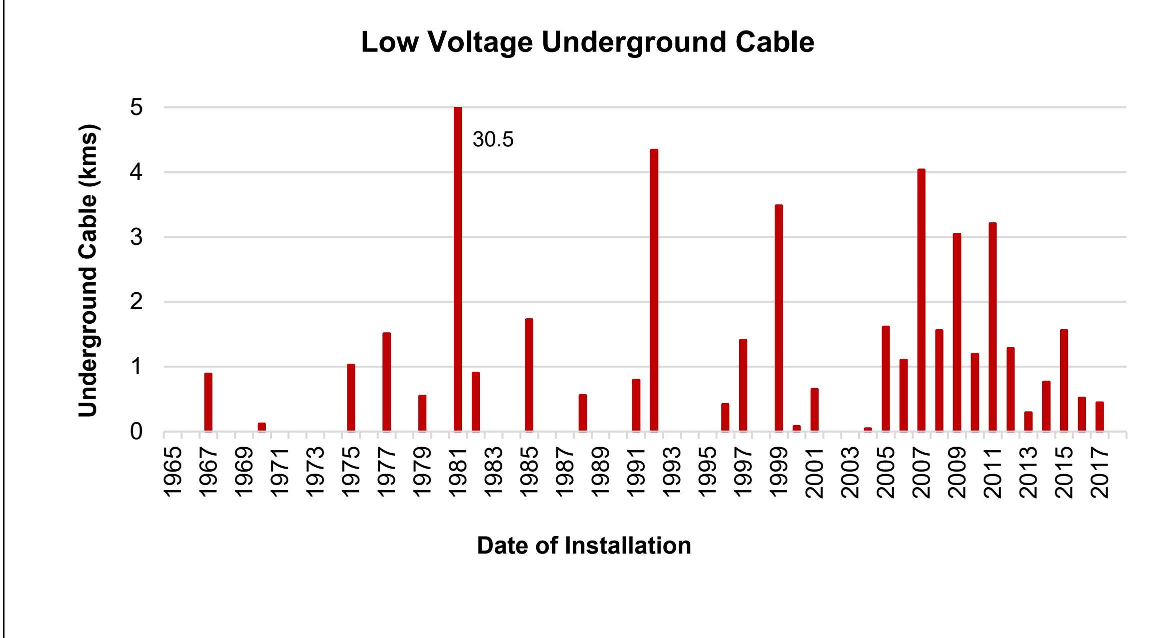

Figure 5-17: Asset Age Profile: Low Voltage Underground Cable

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

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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.

Replacement/Refurbishment Drivers
• 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 Management 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

Controlled Document Reference	Controlled Document Description
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 2,137 pole mounted and 167 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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
Transformers: Pole Mounted		1%	34.5%	34.5%	30%	3	1%
Transformers: Ground Mounted		1%	10%	10%	79%	3	1%

Table 5-53: Asset Condition Assessment: Distribution Transformers

5.18.4 Asset Age Profile: Distribution Transformers

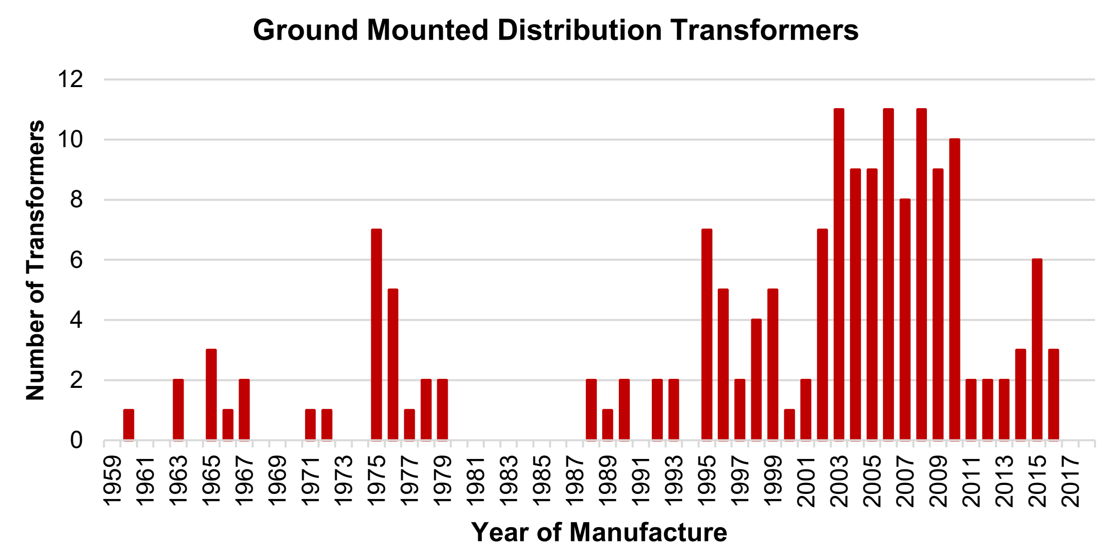

Figure 5-18: Asset Age Profile: Ground Mounted Distribution Transformers

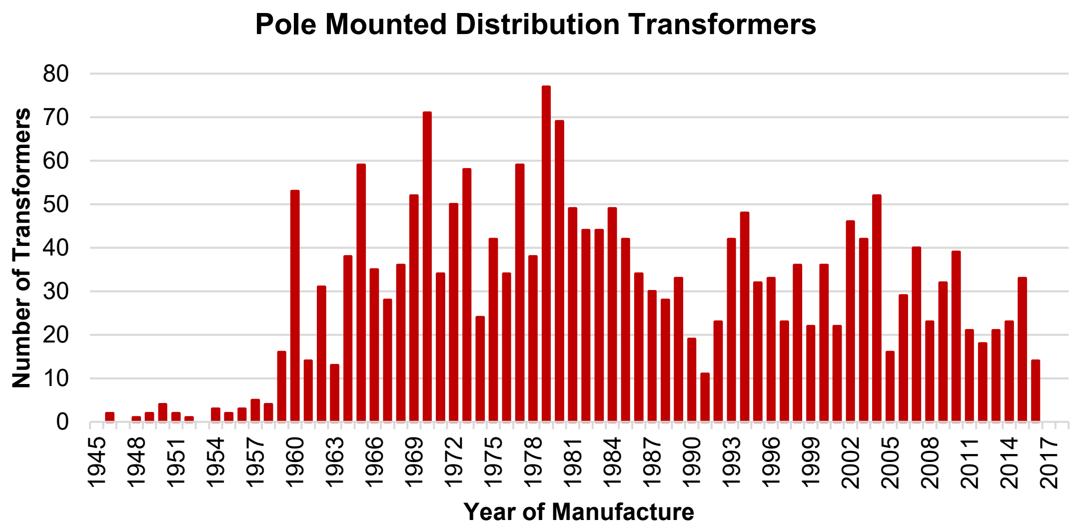

Figure 5-19: Asset Age Profile: Pole Mounted Distribution Transformers

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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

Condition Monitoring/Testing: Pole Mounted Transformers	Frequency
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 five-year period.	

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

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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

Controlled Document Reference	Controlled Document Description
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 Management Standard
SC2050	Service Code - Dielectric Breakdown Voltage Test
SC2051	Service Code - Acidity Test
SC2052	Service Code - Dissolved Gas Analysis
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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
Voltage Regulators				50%	50%	3	

Table 5-58: Asset Condition Assessment: Voltage Regulators

5.19.4 Asset Age Profile: Voltage Regulators

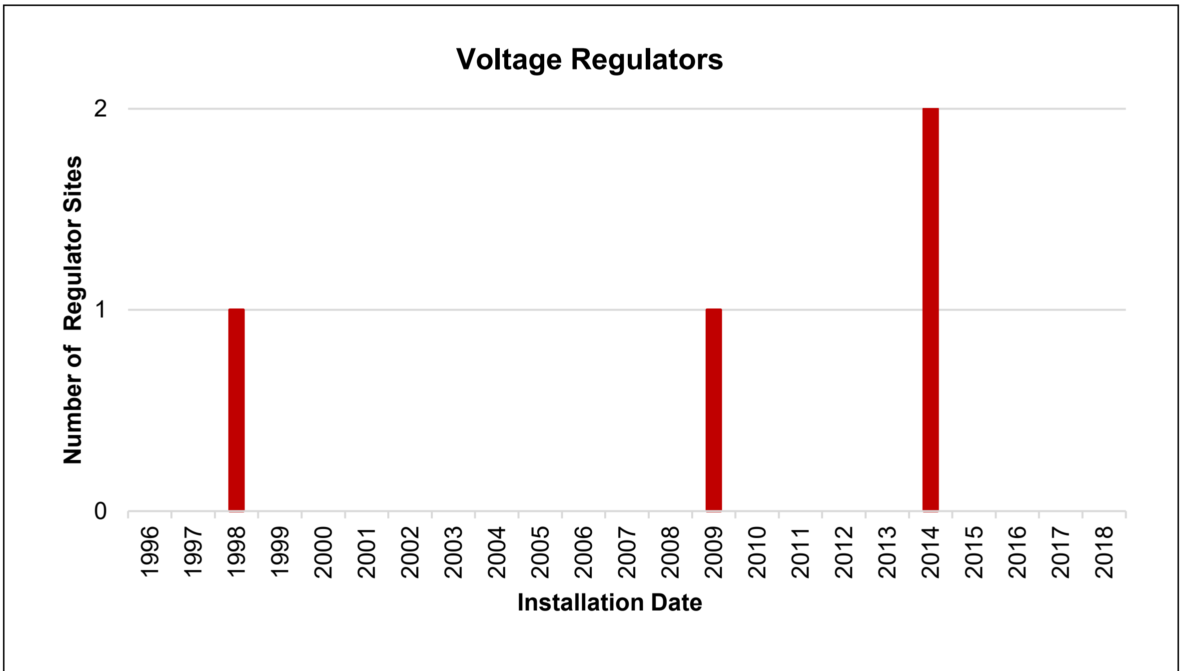

Figure 5-20: Asset Age Profile: Voltage Regulators

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 RAMP 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 Management 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 290 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 2,694 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. They can be programmed to auto-reclose under certain circumstances until they lock out if the fault remains after a predetermined number of operations.

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 79 reclosers and sectionalisers on its network including both three phase and single phase units.

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.

There have been some cracked insulators identified on a certain type of ABS and there have been indications that other networks may have been experiencing similar issues. Centralines is now using Schneider ABSs for all new installations.

More recently due to some failures of single phase 11kV reclosers (peanuts) a prioritised replacement programme has been developed and is being implemented.

5.20.7 Asset Condition Assessment: Overhead Distribution Switchgear

Asset Type	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Data Accuracy	% Forecast to be Replaced in next 5 Years
Pole Mounted 11kV Switches and Fuses		1%	23.5%	23.5%	52%	2	1.5%
Reclosers and Sectionalisers		3%	22.5%	22.5%	52%	3	14%

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

5.20.8 Asset Age Profile: Overhead Distribution Switchgear

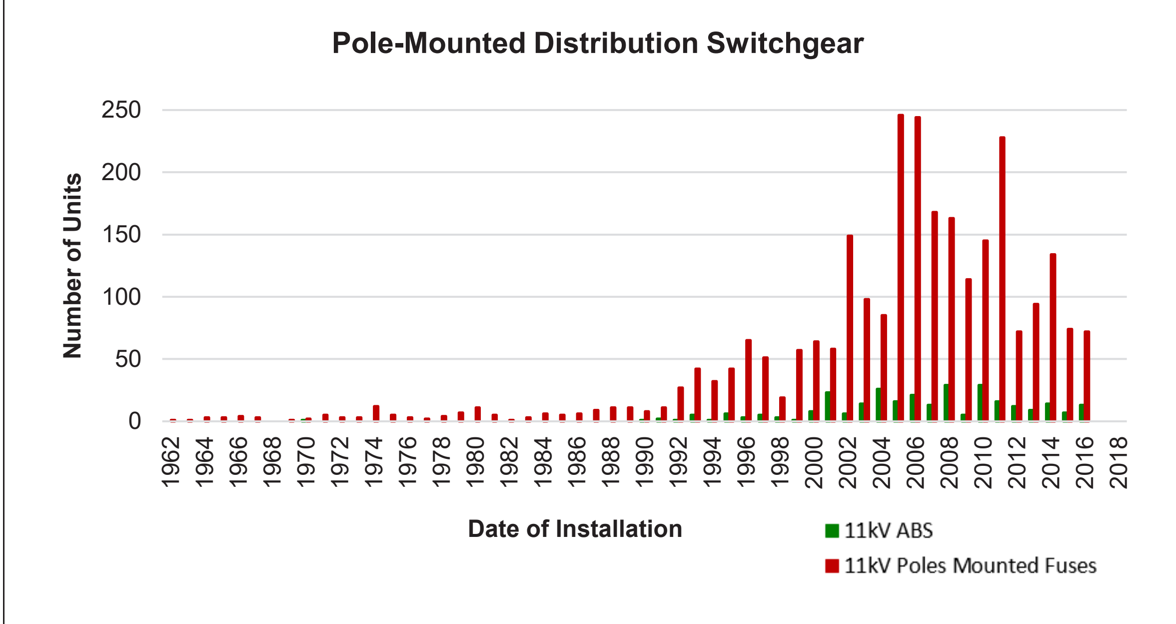

Figure 5-21: Asset Age Profile: Pole Mounted Distribution Switchgear

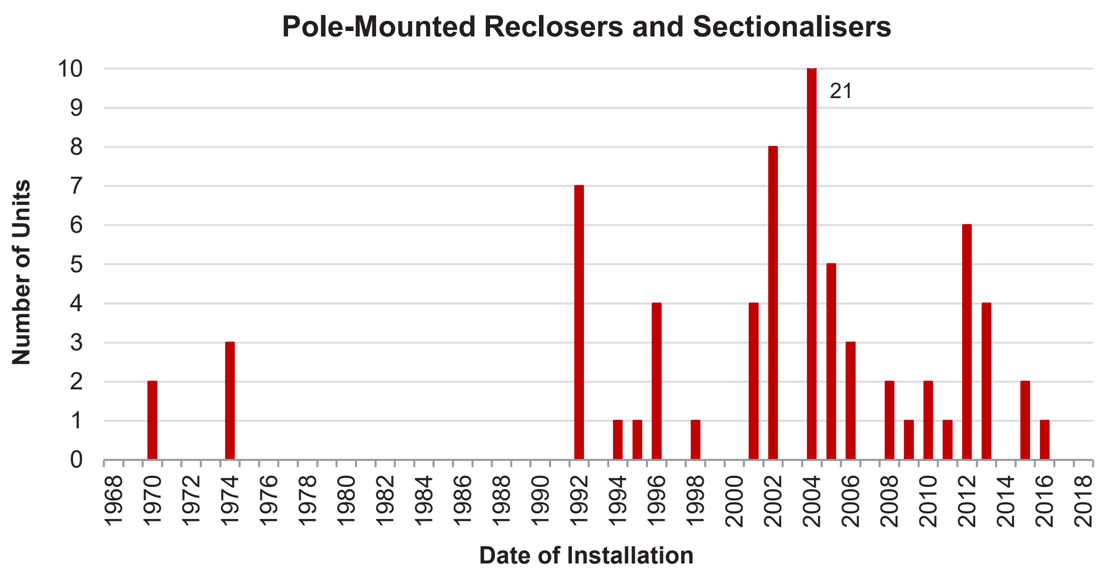

Figure 5-22: Age Profile: Pole Mounted Reclosers and Sectionalisers

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
Thermo-vision, 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	10-year cycle

Condition Monitoring/Testing	Frequency
are all inspected and cleaned. The switches are opened and closed to ensure correct operation and alignment of all moving parts.	

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 Management 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. Typically, ground mounted switchgear, including a combination of three or four 11kV switches and/or fused switches, contained within a standalone unit is referred to as a ring main unit (RMU). An RMU typically can have a maximum of two fused switches.

Ground mounted switchgear that encompasses a single switch or fused switch unit that can be connected to an RMU by way of an 11kV busbar or cable, or be a stand-alone unit is referred to as an 11kV switch.

RMUs and 11kV switches 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 with both manual and remote operating capability. Centralines' currently has 16 ring main units and seven 11kV switches 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 H1	Grade H2	Grade H3	Grade H4	Grade H5	Data Accuracy	% Forecast to be Replaced in next 5 Years
11kV Ring Main Units					100%	4	
11kV Switches					100%	4	

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

5.21.4 Asset Age Profile: Ground Mounted Distribution Switchgear

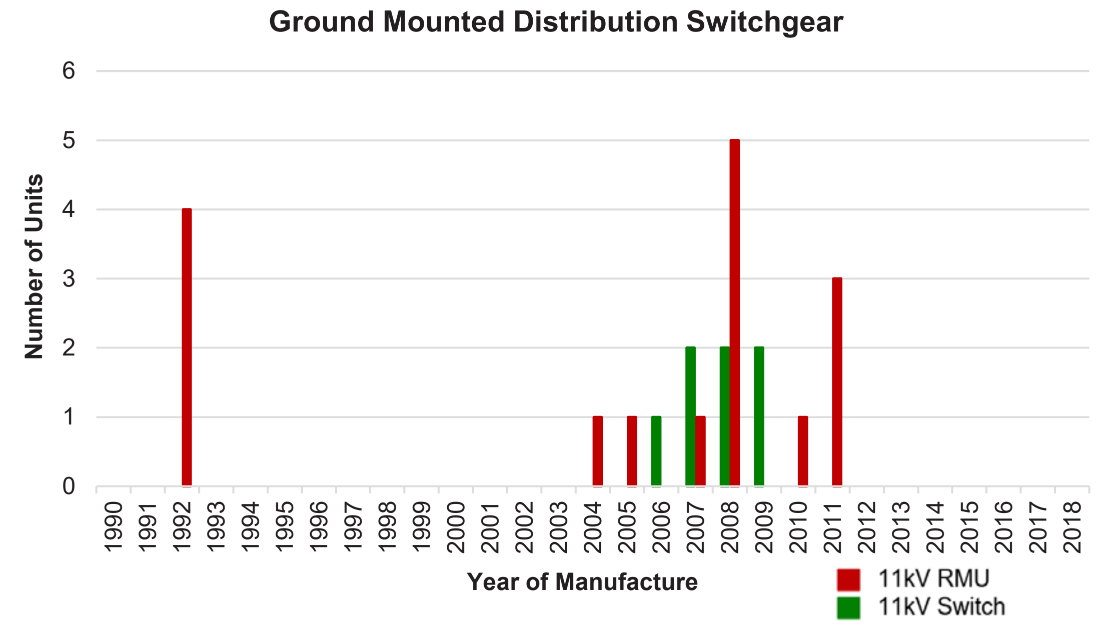

Figure 5-23: Asset Age Profile: Ground Mounted Distribution Switchgear

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 RAMP 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

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

Controlled Document Reference	Controlled Document Description
NK5017	Ground Mounted Distribution Equipment Inspection Standard
NK5038	Metalclad Switchgear Maintenance Standard
NK5043	Insulating Oil Maintenance Standard
NK5070	Sulphur Hexafluoride (SF_6) Use and Handling Standard
NK6003	Concrete Manufactured Products Standard
OS1014	Commissioning and Livening Equipment Standard
OS1015	Defect Management 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

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5.22 Overview of Secondary Assets

This section provides descriptions and high-level summarises 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 Centralines' service provider's, 24/7 Network Operations Centre 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 Centralines' service providers head office in Hastings
- the monitoring and enabling of a 33kV sub-transmission ring circuit, differential protection scheme, and
- 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 Centralines' service provider's Network Operations Centre in Hastings and 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 utilises 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 that is able to provide the ability to optimise the state of the 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 systems and processes during simulated crisis events, and
- train new and existing operators to maintain required competency standards.

Historically, 17 different applications were used in the Network Operations Centre to manage network operations. These functions are merged into the one integrated platform.

The previously described communication platforms are utilised for the ADMS to communicate with Remote Terminal Units (RTUs) located in substations and field equipment. 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, five 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 ten 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 thermos-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.
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 thermos-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 thermos-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 battery replacements.
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 thermos-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 1,207 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 projections for the RAMP 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
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Overhead Lines	745	735	735	735	735	735	735	735	735	735
Underground Cables	39	27	27	27	27	27	27	27	27	27
Circuit Breakers	15	15	15	15	15	15	15	15	15	15
Zone Substation Buildings and Equipment	45	42	42	42	42	42	42	42	42	42
Power Transformers	29	38	38	38	38	38	38	38	38	38
Distribution Transformers and Regulators	42	49	49	49	49	49	49	49	49	49

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
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Distribution Switchgear	42	30	30	30	30	30	30	30	30	30
Vegetation	434	362	362	362	362	362	362	362	362	362
SCADA and Communications	17	22	22	22	22	22	22	22	22	22
TOTAL	**1,408**	**1,320**	**1,320**	**1,320**	**1,320**	**1,320**	**1,320**	**1,320**	**1,320**	**1,320**

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

5.32 Asset Renewal Expenditure Projections

Centralines' renewal expenditure projections for the RAMP planning period is presented by asset category in the table below.

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
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
11kV GM CBs						450	450			450
11kV PM Reclosers and Sectionalisers	297	145	145	145	100	100	100	190	100	100
11kV PM Switches and Fuses	14	10	10	10	10	10	10	10	10	10
Concrete Poles	240	200	200	200	200	200	200	200	200	200
Distribution OH Open Wire Conductor	420	347	330	455	422	425	425	425	425	425
PM Transformers	75	75	75	75	75	75	75	75	75	75
Wooden Poles	75	75	75	75	75	75	75	75	75	75
Zone Substation Transformers	28									

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
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Zone Substations	103	150								

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

5.33 Renewal Project List 2018-2019

Asset Category	Project Description	Project Budget ($000)
Distribution and LV Lines	Wilder Road Stage 7	150
Distribution and LV Lines	11kV Reconductor Matthew Street	45
11kV PM Switches	Proactive Replacements of Aged ABS	14
Distribution and LV Lines	Reconductor 11kV and LV Higginson Street	50
Zone Substations	Takapau Zone Substation - Replace Porcelain Lightening Arrestors	5
Zone Substations	Install Online Temperature Management System to Waipukurau Zone Substation Power Transformers	28
Zone Substations	Seismic Strengthening of Takapau Zone Substation	97
11kV PM Reclosers and Sectionalisers	Centralines Recloser Replacement CB 25	49
11kV PM Reclosers and Sectionalisers	Centralines Recloser Replacement CB 36	49

Table 5-74: Renewal Project List 2018-2019

5.34 Renewal Project List 2019/20 to 2022/23

Renewal Project List 2019/20 to 2022/23		
Financial Year	**Asset Category**	**Project Description**
2019/20	Distribution and LV Lines	Reconductor Te Aute College Spur
2019/20	Zone Substations	Wilder Road Upgrade
2019/20	Zone Substations	Replace Existing Porcelain Lighting Arrestors at Waipawa Zone Substation
2019/20	Distribution and LV Lines	Oruawharo Road Reconductor 1km of 1942 Small Diameter Copper Conductor
2019/20	Distribution Substations and Transformers	Replace 2 Pole Mounted 200kVA Transformers B4/119
2019/20	Zone Substations	Allocation to Replace Peanut Remote-Controlled Switches with ENTEC Switch
2021/20	Distribution and LV Lines	Reconductor Drumpeel Road Capex 625
2021/20	Zone Substations	Replace Existing Porcelain Lighting Arrestors at Wilder Road Zone Substation
2021/20	Zone Substations	Seismic Strengthening of the Takapau Zone Substation Power Transformer Mountings
2021/20	Distribution Substations and Transformers	Replace 2 Pole Mounted 200kVA Transformers C4/2
2021/22	Distribution and LV Lines	Paget Road 2.5km Reconductor 1948 Small Diameter Copper Conductor
2022/23	Zone Substations	Upgrade Waipukurau Zone Substation Security Doors and Install New Security System
2022/23	Distribution and LV Lines	Smedley Road 2.3km Reconductor 1945 Small Diameter Copper Conductor

Table 5-75: Renewal Project List 2019/20-2022/23

5.35 Renewal Project List 2023/24 to 2027/28

Renewal Project List 2023/24 to 2027/28		
Financial Year	**Asset Category**	**Project Description**
2023/24	Zone Substations	Takapau Zone Substation 11kV Switchboard and Protection Upgrade (Half the Switchboard)
2023/24	Zone Substations	Upgrade Waipawa Zone Substation Security Doors and Install New Security System
2024/25	Zone Substations	Takapau Zone Substation 11kV Switchboard and Protection Upgrade (Half the Switchboard)
2024/25	Zone Substations	Upgrade Takapau Zone Substation Security Doors and Install New Security System
2026/27	Zone Substations	Install Interceptor Tank at Waipukurau Zone Substation
2026/27	Zone Substations	Install Interceptor Tank at Waipawa Zone Substation
2027/28	Zone Substations	Waipawa ZS 11kV Switchboard and Protection Upgrade (Half the Switchboard)

Table 5-76: Renewal Project List 2023/24-2027/28

5.36 Determination Reference Mapping Table

Section 5 Reference	Determination Reference
5.1 Introduction to this Section 5.2 Overview of Lifecycle Asset Management Planning	12
5.3 Maintenance	12.1, 12.2
5.4 Renewal	12.3, including 12.3.1 and 12.3.2

Section 5 Reference	Determination Reference
5.5 Asset Lifecycle Management by Asset Category 5.6 Sub-transmission: Asset Group Overview 5.7 Sub–transmission: 33kV Overhead Lines 5.8 Sub–transmission: 33kV Underground Cables 5.9 Zone Substations: Asset Group 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 Zone 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
5.32 Asset Renewal Expenditure Projections	12.3
5.33 Renewal Project List 2018-2019 5.34 Renewal Project List 2019/20 to 2022/23 5.35 Renewal Project List 2023/24 to 2027/28	12.3.3 12.3.4 12.3.5

Table 5-77: Determination Reference Mapping Table

6

NON-NETWORK DEVELOPMENT MAINTENANCE & RENEWAL

CONTENTS

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, 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 Regulatory 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 Coughlan 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 have been completed on both the Centralines' Peel Street depot and Coughlan Road storage yard buildings. Some mitigation is required on the Peel Street site but this is currently on hold pending the potential construction of a new office complex (refer below). The storage yard buildings have been completed as part of a network project to strengthen the Waipukurau Substation building which is on the same site.
Peel Street Extension	Neighbouring properties have been sought to extend the size of the property. One property has now been purchased and Centralines are in discussion with the other property owner.

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 Regulatory 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.	17 vehicles
Other	Excavators, trailers and generators, etc.	16 assets

Table 6-2: Description and Quantity of Vehicles

6.3.2 *Renewal Policy*

Centralines has a Motor Vehicle Policy (CL-PE-16), 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 their 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.

One of the existing Bucket Trucks is scheduled for a rebuild in the upcoming planning period. No other material maintenance activities are planned for this period.

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

CENTRALINES LIMITED

7

RISK MANAGEMENT

CONTENTS

7. RISK MANAGEMENT

7.1 Introduction to this Section

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. This is not only to ensure operational risks to assets are effectively identified and managed but also, given the changing dynamics 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 Executive and Senior Management Risk Committee

The Centralines' Executive and Senior Management Risk Committee meet at least six-monthly to formally discuss and challenge Centralines risks, by:

- monitoring and managing risks
- escalating risks of material significance
- managing the progress of control remediation activities, and
- promoting a risk-awareness 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 Group Risk Manager

Unison Networks Limited is the Management services provider for Centralines' and Unison's Group Risk Manager is responsible for developing, coordinating and implementing strategic risk maturity practices.

Unison's Group Risk Manager updates the Enterprise Risk Register and prepares the relevant risk reports for Centralines' Senior Management and the ARC. In addition, the Group 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.

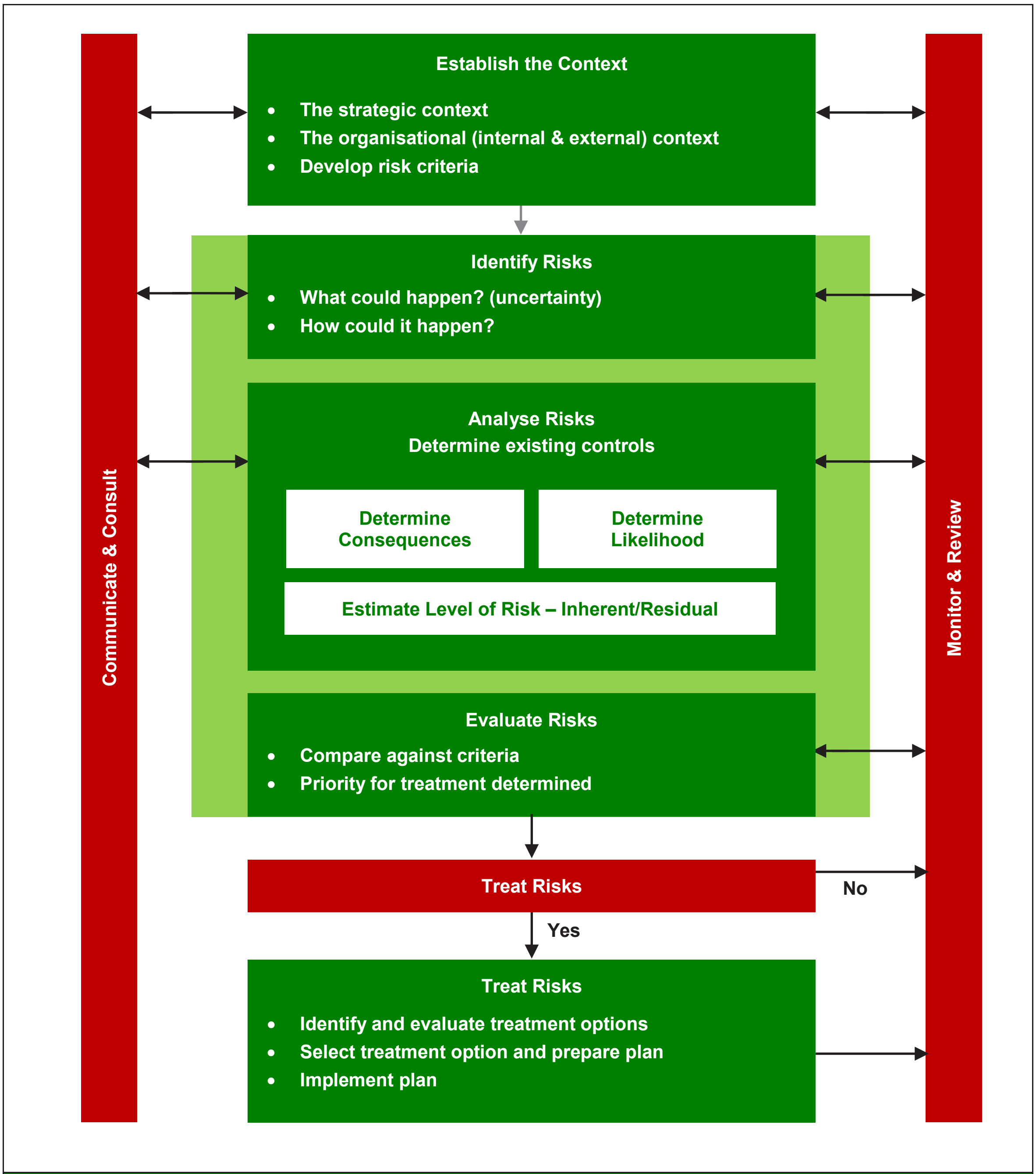

Figure 7-1: The Risk Management Process

7.3.1 Establish the Context

Figure 7-1 outlines the first step in the risk management process is to 'Establish Context'. This is affected 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., and
- 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	Extreme	Extreme
	Possible	Insignificant	Low	Medium	High	Extreme
	Rare	Insignificant	Low	Medium	High	Extreme

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 considered when determining whether to treat a risk.

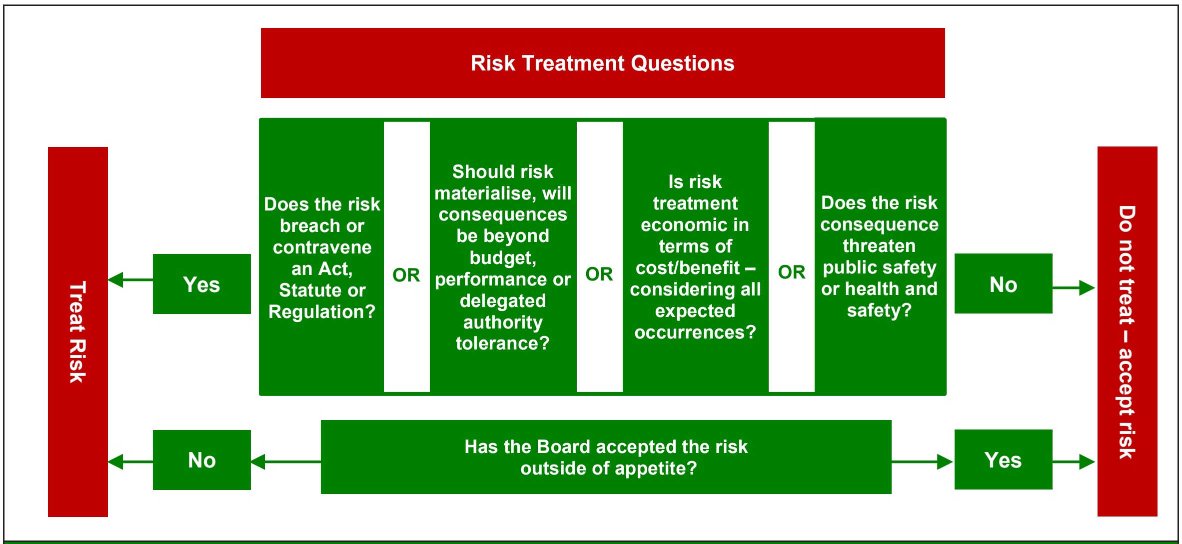

Figure 7-3: Risk Treatment Questions

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. Treatment plans are then monitored and tracked until actions are completed and closed.

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 several systemised management practices in place 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.

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 of vital importance to Centralines and accordingly it has a Public Safety Management System (PSMS) in place which is compliant with NZS 7901:2008 Electricity and Gas Industries – Safety Management Systems for public safety. In March 2018 Centralines underwent a re-validation audit to seek recertification to this standard. The outcome of this audit was not available at the time of publishing this Regulatory Asset Management Plan. 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 six-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 six-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 operational risk register and has a representative on Unison's Networks and Operations Operational Risk sub-committee.

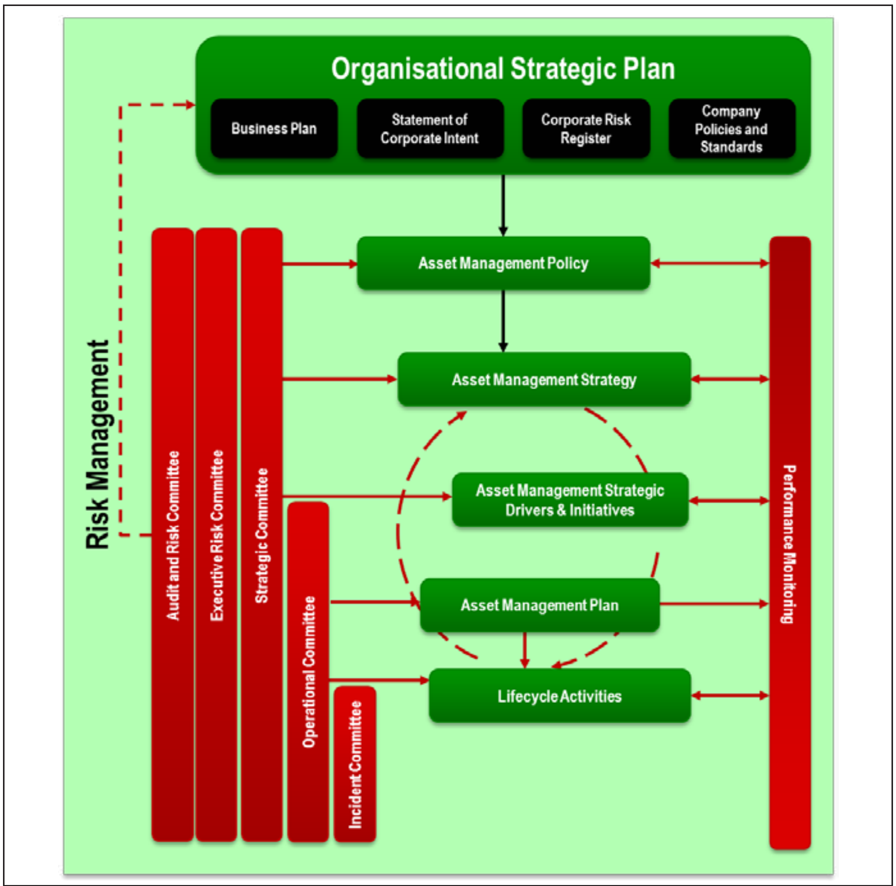

Figure 7-4: Committee Structures

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.

[1] SWIFT Analysis - Structured What If Technique

7.6.1 Network Resilience to HILP Events

7.6.1.1 GXP Substations

Transpower who own and operate New Zealand's transmission network, has 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) 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. Options to mitigate this are being considered.

A review of the structural integrity of Centralines' zone substation buildings has been undertaken and subsequently seismic strengthening of, and remedial work to, the zone substation buildings has been completed except for Takapau Substation. Seismic strengthening of Takapau Substation will commence in 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 which have impacted the region. Of these, five have caused significant damage to buildings and infrastructure, 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
- volcanic ashfall from the Taupo Volcanic Zone, and
- tsunami impacting the coastal network.

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, and
- 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.

There are several physical attributes that improve network resilience for Centralines. These attributes are listed below.

- A containerised data centre that is elevated above the ground and placed on base isolators providing increased resilience to significant seismic shaking, liquefaction and flooding. The container is separate to any main administration building and is therefore accessible in situations where administration building access is denied.
- A purpose built 'hot site' and alternate operations centre that has been strategically placed in Havelock North where there is a low risk of tsunami, liquefaction and flooding. The 'hot site' has N-1 fibre capability and is built to 100% of Importance Level 4 under the Building Standard.
- A 'Disaster Recovery' (DR) container that replicates in real time and is located away from the main data centre.
- Seismically strengthened substations.

The physical attributes that provide an organisationally resilient system are underpinned by a few continuity plans. Continuity plans guide an effective and efficient response and recovery, to significant events. Simulation exercises test the effectiveness of the continuity plans. In February 2018 using external consultants, Centralines undertook a storm simulation exercise that tested Centralines' continuity plans and ability to operate independently of Unison Networks Limited, Centralines' Management services provider.

These plans are outlined below.

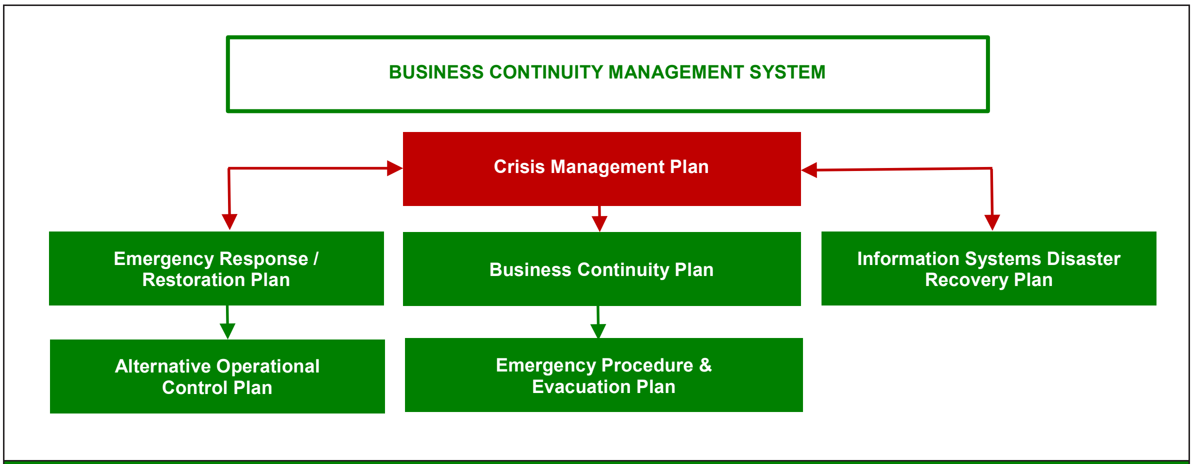

Figure 7-5: Business Continuity Management System

7.7.2.1 Crisis Management Plan

The Crisis Management Plan is a key document in the Business Continuity Management Programme. Under the Management Services Agreement, Centralines is included in Unison's Crisis Management Plan. This 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 the Network Operations Centre (NOC). Loss of supply can be restored remotely by the NOC or locally by Centralines' personnel. Centralines has in place an after-hours roster for 24-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. It provides a checklist of actions to be followed by NOC staff when operations are transferred, and identifies tasks required to close down the alternate site upon resumption of operations at the Omahu Road NOC.

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. It 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 to this Section 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

8

EVALUATION OF PERFORMANCE

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 RAMP
- performance against service level targets, and
- assessment under the Asset Management Maturity Assessment Tool.

The section concludes with an analysis of gaps identified and initiatives that are planned to close these gaps.

Evaluation of performance in respect of the 2017/18 financial year is undertaken using year-end forecast information where this is available.

8.2 Review of Progress Against Plan

In this section Centralines' performance in delivering the plans set out in the RAMP update disclosed in March 2017 is reviewed in terms of physical progress (commissioning of works) and financial progress (cost performance). This evaluation is undertaken for the 2016/17 and 2017/18 financial years, for both capital and maintenance programmes.

8.2.1 Planned Capex

Capital projects proposed for each financial year as published in Centralines' 2017 AMP Update are detailed below and include the status of each project as at February 2018.

An update is provided for all 16/17 projects not completed at the time of the 2017 AMP Update as well as all 2017/18 projects.

8.2.1.1 Capex Programme of Works 2016/17

Ref	Constraints and Projects	Category	Status	AMP Budget	Actual Spend	Comments
39808	Wilder Road Stage 5	Asset Replacement and Renewal	WIP	150k	149k	Carried over due to resource availability
39810	Install new 33kV ripple CB at Waipukurau Zone Substation	Reliability, Safety and Environment	WIP	120k	137k	Completed April 2017
39809	Feeder 13 - Install paralelling RCS on Pole 900757 to shift urban customers off Feeder 13 (rural) onto Feeder 15 (urban)	Quality of Supply	Complete	50k	55k	Completed March 2017
39805	Reconductor Awahiwi Road	Asset Replacement and Renewal	Complete	30k	47k	Completed March 2017

Table 8-1: Physical Progress of Planned Network Development Projects – 2016/17

8.2.1.2 Capex Programme of Works – 2017/18

Ref	Constraints and Projects	Category	Status	AMP Budget	Actual Spend	Comments
5603	Seismic strengthening of the Waipukurau Zone Substation building	Other Reliability, Safety, and Environment	Complete	100k	106k	On time and on budget
5632	Wilder Road Substation - Preparations for substation upgrade	Legislative and Regulatory	Complete	100k	149k	On time and over budget due to bringing forward of upgrade work
5647	Ruataniwha Street, Waipawa CBD - Improve LV supply	Quality of Supply	Carryover	80k		Carried over due to resource availability
617	Nancy Street Reconductor Takapau	Asset Replacement and Renewal	Carryover	125k		Carried over due to resource availability

Ref	Constraints and Projects	Category	Status	AMP Budget	Actual Spend	Comments
5630	Centralines Off-Grid Rural Generation Initiative	Research and Development	Carryover	100k		On Hold
620	Church Street reconductor Waipawa	Other Reliability, Safety, and Environment	Complete	40k	41k	On time and on budget
621	Replace two pole mounted 200kVA TX B4/8 Waverley Street Waipawa with ground mount	Other Reliability, Safety, and Environment	Complete	100k	90k	On time and on budget
5628	11kV diversion Porangahau bridge	Other Reliability, Safety, and Environment	WIP	120k		Expected to complete in March
649	Replace Transformer C4/203	Asset Replacement and Renewal	Carryover	65k		Scope extension underway due to customer request
5627	Wilder Road Stage 6 of 8	Asset Replacement and Renewal	Carryover	150k		Carried over due to resource availability
5590	Transfer load pulses to fibre from radio for ripple plant control	Quality of Supply	WIP	10k		Expected to complete in March
5649	Install online temperature management system to Waipukurau or Takapau Zone Substation power transformers	Other Reliability, Safety, and Environment	WIP	25k		Expected to complete in March
642	Feeder 83 - Install new Remote Control Switch (RCS) on Pole 917054	Quality of Supply	WIP	50k		Expected to complete in March
5610	Replace ABS 543 with a Remote Control Switch (RCS)	Quality of Supply	Complete	50k	40k	On time and under budget
5646	Feeder 15 - 11kV Cable Upgrade	System Growth	WIP	40k		Expected to complete in March
5643	Feeder 46 - Install new Sectionaliser on Pole 914347	Quality of Supply	Complete	60k	44k	On time and under budget

Ref	Constraints and Projects	Category	Status	AMP Budget	Actual Spend	Comments
5642	Feeder 18 - Replace ABS 485 with a Remote Control Switch (RCS)	Quality of Supply	Complete	50k	37k	On time and under budget
5631	Install new Ion meter at Waipawa GXP	Quality of Supply	Complete	35k		On time and budget
634	Feeder 1 - Install Distribution Transformer Monitoring (DTM) meter	System Growth	Cancelled	10k		Alternate technology is to be implemented. Remote loggers will be installed instead and work is underway to identify suitable products and vendors.
635	Feeder 2 - Install two Distribution Transformer Monitoring (DTM) meters	System Growth	Cancelled	20k		
636	Feeder 18 - Install Distribution Transformer Monitoring (DTM) meter	System Growth	Cancelled	10k		
5640	Feeder 83 - Install Distribution Transformer Monitoring (DTM) meter	System Growth	Cancelled	10k		
638	Feeder 45 - Install Distribution Transformer Monitoring (DTM) meter	System Growth	Cancelled	10k		
5639	Feeder 75 - Install Distribution Transformer Monitoring (DTM) meter	System Growth	Cancelled	10k		
5638	Feeder 46 - Install two Distribution Transformer Monitoring (DTM) meters	System Growth	Cancelled	20k		
637	Feeder 19 - Install two Distribution Transformer Monitoring (DTM) meters	System Growth	Cancelled	20k		
635	Feeder 2 - Install two Distribution Transformer Monitoring (DTM) meters	System Growth	Cancelled	100k		
636	Feeder 18 - Install Distribution Transformer Monitoring (DTM) meter	System Growth	Cancelled	100k		
5640	Feeder 83 - Install Distribution Transformer Monitoring (DTM) meter	System Growth	Cancelled	80k		
638	Feeder 45 - Install Distribution Transformer Monitoring (DTM) meter	System Growth	Cancelled	125k		

Ref	Constraints and Projects	Category	Status	AMP Budget	Actual Spend	Comments
5639	Feeder 75 - Install Distribution Transformer Monitoring (DTM) meter	System Growth	Cancelled	100k		
5638	Feeder 46 - Install two Distribution Transformer Monitoring (DTM) meters	System Growth	Cancelled	40k		
637	Feeder 19 - Install two Distribution Transformer Monitoring (DTM) meters	System Growth	Cancelled	100k		

Table 8-2: Physical Progress of Planned Renewal Projects – 2017/18

8.2.2 Planned Opex

Maintenance programmes described in Section 5 – Lifecycle Asset Management are detailed below and include the status of the programme as at the end of each financial year.

The programmes have remained reasonably consistent so progress for each year is presented in one table to allow a comparison to easily be made between the financial years.

8.2.2.1 Planned Maintenance 2016/17 and 2017/18

Asset Inspection/Condition Assessment	Progress 2016/17	Progress 2017/18
Annual 33kV Line Visual Inspection	Complete	Complete
5-Yearly Overhead Line Feeder Inspections	Complete	Complete
Annual Aerial Inspection	Complete	Complete
Annual Ground Mounted Inspection	Complete	Complete
Level 1: Fortnightly Substation Visual Inspections	Complete	Complete
Level 2: 3-monthly Substation Detailed Inspections	Complete	Complete
Zone Substation Earth Tests – 5-yearly	Complete	Complete
Zone Substation Thermo-vision – Annually	Complete	Complete
Power Transformer – Annual DGA Oil Tests	Complete	Complete
Partial Discharge – 2-yearly Test for Circuit Breakers	Complete	Complete

Asset Inspection/Condition Assessment	Progress 2016/17	Progress 2017/18
2-monthly Detailed Inspections of Voltage Regulators	Complete	Complete
Recloser and Remote-Control Switch – 2-yearly Detailed Inspection and Operational Tests	Complete	Complete
Distribution Equipment Earth Tests – 5-yearly	Complete	Complete
Distribution Equipment Oil Testing	Complete	Complete
5-yearly Inspection of Ground-Mounted Low Voltage Distribution Equipment (including Minor Repairs)	Complete	Complete

Table 8-3: Physical Progress of Asset Inspection/Condition Assessment

Routine and Corrective Maintenance	Progress 2016/17	Progress 2017/18
Vegetation Control	Complete	Complete
Transformer – 2-yearly Service	Complete	Complete
Tap Changers – 2-yearly or 6-yearly Service, depending on Tap Changer Type	Complete	Complete
Station Regulators – 2-yearly, 5-yearly or 10-yearly Service. depending on Make and Model	Complete	Complete
Circuit Breaker SF6 – 3-yearly Service	Complete	Complete
Circuit Breaker Vacuum – 3-yearly Service	Complete	Complete
Circuit Breaker Oil – 2-yearly Service	Complete	Complete
Circuit Breaker Oil – Fault Service after every Fault Operation	Complete	Complete
Disconnectors and Earth Switches – 10-yearly	Complete	Complete
Annual Ripple Plant Service	Complete	Complete
Zone substation Batteries – 3-monthly General Service, 6-monthly Discharge Tests	Complete	Complete
Zone substation – Electro-Mechanical (4-yearly), Electronic (6-yearly) and Microprocessor (6-yearly)	Complete	Complete
Voltage Regulators, Reclosers and Sectionalisers – 2-yearly or 5-yearly Service depending on Make and Model	Complete	Complete

Routine and Corrective Maintenance	Progress 2016/17	Progress 2017/18
Targeted Cleaning of Insulators in areas prone to accumulation of residue	Complete	Complete

Table 8-4: Physical Progress of Routine and Corrective Maintenance

8.3 Review of Financial Progress against Plan

In this section, Centralines' performance in delivering the plans set out in the 2017 AMP Update is reviewed in terms of financial progress (cost performance). This evaluation is undertaken for the 2016/17 and 2017/18 financial years for both capital and maintenance programmes.

Explanations are provided in respect of works programmes with a variance of greater than 10% of budget.

8.3.1 Network Spend Financial Progress 2016/17

Category	Forecasted Expenditure from 2016/17 AMP Update ($'000s)	Actual Expenditure ($'000s)	Variance %
Capex			
Consumer Connection	500	637	27%
System Growth	0	133	100%
Asset Replacement and Renewal	720	394	-45%
Asset Relocations	43	29	-33%
Reliability, Safety and Environment	119	520	437%
Network Capex	1,382	1,713	24%
Opex			
Service Interruptions and Emergencies	336	338	1%
Vegetation Management	517	519	0%
Routine and Corrective Maintenance and Inspections	109	97	-11%
Asset Replacement and Renewal	431	435	1%
Network Maintenance	1,393	1,389	0%

Table 8-5: Financial Progress Opex and Capex 2016/17

8.3.1.1 *Variance Explanation Consumer Connection*

Actual expenditure in 2016/17 was higher than forecasted due to an increased demand for customer connections requiring complex network alterations.

8.3.1.2 *Explanation System Growth*

An unexpected surge in property development in Tikokino meant there was a need to increase the network capacity in the area. Additionally, there were unforeseen costs with the investigation and planning associated with the Ruataniwha Water Storage Scheme project.

8.3.1.3 *Variance Explanation Asset Replacement and Renewal*

As this year was the start of the next five-year cycle of inspections and Feeder MAPT work, the inspected feeders were still in good shape from the last round of maintenance. This resulted in considerable savings in the Asset Replacement and Renewal expenditure.

Additionally, some projects were incorrectly included in this category in the forecast rather than the Other Reliability, Safety and Environment forecast.

8.3.1.4 *Variance Explanation Asset Relocations*

There were less than anticipated assets requiring relocation during the 2016/2017 financial year.

8.3.1.5 *Variance Explanation Reliability, Safety and Environment*

Some of the work programme was incorrectly classified as Asset Replacement and Renewal in the RAMP forecast.

8.3.1.6 *Variance Explanation Routine Corrective Maintenance and Inspection*

Actual expenditure in 2016/17 was lower than expected as aerial inspections via helicopter saved significant time and cost, resulting in the underspend in the planned Routine and Corrective and Inspection expenditure.

8.3.2 Network Spend Financial Progress 2017/18

Category	Forecasted Expenditure from 2016/17 AMP Update ($'000s)	Actual Expenditure ($'000s)	Variance %
Capex			
Consumer Connection	300	527	76%
System Growth	40	0	100%
Asset Replacement and Renewal	950	869	24%
Asset Relocations	50	0	-100%
Reliability, Safety and Environment	920	638	-31%
Network Capex	2,260	2,034	-10%
Opex			
Service Interruptions and Emergencies	264	317	20%
Vegetation Management	473	458	-3%
Routine and Corrective Maintenance and Inspections	193	96	-50%
Asset Replacement and Renewal	476	341	-28%
Network Maintenance	1,406	1,212	-14%

Table 8-6: Financial Progress Opex and Capex 2017/18

8.3.2.1 Variance Explanation Consumer Connection

Actual expenditure in 2017/18 was higher than forecasted due to an increased demand for customer connections requiring complex network alterations.

8.3.2.2 Explanation System Growth

Only one project was planned for 2017/18. This was put on hold due to a lack of resources and the requirement for the replacement of a switch.

8.3.2.3 Variance Explanation Asset Replacement and Renewal

Actual expenditure in 2017/18 was lower than forecast as some projects were put on hold due to a diversion of resources to customer connection work.

8.3.2.4 Variance Explanation Asset Relocations

No requests for asset relocations were received during 2017/18.

8.3.2.5 Variance Explanation Reliability, Safety and Environment

The planned distribution transformer monitoring projects have been cancelled as an alternate technology is to be implemented. Remote loggers will be installed instead and work is underway to identify suitable products and vendors.

8.3.2.6 Variance Explanation Service Interruptions and Emergencies

Actual expenditure in 2017/18 was higher than forecast as storm events have caused more significant damage to the network than previous years.

8.3.2.7 Variance Explanation Routine Corrective Maintenance and Inspections

Actual expenditure in 2017/18 was lower than expected as ongoing efficiencies in the inspection process were realised which contributed to the underspend.

8.3.2.8 Variance Explanation Routine Asset Replacement and Renewal

Actual expenditure in 2017/18 was lower than expected as fewer maintenance related defects were identified during the asset inspection processes.

8.4 Review of Service Level Performance

In this section, an evaluation of performance against the Service Levels published in Section 3 – Service Levels will be provided.

In all cases, explanations will be provided in respect of variances against expected performance, of greater than 10% unfavourable.

8.4.1 Service Level Performance 2016/17

The table below shows the current service level framework with targets as per Section 3 and the forecast information as per the 2017 AMP Update compared to actual results for the 2016/17 Financial Year.

Asset Management Objective	Service Level	Unit/Type	Forecast 2016/17	Actual 2016/17	Comments
Health and Safety Performance	Accidents causing harm to a member of the public	Number of accidents	0	0	Met.
	Serious harm or lost-time injury to employees or contractors	Number of injuries	2	1	On Target.
	Injuries to employees or contractors requiring medical treatment	Number of injuries	1	2	Exceeded forecast but still on target.
Customer Service Performance	Surveyed customer satisfaction with delivery of customer works	%	> 95%	97%	Met.
	SAIDI	Minutes	96.7	92.07	Met.
	SAIFI	Interruptions	1.73	1.67	Met.
	Revenue per ICP	$ (nominal)	$1,562	$1,596	Ahead of forecast.
	Restoration of supply for unplanned interruptions	Urban	0	Unavailable	Unavailable.
		Rural	4	Unavailable	Unavailable.
		Remote rural	0	Unavailable	Unavailable.
Cost and Efficiency Performance	Forward work planning horizon at a project level provided to contracting services providers	Years	2 years	2 years	On Target.
	Operating expenditure per ICP (nominal)	$ (nominal)	$422	$429	Exceeded forecast.
	Faults per 100km of network	33kV Overhead	7.08	6.5	Ahead of forecast.

Table 8-7: Service Level Performance 2016/17

8.4.1.1 *Variance Explanation Injuries to Employees or Contractors Requiring Medical Treatment*

The actual injuries are greater than forecast due to an incident in February 2017 where a worker received an electric shock while installing new metering. Following an investigation of the incident, relevant learnings and mitigations were adopted and additional training was provided to the worker.

8.4.2 *Service Level Performance 2017/18*

The table below shows the current service level framework with targets as per Section 3 and the forecast information as per the 2017 AMP Update compared to actual results for the 2016/17 Financial Year.

Asset Management Objective	Service Level	Unit/Type	Target 2017/18	Forecast 2017/18	Comments
Health and Safety Performance	Accidents causing harm to a member of the public	Number of accidents	0	0	On Target.
	Serious harm or lost-time injury to employees or contractors	Number of injuries	0	1	Target Exceeded.
	Injuries to employees or contractors requiring medical treatment	Number of injuries	<2	1	On Target.
Customer Service Performance	Surveyed customer satisfaction with delivery of customer works	%	>95%	>95%	On Target.
	SAIDI	Minutes	99-119	133.5	Unfavourable.
	SAIFI	Interruptions	2.9-3.5	2.4	Favourable.
	Revenue per ICP	$ (nominal)	<$1,644	$1,734	On Target.
	Restoration of supply for unplanned interruptions	Urban		Unavailable	Unavailable.
		Rural		Unavailable	Unavailable.
		Remote rural		Unavailable	Unavailable.
Cost and Efficiency Performance	Forward work planning horizon at a project level provided to contracting services providers	Years	≥ 3 years rolling	2 Years	Unfavourable.

Asset Management Objective	Service Level	Unit/Type	Target 2017/18	Forecast 2017/18	Comments
	Operating expenditure per ICP (nominal)	$ (nominal)	<$425	$449	Unfavourable.
	Faults per 100km of network	33kV Overhead	< 6.4	8.4	Unfavourable.

Table 8-8:. Service Level Performance 2015/16

8.4.2.1 *Variance Explanation - Serious Harm or Lost-Time Injury to Employees or Contractors*

In November 2017 a worker strained their back while loading a wood chipper. Following an investigation of the incident it was found that the worker had not followed proper lifting techniques despite previous education on the topic.

The employee resigned for unrelated reasons within eight weeks of the incident so further training was not carried out with this particular employee.

8.4.2.2 *Variance Explanation – SAIDI*

SAIDI is currently forecast to exceed the target due to three ‘Major Event Days’ from environmental and vegetation related outages.

8.4.2.3 *Variance Explanation – Forward Work Planning Horizon*

Throughout 2017 the planning processes used to develop the ten-year capital works plan have been reviewed and a new planning process has been developed. This revised process requires that certainty is developed for only two years of forward work rather than three years. This allows for forward resource planning, but also flexibility to respond in a timely manner to improved information around network and asset condition.

8.4.2.4 *Variance Explanation - Faults per 100km of Network*

The faults per 100km of network variance is primarily due to network faults during significant storm events.

8.5 Evaluation of Asset Management Maturity

8.5.1 Background

In 2012, the Commerce Commission included an Asset Management Maturity Assessment Tool (AMMAT) as part of the information 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 8-1 taken from the Institute of Asset Managements (IAMs) PAS55 Assessment Methodology Guidance Notes, details the maturity scales on which the AMMAT scoring is based.

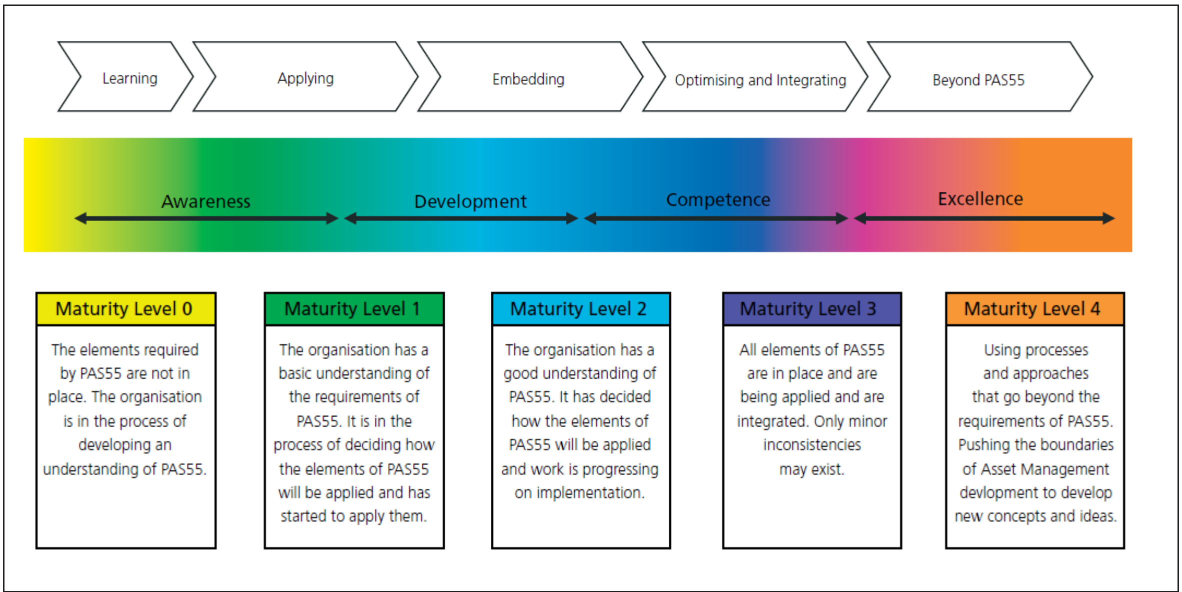

Figure 8-1: PAS55 Maturity Levels

8.5.2 2018 AMMAT Results

Figure 8-2: 2018 Centralines' AMMAT Results

Centralines' AMMAT disclosures are self-assessed.

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 8-3.

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 Lifecycle
		26	Asset Management Plan
		33	Contingency Planning
		69	Lifecycle Management of Risks
		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 and 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 8-3: AMMAT Scoring per Asset Management Capability Area

Centralines is committed to continually improving its asset management capabilities in all areas. Unison, Centralines' Management service provider in March 2018 was certified to ISO 55001. Many of the improvements being made to Unison's asset management practices are likely to be adopted and implemented at Centralines, thereby addressing areas above where improvements are desirable.

8.6 Determination Reference Mapping Table

Section 8 Reference	Determination Reference
8.1 Introduction to Section	15
8.2 Review of Progress Against Plan 8.3 Review of Financial Progress Against Plan	15.1
8.4 Review of Service Level Performance	15.2, 15.4
8.5 Evaluation of Asset Management Maturity	15.3, 15.4

Table 8-4: Determination Reference Mapping Table

9

CAPABILITY TO DELIVER

CONTENTS

9. CAPABILITY TO DELIVER

9.1 Introduction to this Section

The Regulatory Asset Management Plan (RAMP) is compiled to ensure there is transparency and confidence 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 Asset Management Plans detailed in the RAMP are realistic and the objectives are achievable. The organisational structure, processes for authorisation and business capability also support how the Centralines' Asset Management Plans are delivered.

9.2 Achieving the Objectives of the Plan

The requirements for the RAMP state that it must describe the processes used by the EDB to ensure that:

- the RAMP is realistic, and the objectives set out in the plan can be achieved, and
- the organisation structure and the processes for authorisation and business capabilities will support the implementation of the RAMP plans.

Centralines interprets these requirements as having an explanation of how Centralines ensures 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 RAMP, 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.

9.2.1 Ensuring the Plan is Realistic

The main contributing factors that ensure the RAMP 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)
- lifecycle 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, and
- commercial or legal arrangements (e.g. easements) required to facilitate work being carried out.

9.2.2 Needs Assessments

Section 4 of the RAMP 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 and 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 constraint 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.

9.2.3 Lifecycle Asset Management Planning

Centralines' approach to lifecycle 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 asset renewal, and maintenance planning processes going forward. This approach is being formalised by the certification of Centralines' Management service provider to ISO 55001. This certification will drive improvements to existing processes which will be adopted and utilised to manage Centralines' Asset Portfolio.

9.2.4 Contracting Arrangements

Centralines has a Management Services Agreement with Unison Networks Limited (UNL) to provide a broad suite of management services. These services include 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 service 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 has 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.

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.

9.3 Organisation Structure, Processes for Authorisation and Business Capabilities

9.3.1 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 service provider.

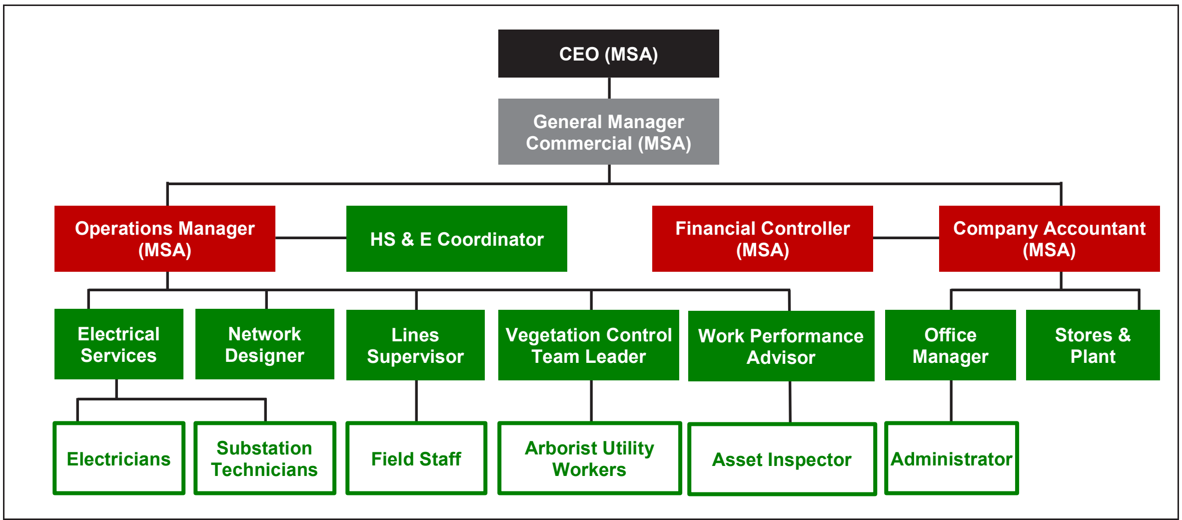

Figure 9-1: Centralines' Organisation Structure

9.4 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 service 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.

9.5 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 service 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.

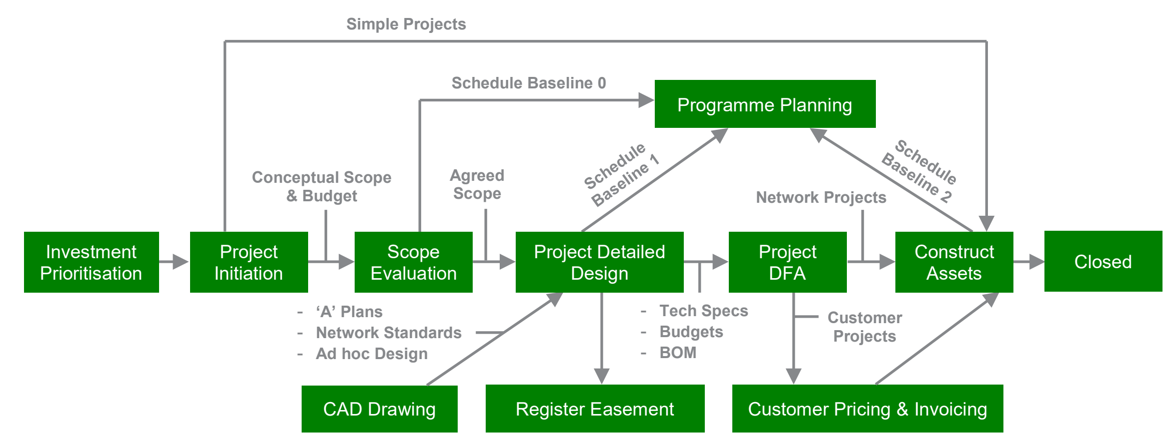

Figure 9-2: Asset Management Business Process

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 service provider.

9.6 Determination Reference Mapping Table

Section 9 Reference	Determination Reference
9.1 Achieving the Objectives of the Plan	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

10

SCHEDULES

CONTENTS

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 18**	**31 Mar 19**	**31 Mar 20**	
		$000 (in nominal dollars)			
	Consumer connection	527	408	417	
	System growth	-	-	-	
	Asset replacement and renewal	869	1,277	1,018	
	Asset relocations	-	-	115	
	Reliability, safety and environment:				
	Quality of supply	303	357	865	
	Legislative and regulatory	100	-	-	
	Other reliability, safety and environment	235	680	155	
	Total reliability, safety and environment	**638**	**1,037**	**1,020**	
	Expenditure on network assets	**2,034**	**2,723**	**2,570**	
	Non-network assets	718	845	1,188	
	Expenditure on assets	**2,752**	**3,568**	**3,758**	
plus	Cost of financing	-	-	-	
less	Value of capital contributions	-	-	-	-
plus	Value of vested assets	-	-	-	
	Capital expenditure forecast	**2,752**	**3,568**	**3,758**	
	Value of commissioned assets	2,752	3,568	3,758	
		$000 (in constant prices)			
	Consumer connection	527	400	400	
	System growth	-	-	-	
	Asset replacement and renewal	869	1,251	977	
	Asset relocations	-	-	110	
	Reliability, safety and environment:				
	Quality of supply	303	350	830	
	Legislative and regulatory	100	-	-	
	Other reliability, safety and environment	235	666	149	
	Total reliability, safety and environment	**638**	**1,016**	**979**	
	Expenditure on network assets	**2,034**	**2,666**	**2,466**	
	Non-network assets	718	828	1,140	
	Expenditure on assets	**2,752**	**3,494**	**3,606**	
	Subcomponents of expenditure on assets (where known)				
	Energy efficiency and demand side management, reduction of energy losses	-	-	-	
	Overhead to underground conversion	-	-	-	
	Research and development	-	-	-	

	CY+3	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
	31 Mar 21	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**
	425	434	442	451	460	469	479	488
	-	-	-	56	-	-	-	366
	861	1,014	998	1,478	1,507	1,115	1,029	1,600
	117	119	122	124	127	129	132	134
	829	759	912	733	805	763	838	366
	-	-	-	-	-	-	-	-
	367	92	182	102	104	76	126	147
	1,196	**851**	**1,095**	**835**	**909**	**839**	**964**	**513**
	2,599	**2,418**	**2,656**	**2,944**	**3,003**	**2,553**	**2,604**	**3,101**
	531	548	348	593	610	223	227	232
	3,131	**2,965**	**3,005**	**3,538**	**3,613**	**2,776**	**2,831**	**3,333**
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	3,131	**2,965**	**3,005**	**3,538**	**3,613**	**2,776**	**2,831**	**3,333**
	3,131	2,965	3,005	3,538	3,613	2,776	2,831	3,333
	400	400	400	400	400	400	400	400
	-	-	-	50	-	-	-	300
	810	935	902	1,310	1,310	950	860	1,310
	110	110	110	110	110	110	110	110
	780	700	825	650	700	650	700	300
	-	-	-	-	-	-	-	-
	345	85	165	90	90	65	105	120
	1,125	**785**	**990**	**740**	**790**	**715**	**805**	**420**
	2,445	**2,230**	**2,402**	**2,610**	**2,610**	**2,175**	**2,175**	**2,540**
	500	505	315	526	530	190	190	190
	2,945	**2,735**	**2,717**	**3,136**	**3,140**	**2,365**	**2,365**	**2,730**
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

	Current Year	CY+1	CY+2
for year ended	31 Mar 18	31 Mar 19	31 Mar 20
Difference between nominal and constant price forecasts	$000		
Consumer connection	-	8	17
System growth	-	-	-
Asset replacement and renewal	-	26	41
Asset relocations	-	-	5
Reliability, safety and environment:			
Quality of supply	-	7	35
Legislative and regulatory	-	-	-
Other reliability, safety and environment	-	14	6
Total reliability, safety and environment	**-**	**21**	**41**
Expenditure on network assets	**-**	**56**	**104**
Non-network assets	-	17	48
Expenditure on assets	**-**	**74**	**152**

11a(ii): Consumer Connection

	Current Year	CY+1	CY+2
for year ended	31 Mar 18	31 Mar 19	31 Mar 20
Consumer types defined by EDB*	$000 (in constant prices)		
All Customers	527	400	400
Consumer connection expenditure	**527**	**400**	**400**
less Capital contributions funding consumer connection	315	300	300
Consumer connection less capital contributions	**212**	**100**	**100**

11a(iii): System Growth

	Current Year	CY+1	CY+2
Sub-transmission	-	-	-
Zone substations	-	-	-
Distribution and LV lines	-	-	-
Distribution and LV cables	-	-	-
Distribution substations and transformers	-	-	-
Distribution switchgear	-	-	-
Other network assets	-	-	-
System growth expenditure	**-**	**-**	**-**
less Capital contributions funding system growth	-	-	-
System growth less capital contributions	**-**	**-**	**-**

11a(iv): Asset Replacement and Renewal

	Current Year	CY+1	CY+2
Sub-transmission	149	-	-
Zone substations	-	-	-
Distribution and LV lines	632	745	772
Distribution and LV cables	9	-	-
Distribution substations and transformers	24	183	38
Distribution switchgear	55	323	168
Other network assets	-	-	-
Asset replacement and renewal expenditure	**869**	**1,251**	**977**
less Capital contributions funding asset replacement and renewal	-	-	-
Asset replacement and renewal less capital contributions	**869**	**1,251**	**977**

CY+3 31 Mar 21	CY+4 31 Mar 22	CY+5 31 Mar 23	CY+6 31 Mar 24	CY+7 31 Mar 25	CY+8 31 Mar 26	CY+9 31 Mar 27	CY+10 31 Mar 28
25	34	42	51	60	69	79	88
-	-	-	6	-	-	-	66
51	79	96	168	197	165	169	290
7	9	12	14	17	19	22	24
49	59	87	83	105	113	138	66
-	-	-	-	-	-	-	-
22	7	17	12	14	11	21	27
71	**66**	**105**	**95**	**119**	**124**	**159**	**93**
154	**188**	**254**	**334**	**393**	**378**	**429**	**561**
31	43	33	67	80	33	37	42
185	**230**	**288**	**402**	**473**	**411**	**466**	**603**

CY+3 31 Mar 21	CY+4 31 Mar 22	CY+5 31 Mar 23
400	400	400

400	**400**	**400**
300	300	300
100	**100**	**100**

-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	**-**	**-**
-	-	-
-	**-**	**-**

-	-	-
-	-	-
605	730	697
-	-	-
38	38	38
168	168	168
-	-	-
810	**935**	**902**
-	-	-
810	**935**	**902**

11a(v):Asset Relocations

		Current Year	CY+1	CY+2
	for year end	31 Mar 18	31 Mar 19	31 Mar 20
	*Project or programme**	$000 (in constant prices)		
	NZTA	-	-	40
	Councils	-	-	50
	Other Customers	-	-	20
	All other asset relocations projects or programmes	-	-	-
	Asset relocations expenditure	**-**	**-**	**110**
less	Capital contributions funding asset relocations			-
	Asset relocations less capital contributions	**-**	**-**	**110**

11a(vi):Quality of Supply

		Current Year	CY+1	CY+2
	*Project or programme**			
		-	-	-
		-	-	-
		-	-	-
		-	-	-
	All other quality of supply projects or programmes	303	350	830
	Quality of supply expenditure	**303**	**350**	**830**
less	Capital contributions funding quality of supply			
	Quality of supply less capital contributions	**303**	**350**	**830**

11a(vii): Legislative and Regulatory

		Current Year	CY+1	CY+2
	*Project or programme**			
		-	-	-
		-	-	-
	All other legislative and regulatory projects or programmes	100	-	-
	Legislative and regulatory expenditure	**100**	**-**	**-**
less	Capital contributions funding legislative and regulatory	-	-	-
	Legislative and regulatory less capital contributions	**100**	**-**	**-**

11a(viii): Other Reliability, Safety and Environment

		Current Year	CY+1	CY+2
	*Project or programme**			
		-	-	-
		-	-	-
		-	-	-
		-	-	-
		-	-	-
	All other reliability, safety and environment projects or programmes	235	666	149
	Other reliability, safety and environment expenditure	**235**	**666**	**149**
less	Capital contributions funding other reliability, safety and environment			
	Other reliability, safety and environment less capital contributions	**235**	**666**	**149**

CY+3	*CY+4*	*CY+5*
31 Mar 21	**31 Mar 22**	**31 Mar 23**
40	40	40
50	50	50
20	20	20
-	-	-
110	**110**	**110**
-	-	-
110	**110**	**110**
-	-	-
-	-	-
-	-	-
-	-	-
780	700	825
780	**700**	**825**
780	**700**	**825**
-	-	-
-	-	-
-	-	-
-	**-**	**-**
-	-	-
-	**-**	**-**
-	-	-
-	**-**	**-**
-	**-**	**-**
-	**-**	**-**
-	**-**	**-**
345	85	165
345	**85**	**165**
345	**85**	**165**

11a(ix): Non-Network Assets

		Current Year	CY+1	CY+2
Routine expenditure	*for year end*	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**
Project or programme*		**$000 (in constant prices)**		
Motor Vehicles		119	204	585
Plant, Equipment and Tools		100	124	40
Office Furniture		106	27	15
Land and Buildings		393	473	500
All other routine expenditure projects or programmes		-	-	-
Routine expenditure		**718**	**828**	**1,140**
Atypical expenditure				
Project or programme*				
		-	-	-
		-	-	-
		-	-	-
All other atypical projects or programmes				
Atypical expenditure		**-**	**-**	**-**
Non-network assets expenditure		**718**	**828**	**1,140**

CY+3	*CY+4*	*CY+5*
31 Mar 21	**31 Mar 22**	**31 Mar 23**
445	450	260
40	40	40
15	15	15
-	-	-
-	-	-
500	**505**	**315**
-	-	-
-	-	-
-	-	-
-	**-**	**-**
500	**505**	**315**

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 18**	**31 Mar 19**	**31 Mar 20**
Operational Expenditure Forecast	**$000 (in nominal dollars)**		
Service interruptions and emergencies	335	311	318
Vegetation management	446	442	377
Routine and corrective maintenance and inspection	97	185	196
Asset replacement and renewal	340	499	485
Network Opex	**1,218**	**1,438**	**1,376**
System operations and network support	233	244	248
Business support	1,697	1,662	1,720
Non-network opex	**1,930**	**1,906**	**1,968**
Operational expenditure	**3,148**	**3,344**	**3,343**
	$000 (in constant prices)		
Service interruptions and emergencies	335	305	305
Vegetation management	446	433	362
Routine and corrective maintenance and inspection	97	181	188
Asset replacement and renewal	340	489	465
Network Opex	**1,218**	**1,408**	**1,320**
System operations and network support	233	239	238
Business support	1,697	1,628	1,650
Non-network opex	**1,930**	**1,867**	**1,888**
Operational expenditure	**3,148**	**3,275**	**3,208**
Subcomponents of operational expenditure (where known)			
Energy efficiency and demand side management, 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	-	6	13
Vegetation management	-	9	15
Routine and corrective maintenance and inspection	-	4	8
Asset replacement and renewal	-	10	20
Network Opex	**-**	**30**	**56**
System operations and network support	-	5	10
Business support	-	34	70
Non-network opex	**-**	**39**	**80**
Operational expenditure	**-**	**69**	**135**

CY+3	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
31 Mar 21	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**
324	331	337	344	351	358	365	372
385	392	400	408	417	425	433	442
200	204	208	212	216	221	225	230
494	504	514	525	535	546	557	568
1,403	**1,431**	**1,460**	**1,489**	**1,519**	**1,549**	**1,580**	**1,612**
253	258	263	268	274	279	285	291
1,754	1,789	1,825	1,861	1,898	1,936	1,975	2,015
2,007	**2,047**	**2,088**	**2,130**	**2,172**	**2,216**	**2,260**	**2,305**
3,410	**3,478**	**3,548**	**3,619**	**3,691**	**3,765**	**3,840**	**3,917**
305	305	305	305	305	305	305	305
362	362	362	362	362	362	362	362
188	188	188	188	188	188	188	188
465	465	465	465	465	465	465	465
1,320	**1,320**	**1,320**	**1,320**	**1,320**	**1,320**	**1,320**	**1,320**
238	238	238	238	238	238	238	238
1,650	1,650	1,650	1,650	1,650	1,650	1,650	1,650
1,888	**1,888**	**1,888**	**1,888**	**1,888**	**1,888**	**1,888**	**1,888**
3,208	**3,208**	**3,208**	**3,208**	**3,208**	**3,208**	**3,208**	**3,208**
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-
19	26	32	39	46	53	60	67
23	30	38	46	55	63	71	80
12	16	20	24	28	33	37	42
29	39	49	60	70	81	92	103
83	**111**	**140**	**169**	**199**	**229**	**260**	**292**
15	20	25	30	36	41	47	53
104	139	175	211	248	286	325	365
119	**159**	**200**	**242**	**284**	**328**	**372**	**417**
202	**270**	**340**	**411**	**483**	**557**	**632**	**709**

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)							
	H1	H2	H3	H4	H5	Grade unknown	Data accuracy (1–4)	% of asset forecast to be replaced in next 5 years
	-	0.50%	33.25%	33.25%	33.00%	-	3	1.00%
	-	18.00%	38.00%	38.00%	6.00%	-	3	20.00%
	-	-	-	-	-	-	N/A	-
	-	-	47.00%	47.00%	6.00%	-	2	-
	-	-	-	-	-	-	N/A	-
	-	-			100.00%	-	3	-
	-	-	-	-	-	-	N/A	-
	-	-	-	-	-	-	N/A	-
	-	-	-	-	-	-	N/A	-
	-	-	-	-	-	-	N/A	-
	-	-	-	-	-	-	N/A	-
	-	-	-	-	-	-	N/A	-
	-	-	-	-	-	-	N/A	-
	-	-	-	-	-	-	N/A	-
	-	-	16.50%	16.50%	67.00%	-	3	-
	-	-	-	-	-	-	N/A	-
	-	-	-	-	-	-	N/A	-
	-	-	-	-	100.00%	-	4	-
	-	-	-	-	-	-	N/A	-
	-	5.00%	20.00%	20.00%	55.00%	-	3	-
	-	-	-	-	-	-	N/A	-
	-	-	-	-	-	-	N/A	-
	-	-	-	-	-	-	N/A	-
	-	3.70%	44.40%	18.50%	33.40%	-	4	-
	-	-	-	-	100.00%	-	4	-
	-	-	14.30%		85.70%	-	4	-
	-	1.00%	47.50%	47.50%	4.00%	-	2	1.00%
	-	-	-	-	-	-	N/A	-
	-	-	-	-	-	-	N/A	-
	-	-	2.50%	2.50%	95.00%	-	3	0.50%
	-	-	2.50%	2.50%	95.00%	-	3	0.50%
	-	-	-	-	-	-	N/A	-
	-	3.00%	22.50%	22.50%	52.00%	-	3	5.00%
	-	-	-	-	-	-	N/A	-
	-	1.00%	23.50%	23.50%	52.00%	-	2	2.00%
	-	-	-	-	100.00%	-	4	-
	-				100.00%	-	4	
	-	1.00%	34.50%	34.50%	30.00%	-	3	1.50%
	-	1.00%	10.00%	10.00%	79.00%	-	3	1.00%
	-			50.00%	50.00%	-	3	2.00%
	-	-	-	-	100.00%	-	2	-
	-	0.50%	44.75%	44.75%	10.00%	-	2	0.50%
	-	-	13.50%	13.50%	73.00%	-	2	0.50%
	-	-	13.50%	13.50%	73.00%	-	2	0.50%
	0.15%	-	-	-	99.85%	-	2	0.50%
	-	-	16.67%	16.67%	66.67%	-	2	5.00%
	-	-	-	-	100.00%	-	2	-
	-	-	-	-	100.00%	-	4	-
	-	-	-	-	100.00%	-	4	-
	-	-	50.00%	50.00%	-	-	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	8.0	10.0	N-1	-	80%
Waipawa	4.0	7.5	N-1	-	53%
Takapau	6.2	7.5	N-1	-	82%
OngaOnga	6.1	-	N-1 Switched	10.0	-
Wilder Road	1.2	-	N-1 Switched	2.4	-

[1] *Extend forecast capacity table as necessary to disclose all capacity by each zone substation*

	Installed Firm Capacity +5 years (MVA)	Utilisation of Installed Firm Capacity + 5yrs %	Installed Firm Capacity Constraint +5 years (cause)	Explanation
	10.0	80%	No constraint within +5 years	
	7.5	53%	No constraint within +5 years	
	7.5	82%	No constraint within +5 years	
	-	-	No constraint within +5 years	Load transfer from adjacent substations available using remote switches.
	-	-	No constraint within +5 years	Load transfer from adjacent substations available using remote switches.

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 18	31 Mar 19
Consumer types defined by EDB*	**Number of connections**	
Residential	70	30
Commercial	8	1
Connections total	**78**	**31**
****include additional rows if needed***		
Distributed generation		
Number of connections	12	12
Installed connection capacity of distributed generation (MVA)	0	0

12c(ii) System Demand

Maximum coincident system demand (MW) — for year ended	Number of connections	
GXP demand	21	21
plus Distributed generation output at HV and above	-	-
Maximum coincident system demand	**21**	**21**
less Net transfers to (from) other EDBs at HV and above	-	-
Demand on system for supply to consumers' connection points	**21**	**21**
Electricity volumes carried (GWh)		
Electricity supplied from GXPs	115	113
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	**115**	**113**
less Total energy delivered to ICPs	106	104
Losses	**9**	**9**
Load factor	**62%**	**61%**
Loss ratio	**7.8%**	**8.0%**

	CY+2	CY+3	CY+4	CY+5
	31 Mar 20	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**
	Number of connections			
	20	20	20	20
	1	1	1	1
	21	**21**	**21**	**21**
	12	12	12	12
	0	0	0	0

	Number of connections			
	21	22	22	22
	-	-	-	-
	21	**22**	**22**	**22**
	-	-	-	-
	21	**22**	**22**	**22**
	113	113	113	113
	-	-	-	-
	-	-	-	-
	-	-	-	-
	113	**113**	**113**	**113**
	104	104	104	104
	9	**9**	**9**	**9**
	61%	**59%**	**60%**	**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 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**
SAIDI						
Class B (planned interruptions on the network)	57.5	56.8	56.8	56.8	56.8	56.8
Class C (unplanned interruptions on the network)	91.9	90.7	90.7	90.7	90.7	90.7
SAIFI						
Class B (planned interruptions on the network)	0.27	0.42	0.42	0.42	0.42	0.42
Class C (unplanned interruptions on the network)	2.08	3.31	3.31	3.31	3.31	3.31

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	
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.	
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 organizational policies, strategies and stakeholder requirements are defined. The work is fairly well advanced but still incomplete.	
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.	
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.	

	Why	Who	Record/documented Information	Maturity narrative for assessed score
	Widely used AM practice standards require an organisation to document, authorise and communicate its asset management policy (eg, as required in PAS 55 para 4.2 i). A key pre-requisite of any robust policy is that the organisation's top management must be seen to endorse and fully support it. Also vital to the effective implementation of the policy, is to tell the appropriate people of its content and their obligations under it. Where an organisation outsources some of its asset-related activities, then these people and their organisations must equally be made aware of the policy's content. Also, there may be other stakeholders, such as regulatory authorities and shareholders who should be made aware of it.	Top management. The management team that has overall responsibility for asset management.	The organisation's asset management policy, its organisational strategic plan, documents indicating how the asset management policy was based upon the needs of the organisation and evidence of communication.	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.
	In setting an organisation's asset management strategy, it is important that it is consistent with any other policies and strategies that the organisation has and has taken into account the requirements of relevant stakeholders. This question examines to what extent the asset management strategy is consistent with other organisational policies and strategies (e.g. as required by PAS 55 para 4.3.1 b) and has taken account of stakeholder requirements as required by PAS 55 para 4.3.1 c). Generally, this will take into account the same polices, strategies and stakeholder requirements as covered in drafting the asset management policy but at a greater level of detail.	Top management. The organisation's strategic planning team. The management team that has overall responsibility for asset management.	The organisation's asset management strategy document and other related organisational policies and strategies. Other than the organisation's strategic plan, these could include those relating to health and safety, environmental, etc. Results of stakeholder consultation.	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.
	Good asset stewardship is the hallmark of an organisation compliant with widely used AM standards. A key component of this is the need to take account of the lifecycle of the assets, asset types and asset systems. (For example, this requirement is recognised in 4.3.1 d) of PAS 55). This question explores what an organisation has done to take lifecycle into account in its asset management strategy.	Top management. People in the organisation with expert knowledge of the assets, asset types, asset systems and their associated life-cycles. The management team that has overall responsibility for asset management. Those responsible for developing and adopting methods and processes used in asset management.	The organisation's documented asset management strategy and supporting working documents.	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 need to be translated into practical plan(s) so that all parties know how the objectives will be achieved. The development of plan(s) will need to identify the specific tasks and activities required to optimize costs, risks and performance of the assets and/or asset system(s), when they are to be carried out and the resources required.	The management team with overall responsibility for the asset management system. Operations, maintenance and engineering managers.	The organisation's asset management plan(s).	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.

Question No.	Function	Question	Score	Evidence—Summary	
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.	
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.	
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.	
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).	

	Why	Who	Record/documented Information	Maturity narrative for assessed score
	Plans will be ineffective unless they are communicated to all those, including contracted suppliers and those who undertake enabling function(s). The plan(s) need to be communicated in a way that is relevant to those who need to use them.	The management team with overall responsibility for the asset management system. Delivery functions and suppliers.	Distribution lists for plan(s). Documents derived from plan(s) which detail the receivers role in plan delivery. Evidence of communication.	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 implementation of asset management plan(s) relies on (1) actions being clearly identified, (2) an owner allocated and (3) that owner having sufficient delegated responsibility and authority to carry out the work required. It also requires alignment of actions across the organisation. This question explores how well the plan(s) set out responsibility for delivery of asset plan actions.	The management team with overall responsibility for the asset management system. Operations, maintenance and engineering managers. If appropriate, the performance management team.	The organisation's asset management plan(s). Documentation defining roles and responsibilities of individuals and organisational departments.	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.
	It is essential that the plan(s) are realistic and can be implemented, which requires appropriate resources to be available and enabling mechanisms in place. This question explores how well this is achieved. The plan(s) not only need to consider the resources directly required and timescales, but also the enabling activities, including for example, training requirements, supply chain capability and procurement timescales.	The management team with overall responsibility for the asset management system. Operations, maintenance and engineering managers. If appropriate, the performance management team. If appropriate, the performance management team. Where appropriate the procurement team and service providers working on the organisation's asset-related activities.	The organisation's asset management plan(s). Documented processes and procedures for the delivery of the asset management plan.	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.
	Widely used AM practice standards require that an organisation has plan(s) to identify and respond to emergency situations. Emergency plan(s) should outline the actions to be taken to respond to specified emergency situations and ensure continuity of critical asset management activities including the communication to, and involvement of, external agencies. This question assesses if, and how well, these plan(s) triggered, implemented and resolved in the event of an incident. The plan(s) should be appropriate to the level of risk as determined by the organisation's risk assessment methodology. It is also a requirement that relevant personnel are competent and trained.	The manager with responsibility for developing emergency plan(s). The organisation's risk assessment team. People with designated duties within the plan(s) and procedure(s) for dealing with incidents and emergency situations.	The organisation's plan(s) and procedure(s) for dealing with emergencies. The organisation's risk assessments and risk registers.	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.

Question No.	Function	Question	Score	Evidence—Summary	
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 Network and Operations Team lead by the General Manager who is a member of the Executive Management Team.	
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.	
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.	

	Why	Who	Record/documented Information	Maturity narrative for assessed score
	In order to ensure that the organisation's assets and asset systems deliver the requirements of the asset management policy, strategy and objectives responsibilities need to be allocated to appropriate people who have the necessary authority to fulfil their responsibilities. (This question, relates to the organisation's assets e.g. para b), s 4.4.1 of PAS 55, making it therefore distinct from the requirement contained in para a), s 4.4.1 of PAS 55).	Top management. People with management responsibility for the delivery of asset management policy, strategy, objectives and plan(s). People working on asset-related activities.	Evidence that managers with responsibility for the delivery of asset management policy, strategy, objectives and plan(s) have been appointed and have assumed their responsibilities. Evidence may include the organisation's documents relating to its asset management system, organisational charts, job descriptions of post-holders, annual targets/objectives and personal development plan(s) of post-holders as appropriate.	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.
	Optimal asset management requires top management to ensure sufficient resources are available. In this context the term 'resources' includes manpower, materials, funding and service provider support.	Top management. The management team that has overall responsibility for asset management. Risk management team. The organisation's managers involved in day-to-day supervision of asset-related activities, such as frontline managers, engineers, foremen and chargehands as appropriate.	Evidence demonstrating that asset management plan(s) and/or the process(es) for asset management plan implementation consider the provision of adequate resources in both the short and long term. Resources include funding, materials, equipment, services provided by third parties and personnel (internal and service providers) with appropriate skills competencies and knowledge.	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.
	Widely used AM practice standards require an organisation to communicate the importance of meeting its asset management requirements such that personnel fully understand, take ownership of, and are fully engaged in the delivery of the asset management requirements (e.g. PAS 55 s 4.4.1 g).	Top management. The management team that has overall responsibility for asset management. People involved in the delivery of the asset management requirements.	Evidence of such activities as road shows, written bulletins, workshops, team talks and management walk-abouts would assist an organisation to demonstrate it is meeting this requirement of PAS 55.	Top management communicates the importance of meeting its asset management requirements to all relevant parts of the organisation.

Question No.	Function	Question	Score	Evidence—Summary	
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.	
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.	
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-EIs and information from othe 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.	

Why	Who	Record/documented Information	Maturity narrative for assessed score
Where an organisation chooses to outsource some of its asset management activities, the organisation must ensure that these outsourced process(es) are under appropriate control to ensure that all the requirements of widely used AM standards (e.g. PAS 55) are in place, and the asset management policy, strategy objectives and plan(s) are delivered. This includes ensuring capabilities and resources across a time span aligned to life cycle management. The organisation must put arrangements in place to control the outsourced activities, whether it be to external providers or to other in-house departments. This question explores what the organisation does in this regard.	Top management. The management team that has overall responsibility for asset management. The manager(s) responsible for the monitoring and management of the outsourced activities. People involved with the procurement of outsourced activities. The people within the organisations that are performing the outsourced activities. The people impacted by the outsourced activity.	The organisation's arrangements that detail the compliance required of the outsourced activities. For example, this this could form part of a contract or service level agreement between the organisation and the suppliers of its outsourced activities. Evidence that the organisation has demonstrated to itself that it has assurance of compliance of outsourced activities.	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.
There is a need for an organisation to demonstrate that it has considered what resources are required to develop and implement its asset management system. There is also a need for the organisation to demonstrate that it has assessed what development plan(s) are required to provide its human resources with the skills and competencies to develop and implement its asset management systems. The timescales over which the plan(s) are relevant should be commensurate with the planning horizons within the asset management strategy considers e.g. if the asset management strategy considers 5, 10 and 15 year time scales then the human resources development plan(s) should align with these. Resources include both 'in house' and external resources who undertake asset management activities.	Senior management responsible for agreement of plan(s). Managers responsible for developing asset management strategy and plan(s). Managers with responsibility for development and recruitment of staff (including HR functions). Staff responsible for training. Procurement officers. Contracted service providers.	Evidence of analysis of future work load plan(s) in terms of human resources. Document(s) containing analysis of the organisation's own direct resources and contractors resource capability over suitable timescales. Evidence, such as minutes of meetings, that suitable management forums are monitoring human resource development plan(s). Training plan(s), personal development plan(s), contract and service level agreements.	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).
Widely used AM standards require that organisations to undertake a systematic identification of the asset management awareness and competencies required at each level and function within the organisation. Once identified the training required to provide the necessary competencies should be planned for delivery in a timely and systematic way. Any training provided must be recorded and maintained in a suitable format. Where an organisation has contracted service providers in place then it should have a means to demonstrate that this requirement is being met for their employees. (e.g. PAS 55 refers to frameworks suitable for identifying competency requirements).	Senior management responsible for agreement of plan(s). Managers responsible for developing asset management strategy and plan(s). Managers with responsibility for development and recruitment of staff (including HR functions). Staff responsible for training. Procurement officers. Contracted service providers.	Evidence of an established and applied competency requirements assessment process and plan(s) in place to deliver the required training. Evidence that the training programme is part of a wider, co-ordinated asset management activities training and competency programme. Evidence that training activities are recorded and that records are readily available (for both direct and contracted service provider staff) e.g. via organisation wide information system or local records database.	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.

Question No.	Function	Question	Score	Evidence—Summary	
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.	
53	Communication, participation 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.	
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.	

	Why	Who	Record/documented Information	Maturity narrative for assessed score
	A critical success factor for the effective development and implementation of an asset management system is the competence of persons undertaking these activities. organisations should have effective means in place for ensuring the competence of employees to carry out their designated asset management function(s). Where an organisation has contracted service providers undertaking elements of its asset management system then the organisation shall assure itself that the outsourced service provider also has suitable arrangements in place to manage the competencies of its employees. The organisation should ensure that the individual and corporate competencies it requires are in place and actively monitor, develop and maintain an appropriate balance of these competencies.	Managers, supervisors, persons responsible for developing training programmes. Staff responsible for procurement and service agreements. HR staff and those responsible for recruitment.	Evidence of a competency assessment framework that aligns with established frameworks such as the asset management Competencies Requirements Framework (Version 2.0); National Occupational Standards for Management and Leadership; UK Standard for Professional Engineering Competence, Engineering Council, 2005.	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.
	Widely used AM practice standards require that pertinent asset management information is effectively communicated to and from employees and other stakeholders including contracted service providers. Pertinent information refers to information required in order to effectively and efficiently comply with and deliver asset management strategy, plan(s) and objectives. This will include for example the communication of the asset management policy, asset performance information, and planning information as appropriate to contractors.	Top management and senior management representative(s), employee's representative(s), employee's trade union representative(s); contracted service provider management and employee representative(s); representative(s) from the organisation's Health, Safety and Environmental team. Key stakeholder representative(s).	Asset management policy statement prominently displayed on notice boards, intranet and internet; use of organisation's website for displaying asset performance data; evidence of formal briefings to employees, stakeholders and contracted service providers; evidence of inclusion of asset management issues in team meetings and contracted service provider contract meetings; newsletters, etc.	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.
	Widely used AM practice standards require an organisation maintain up to date documentation that ensures that its asset management systems (ie, the systems the organisation has in place to meet the standards) can be understood, communicated and operated (e.g. s 4.5 of PAS 55 requires the maintenance of up to date documentation of the asset management system requirements specified throughout s 4 of PAS 55).	The management team that has overall responsibility for asset management. Managers engaged in asset management activities.	The documented information describing the main elements of the asset management system (process(es)) and their interaction.	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.

Question No.	Function	Question	Score	Evidence—Summary	
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.	
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.	
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.	
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.	

	Why	Who	Record/documented Information	Maturity narrative for assessed score
	Effective asset management requires appropriate information to be available. Widely used AM standards therefore require the organisation to identify the asset management information it requires in order to support its asset management system. Some of the information required may be held by suppliers. The maintenance and development of asset management information systems is a poorly understood specialist activity that is akin to IT management but different from IT management. This group of questions provides some indications as to whether the capability is available and applied. Note: To be effective, an asset information management system requires the mobilisation of technology, people and process(es) that create, secure, make available and destroy the information required to support the asset management system.	The organisation's strategic planning team. The management team that has overall responsibility for asset management. Information management team. Operations, maintenance and engineering managers.	Details of the process the organisation has employed to determine what its asset information system should contain in order to support its asset management system. Evidence that this has been effectively implemented.	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 response to the questions is progressive. A higher scale cannot be awarded without achieving the requirements of the lower scale. This question explores how the organisation ensures that information management meets widely used AM practice requirements (e.g. s 4.4.6 (a), (c) and (d) of PAS 55).	The management team that has overall responsibility for asset management. Users of the organisational information systems.	The asset management information system, together with the policies, procedure(s), improvement initiatives and audits regarding information controls.	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.
	Widely used AM standards need not be prescriptive about the form of the asset management information system, but simply require that the asset management information system is appropriate to the organisations needs, can be effectively used and can supply information which is consistent and of the requisite quality and accuracy.	The organisation's strategic planning team. The management team that has overall responsibility for asset management. Information management team. Users of the organisational information systems.	The documented process the organisation employs to ensure its asset management information system aligns with its asset management requirements. Minutes of information systems review meetings involving users.	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.
	Risk management is an important foundation for proactive asset management. Its overall purpose is to understand the cause, effect and likelihood of adverse events occurring, to optimally manage such risks to an acceptable level, and to provide an audit trail for the management of risks. Widely used standards require the organisation to have process(es) and/or procedure(s) in place that set out how the organisation identifies and assesses asset and asset management related risks. The risks have to be considered across the four phases of the asset lifecycle (e.g. para 4.3.3 of PAS 55).	The top management team in conjunction with the organisation's senior risk management representatives. There may also be input from the organisation's Safety, Health and Environment team. Staff who carry out risk identification and assessment.	The organisation's risk management framework and/or evidence of specific process(es) and/ or procedure(s) that deal with risk control mechanisms. Evidence that the process(es) and/or procedure(s) are implemented across the business and maintained. Evidence of agendas and minutes from risk management meetings. Evidence of feedback in to process(es) and/or procedure(s) as a result of incident investigation(s). Risk registers and assessments.	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.

Question No.	Function	Question	Score	Evidence—Summary	
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.	
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.	
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.	

	Why	Who	Record/documented Information	Maturity narrative for assessed score
	Widely used AM standards require that the output from risk assessments are considered and that adequate resource (including staff) and training is identified to match the requirements. It is a further requirement that the effects of the control measures are considered, as there may be implications in resources and training required to achieve other objectives.	Staff responsible for risk assessment and those responsible for developing and approving resource and training plan(s). There may also be input from the organisation's Safety, Health and Environment team.	The organisations risk management framework. The organisation's resourcing plan(s) and training and competency plan(s). The organisation should be able to demonstrate appropriate linkages between the content of resource plan(s) and training and competency plan(s) to the risk assessments and risk control measures that have been developed.	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.
	In order for an organisation to comply with its legal, regulatory, statutory and other asset management requirements, the organisation first needs to ensure that it knows what they are (e.g. PAS 55 specifies this in s 4.4.8). It is necessary to have systematic and auditable mechanisms in place to identify new and changing requirements. Widely used AM standards also require that requirements are incorporated into the asset management system (e.g. procedure(s) and process(es)).	Top management. The organisations regulatory team. The organisation's legal team or advisors. The management team with overall responsibility for the asset management system. The organisation's health and safety team or advisors. The organisation's policy making team.	The organisational processes and procedures for ensuring information of this type is identified, made accessible to those requiring the information and is incorporated into asset management strategy and objectives.	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.
	Life cycle activities are about the implementation of asset management plan(s) i.e. they are the "doing" phase. They need to be done effectively and well in order for asset management to have any practical meaning. As a consequence, widely used standards (e.g. PAS 55 s 4.5.1) require organisations to have in place appropriate process(es) and procedure(s) for the implementation of asset management plan(s) and control of lifecycle activities. This question explores those aspects relevant to asset creation.	Asset managers, design staff, construction staff and project managers from other impacted areas of the business, e.g. Procurement	Documented process(es) and procedure(s) which are relevant to demonstrating the effective management and control of life cycle activities during asset creation, acquisition, enhancement including design, modification, procurement, construction and commissioning.	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.

Question No.	Function	Question	Score	Evidence—Summary	
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 continually 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.	
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.	
99	Investigation of asset-related failures, incidents and non-conformities	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.	

	Why	Who	Record/documented Information	Maturity narrative for assessed score
	Having documented process(es) which ensure the asset management plan(s) are implemented in accordance with any specified conditions, in a manner consistent with the asset management policy, strategy and objectives and in such a way that cost, risk and asset system performance are appropriately controlled is critical. They are an essential part of turning intention into action (e.g. as required by PAS 55 s 4.5.1).	Asset managers, operations managers, maintenance managers and project managers from other impacted areas of the business.	Documented procedure for review. Documented procedure for audit of process delivery. Records of previous audits, improvement actions and documented confirmation that actions have been carried out.	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.
	Widely used AM standards require that organisations establish implement and maintain procedure(s) to monitor and measure the performance and/or condition of assets and asset systems. They further set out requirements in some detail for reactive and proactive monitoring, and leading/lagging performance indicators together with the monitoring or results to provide input to corrective actions and continual improvement. There is an expectation that performance and condition monitoring will provide input to improving asset management strategy, objectives and plan(s).	A broad cross-section of the people involved in the organisation's asset-related activities from data input to decision-makers, i.e. an end-to end assessment. This should include contactors and other relevant third parties as appropriate.	Functional policy and/or strategy documents for performance or condition monitoring and measurement. The organisation's performance monitoring frameworks, balanced scorecards etc. Evidence of the reviews of any appropriate performance indicators and the action lists resulting from these reviews. Reports and trend analysis using performance and condition information. Evidence of the use of performance and condition information shaping improvements and supporting asset management strategy, objectives and plan(s).	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.
	Widely used AM standards require that the organisation establishes implements and maintains process(es) for the handling and investigation of failures incidents and non-conformities for assets and sets down a number of expectations. Specifically this question examines the requirement to define clearly responsibilities and authorities for these activities, and communicate these unambiguously to relevant people including external stakeholders if appropriate.	The organisation's safety and environment management team. The team with overall responsibility for the management of the assets. People who have appointed roles within the asset-related investigation procedure, from those who carry out the investigations to senior management who review the recommendations. Operational controllers responsible for managing the asset base under fault conditions and maintaining services to consumers. Contractors and other third parties as appropriate.	Process(es) and procedure(s) for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non conformances. Documentation of assigned responsibilities and authority to employees. Job Descriptions, Audit reports. Common communication systems i.e. all Job Descriptions on Internet etc.	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.

Question No.	Function	Question	Score	Evidence—Summary	
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.	
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.	
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.	

	Why	Who	Record/documented Information	Maturity narrative for assessed score
	This question seeks to explore what the organisation has done to comply with the standard practice AM audit requirements (e.g. the associated requirements of PAS 55 s 4.6.4 and its linkages to s 4.7).	The management team responsible for its asset management procedure(s). The team with overall responsibility for the management of the assets. Audit teams, together with key staff responsible for asset management. For example, Asset Management Director, Engineering Director. People with responsibility for carrying out risk assessments.	The organisation's asset-related audit procedure(s). The organisation's methodology(s) by which it determined the scope and frequency of the audits and the criteria by which it identified the appropriate audit personnel. Audit schedules, reports etc. Evidence of the procedure(s) by which the audit results are presented, together with any subsequent communications. The risk assessment schedule or risk registers.	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.
	Having investigated asset related failures, incidents and non-conformances, and taken action to mitigate their consequences, an organisation is required to implement preventative and corrective actions to address root causes. Incident and failure investigations are only useful if appropriate actions are taken as a result to assess changes to a businesses risk profile and ensure that appropriate arrangements are in place should a recurrence of the incident happen. Widely used AM standards also require that necessary changes arising from preventive or corrective action are made to the asset management system.	The management team responsible for its asset management procedure(s). The team with overall responsibility for the management of the assets. Audit and incident investigation teams. Staff responsible for planning and managing corrective and preventive actions.	Analysis records, meeting notes and minutes, modification records. Asset management plan(s), investigation reports, audit reports, improvement programmes and projects. Recorded changes to asset management procedure(s) and process(es). Condition and performance reviews. Maintenance reviews.	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.
	Widely used AM standards have requirements to establish, implement and maintain process(es)/procedure(s) for identifying, assessing, prioritising and implementing actions to achieve continual improvement. Specifically there is a requirement to demonstrate continual improvement in optimisation of cost risk and performance/condition of assets across the life cycle. This question explores an organisation's capabilities in this area—looking for systematic improvement mechanisms rather that reviews and audit (which are separately examined).	The top management of the organisation. The manager/team responsible for managing the organisation's asset management system, including its continual improvement. Managers responsible for policy development and implementation.	Records showing systematic exploration of improvement. Evidence of new techniques being explored and implemented. Changes in procedure(s) and process(es) reflecting improved use of optimisation tools/techniques and available information. Evidence of working parties and research.	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.

Question No.	Function	Question	Score	Evidence—Summary	
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.	

	Why	Who	Record/documented Information	Maturity narrative for assessed score
	One important aspect of continual improvement is where an organisation looks beyond its existing boundaries and knowledge base to look at what 'new things are on the market'. These new things can include equipment, process(es), tools, etc. An organisation which does this (e.g. by the PAS 55 s 4.6 standards) will be able to demonstrate that it continually seeks to expand its knowledge of all things affecting its asset management approach and capabilities. The organisation will be able to demonstrate that it identifies any such opportunities to improve, evaluates them for suitability to its own organisation and implements them as appropriate. This question explores an organisation's approach to this activity.	The top management of the organisation. The manager/team responsible for managing the organisation's asset management system, including its continual improvement. People who monitor the various items that require monitoring for 'change'. People that implement changes to the organisation's policy, strategy, etc. People within an organisation with responsibility for investigating, evaluating, recommending and implementing new tools and techniques, etc.	Research and development projects and records, benchmarking and participation knowledge exchange professional forums. Evidence of correspondence relating to knowledge acquisition. Examples of change implementation and evaluation of new tools, and techniques linked to asset management strategy and objectives.	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.

A

GLOSSARY OF TERMS

A. GLOSSARY OF TERMS

A	Amperes	**DER**	Distributed Energy Resources
AAAC	All Aluminium Alloy Conductor	**Deuar**	Deuar Mechanical Partial Load Deflection Testing
AAC	All Aluminium Conductor	**DFA**	Delegated Financial Authority
ABB	Supplier	**DG**	Distributed Generation
ABC	Aerial Bundled Cable	**DGA**	Dissolved Gas Analysis
ABS	Air Break Switch	**DMAIC**	Define, Measure, Analyse, Improve, Control
AC	Alternating Current	**DNP-3**	Distributed Network Protocol
ACC	Accident Compensation Corporation	**DPP**	Commerce Commission's Default Price Path
ACSR	Aluminium Conductor Steel Reinforced	**DR**	Disaster Recovery
ACTIVA	Software Package	**EAMS**	Enterprise Asset Management System
ADMS	Advanced Distribution Management System	**EDB**	Electricity Distribution Business
AE	Augmentation Envelope	**EDSS**	Expert Decision Support System
AEI	Associated Electrical Industries	**EMT**	Executive Management Team
AMMAT	Asset Management Maturity Assessment Tool	**ENTEC**	Supplier
AMO	Asset Management Objective	**ERC**	Executive Risk Committee
AMP	Asset Management Plan	**EVA**	Ethylene Vinyl Acetate
AMS	Asset Management System	**FAIDI**	Feeder Average Interruption Duration Index
AOC	Alternative Operations Centre	**FAIFI**	Feeder Average Interruption Frequency Index
ARC	Audit and Risk Committee	**FRS-3**	Financial Reporting Standards
ARP	Asset Renewal Planning	**GEC**	The General Electric Company
ASEA	Merged with Brown Boveri to create ABB	**GIS**	Geo-spatial Information System
BCP	Business Continuity Planning	**GMI**	Annual Invasive Inspection
BMSF	Business Management Framework	**GPS**	Global Positioning System
CAD	Computer Aided Design	**GSP**	Great Safety Performance
CAPEX	Capital Expenditure	**GWh**	Giga Watt-hours
CB	Circuit Breaker	**GXP**	Grid Exit Point
CBD	Central Business District	**H&S**	Health and Safety
CBRM	Condition Based Risk Management	**H_2S**	Hydrogen Sulphide
CDEM	Civil Defence Emergency Management	**HBPCT**	Hawke's Bay Power Consumers' Trust
CI	Continual Improvement	**HILP**	High Impact Low Probability
CorMon	Corrosion Monitoring	**HP**	Hewlett Packard
CPI	Consumer Price Index	**HR**	Human Relations
CRM	Customer Relationship Management	**HV**	High Voltage
CT	Current Transformer	**ICP**	Installation Control Point
DC	Direct Current	**IMG**	Information Management Group
DDO	Dominion Drop Out	**IMP**	Insulator Pollution Monitoring

APPENDIX GLOSSARY OF TERMS

IP	Internet Protocol	**Peanut**	Vacuum Capacitor Switch
IPT	Investment Prioritisation Tool	**PILC**	Paper Insulated, Lead Covered
IT	Information Technology	**PLC**	Programmable Logic Controller
k	Thousand	**POS**	Point of Supply
kV	Kilovolt	**PSMS**	Public Safety Management System
kVA	1000 Volt-Amps	**PV**	Solar Photovoltaic
kVAr	Reactive power	**PVC**	Polyvinyl Chloride
L+G	Landis+Gyr	**R:P**	Reactive to Preventative Cost
LCAM	Lifecycle Asset Management	**RAMP**	Regulatory Asset Management Plan
LCP	Legislative Compliance Programme	**RC**	Replacement Cost
LED	Light Emitting Diode	**RCS**	Remote Controlled Switch
LFT	Load Forecast Tool	**RE**	Renewal Envelope
LMVP	Model of Reyrolle Pacific Switchgear	**REG D**	A Eberle Voltage Regulating Relay
LTOS	Live Tank Oil Sampling	**RLE**	Residual Life Expectancy
LV	Low Voltage	**RMS**	Ring Main Switchgear
m	Million	**RMU**	Ring Main Unit
MAGTECH	Supplier	**RPS**	Reyrolle Pacific
MCR	Maximum Continuous Rating	**RTU**	Remote Terminal Unit
MD	Maximum Demand	**S/S**	Substation
MDS	Master Data Services	**SAIDI**	System Average Interruption Duration Index
MED	Major Event Day	**SAIFI**	System Average Interruption Frequency Index
MIND	Mineral Insulated Non-Draining	**SAMP**	Strategic Asset Management Plan
MPT40	Deuar Mechanical Partial Load Deflection Testing	**SAN**	Storage Area Network
MRP	Mighty River Power	**SAP**	Software Package
MSA	Management Services Agreement	**SCADA**	Supervisory Control and Data Acquisition
MV	Medium Voltage	**SCI**	Statement of Corporate Intent
MVA	Mega Volt-Amps	**SF_6**	Sulphur Hexafluoride
MW	Megawatt	**SH**	State Highway
NIT	Network Investment Toolbox	**SI**	Serviceability Index
NOC	Network Operations Centre	**SMART**	Specific, Measurable, Achievable, Relevant, Timebound
NPS	Net Promoter Score	**SO^2**	Sulphur Dioxide
NPV	Net Present Value	**Stn**	Station
NZ	New Zealand	**SWER**	Single Wire Earth Return
NZIER	New Zealand Institute for Economic Research	**TCP**	Transmission Control Protocol
OH	Overhead	**TEC**	Technical Evaluation Committee
OHUG	Overhead to Underground	**TELARCC**	Supplier
OPEX	Operational Expenditure	**Triple-R**	Repair, Refurbish, Replace
PA	Partial Achievement	**UCSL**	Unison Contracting Services Limited
PD	Partial Discharge	**UG**	Underground

PDCA	Plan, Do, Check, Act	**VoIP**	Voice over Internet Protocol
UHF	Ultra-High Frequency	**VPT**	Vegetation Prioritisation Tool
UNISAFE	A model of ABB switchgear	**VRR**	Voltage Regulating Relay
UNL	Unison Networks Limited	**VT**	Voltage Transformer
Var	Volt Ampere Reactive	**WPC**	Works Planning and Consolidation
VHF	Very High Frequency		

CENTRALINES
LIMITED

CERTIFICATION FOR YEAR-BEGINNING DISCLOSURES

Pursuant to Schedule 17

We, Wendie Nicola Harvey and Derek Neil Walker, 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, 2.6.6 and 2.7.2 of the Electricity Distribution Information Disclosure Determination 2017 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: 28th March 2018

Director

Date: 28h March 2018

CENTRALINES LIMITED
PO Box 59, Waipukurau   Telephone (06) 858 7770   Fax (06) 858 6601
www.centralines.co.nz