CENTRALINES
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REGULATORY ASSET MANAGEMENT PLAN UPDATE 2019-29

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This Regulatory Asset Management Plan (RAMP) Update is available for public disclosure and applies for the period 1 April 2019 to 31 March 2029.

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SUMMARY OF THE PLAN

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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.

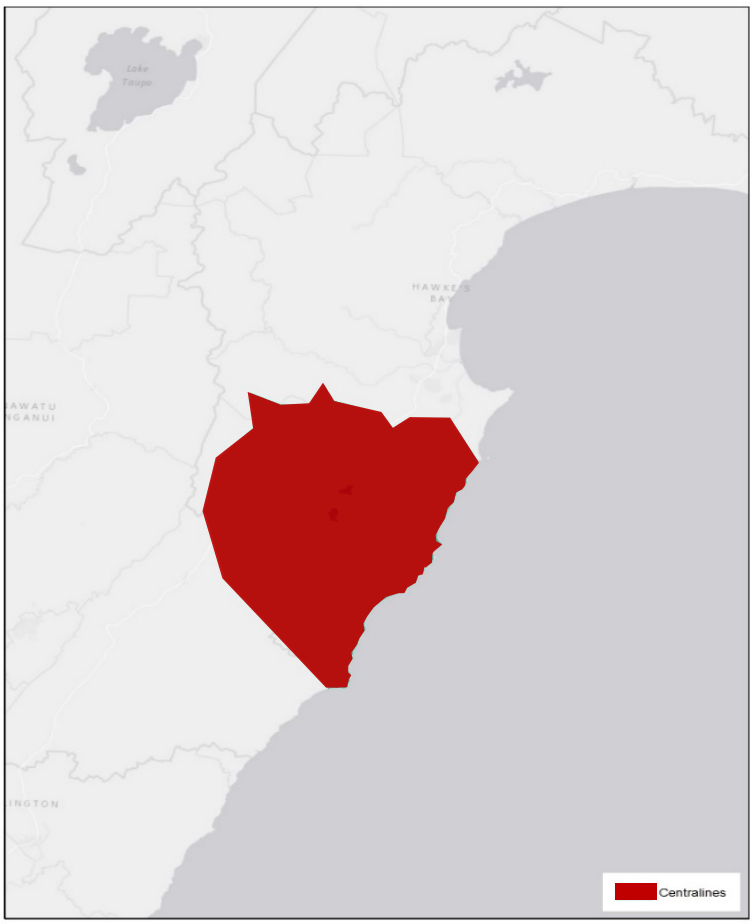

Figure 1-1: Map of Centralines' Network

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.

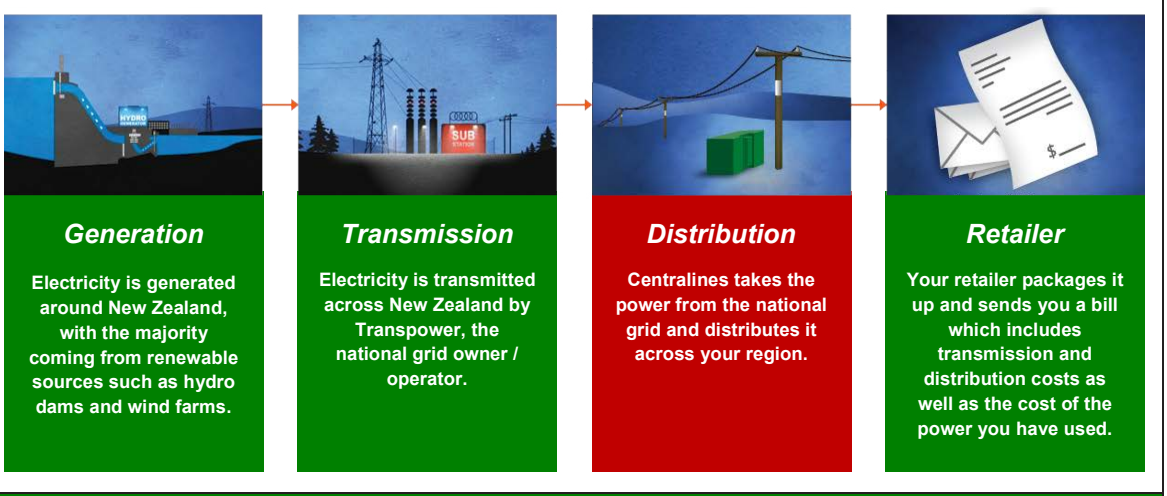

Figure 1-2: New Zealand Electricity Industry Diagram

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%.

1.1.4 Changing Energy Landscape

The energy landscape is likely to change dramatically in the coming years and it is important for Centralines to evolve if it is to deliver value to its stakeholders. The timing and exact nature of the changes are unknowable, so it is critical that Centralines strengths in managing electricity distribution assets continue to be enhanced. Centralines will need to have an agile strategy and the ability to manage future uncertainties to remain relevant. Increasing support for a decarbonised energy policy coupled with breakthroughs in technology mean uptake of Distributed Energy Resources and the efficient integration of them within the electricity distribution system are becoming almost inevitable.

For strategy purposes, Centralines uses a combination of megatrends and scenarios to prepare for an uncertain future. Centralines initially references megatrends to explore the social and technology trends that are shaping the world, and which are most likely to be relevant to Centralines. Following this, scenarios are developed to structure Centralines' perceptions about alternative future environments in which today's decisions might be played out. The opportunities and attendant risks generally fall under two broad categories; rate of trend development (Incrementalism or Metamorphosis), and ability to manage change (Master or Marionette).

Some investment risks will need to be taken to ensure Centralines meets its customers' short-term expectations, irrespective of what the future looks like, but it is important that Centralines is proactive, establish strong partnerships and invest wisely so that we can embark on a least regrets path towards a changing energy landscape.

See section 4.4 for more detail on how Centralines plans to use scenarios to identify future network constraints under each of the four scenarios, and how this work will be used to develop a least regrets pathway.

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 2017/18	Industry Average
Consumers Connected	Total installation control points (ICP) connected to the network.	8,247	71,016
System Length	Total length of all energised circuits.	1,906km	3,951km

Metric	Description	Value 2017/18	Industry Average
Sub-Transmission System Length	Total length of all energised 33kV circuits.	96km	410km
Distribution System Length	Total length of all energised 11kV circuits.	1,435km	3,130km
Low Voltage System Length	Total length of all energised LV circuits.	281km	1,775km
Percentage Underground	The proportion of total system length that is undergrounded.	5.9%	19.2%
Asset Value	Regulatory Asset Base.	$54,013,000	$394,641,000
SAIDI	System Average Interruption Duration Index. A measure of the number of minutes per year the average consumer is without electricity supply.	131.7 minutes	230.3 minutes
SAIFI	System Average Interruption Frequency Index. A measure of the number of interruptions per year that affect the average consumer.	2.23	2.40
Electricity Supplied	Electricity entering system for supply to consumers.	115 GWh	1048 GWh
Loss Ratio	Proportion of electricity lost on the high voltage network.	8.5%	5.6%

Table 1-1: 2017/18 Network Comparison Between Centralines and Industry Average of NZ EDBs

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.

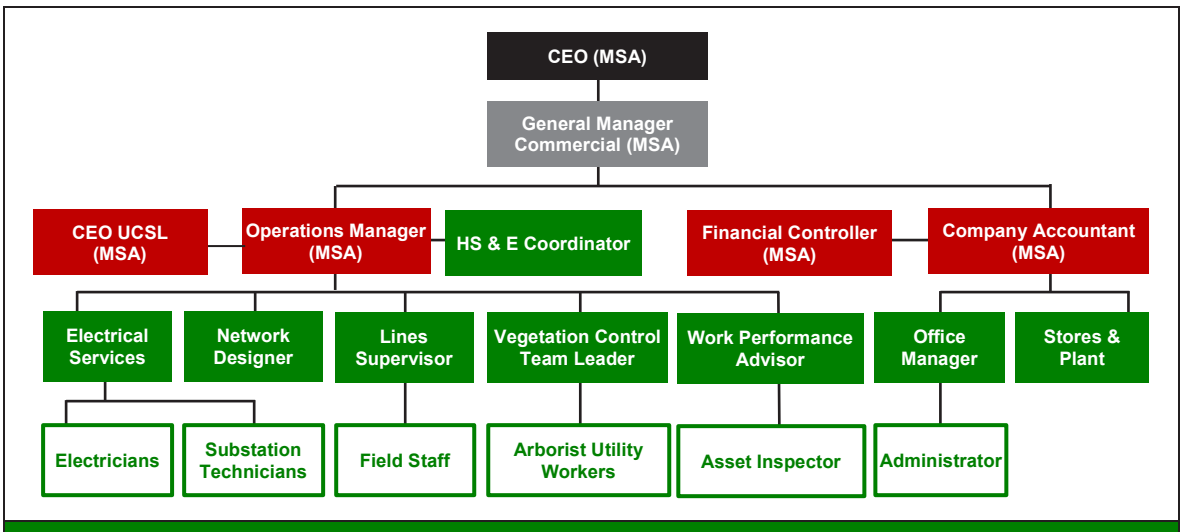

Figure 1-3: Centralines' Organisation Structure

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

Section Name	Description	Determination Reference
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.
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				
			2019/20	2020/21	2021/22	2022/23-23/24	2024/25-28/29
Health and Safety Performance	Accidents Causing Harm to a Member of the Public	Number of accidents	0	0	0	0	0
	Serious Harm or Lost-Time Injury to Employees or Contractors	Number of injuries	0	0	0	0	0
	Injuries to Employees requiring Medical Treatment	Number of injuries	< 2	< 2	< 2	< 2	< 2
Customer Service Performance	Surveyed Customer Satisfaction	%	> 95%	> 95%	> 95%	> 95%	> 95%
	SAIDI	Minutes	98.80 – 119.07	98.80 – 119.07	98.80 – 119.07	98.80 – 119.07	98.80 – 119.07
	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
2019/2020-2028/2029	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.
2019/2020-2020/2021	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	3.1
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	

Table 1-6: Determination Reference Mapping Table

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2. BACKGROUND AND OBJECTIVES

2.4 Purpose of the Regulatory Asset Management Plan (RAMP)

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).

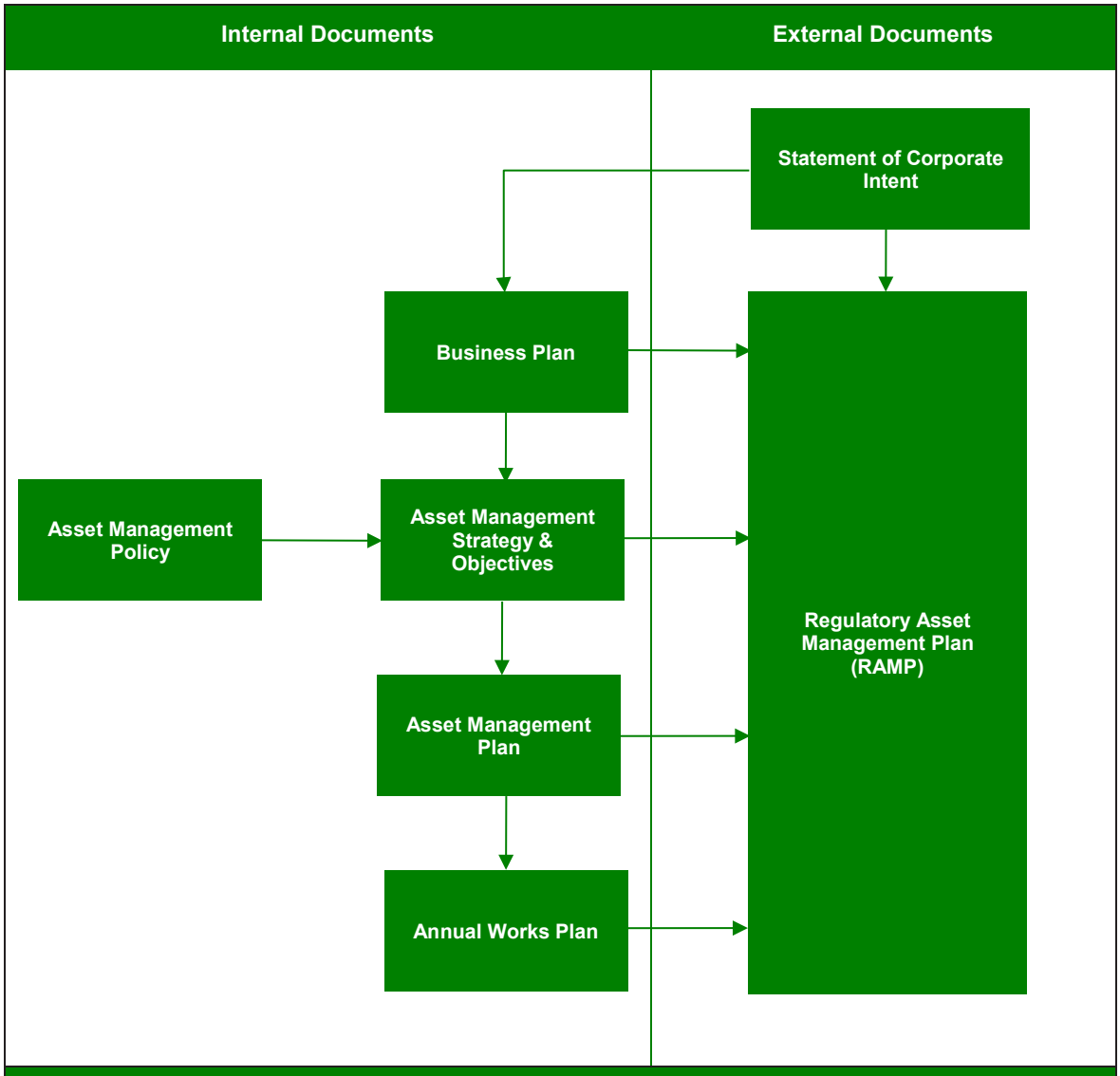

Figure 2-3: Consolidation of Asset Management Information in the RAMP

2.5 Planning Period of the Regulatory Asset Management Plan

The RAMP covers the period from 1 April 2019 to 31 March 2029. 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 27 March 2019.

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SERVICE LEVELS

NO MATERIAL CHANGES

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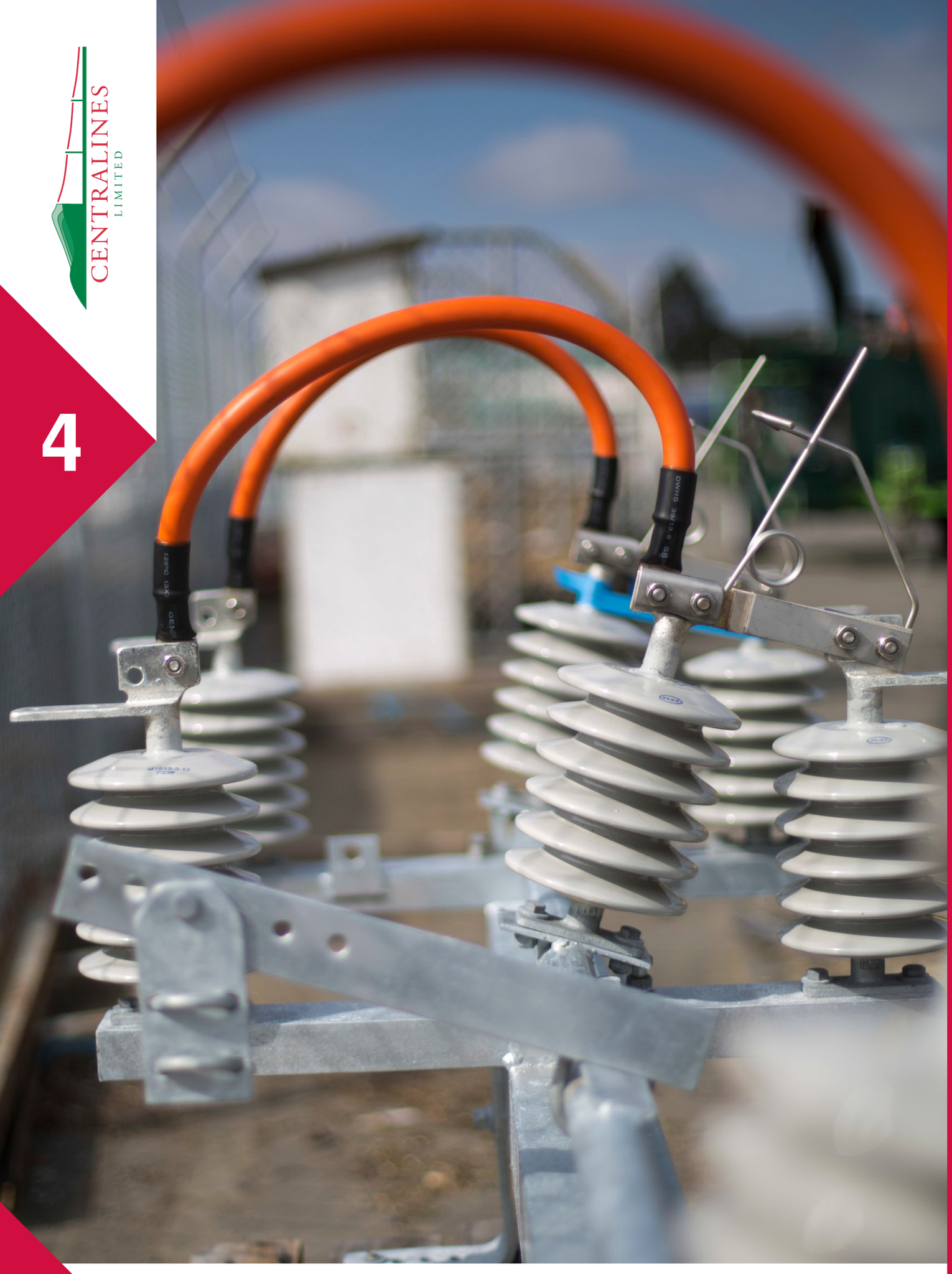

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4. NETWORK DEVELOPMENT PLANS

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. This site is scheduled to have the 33kV switchgear replaced between 2021 and 2025.

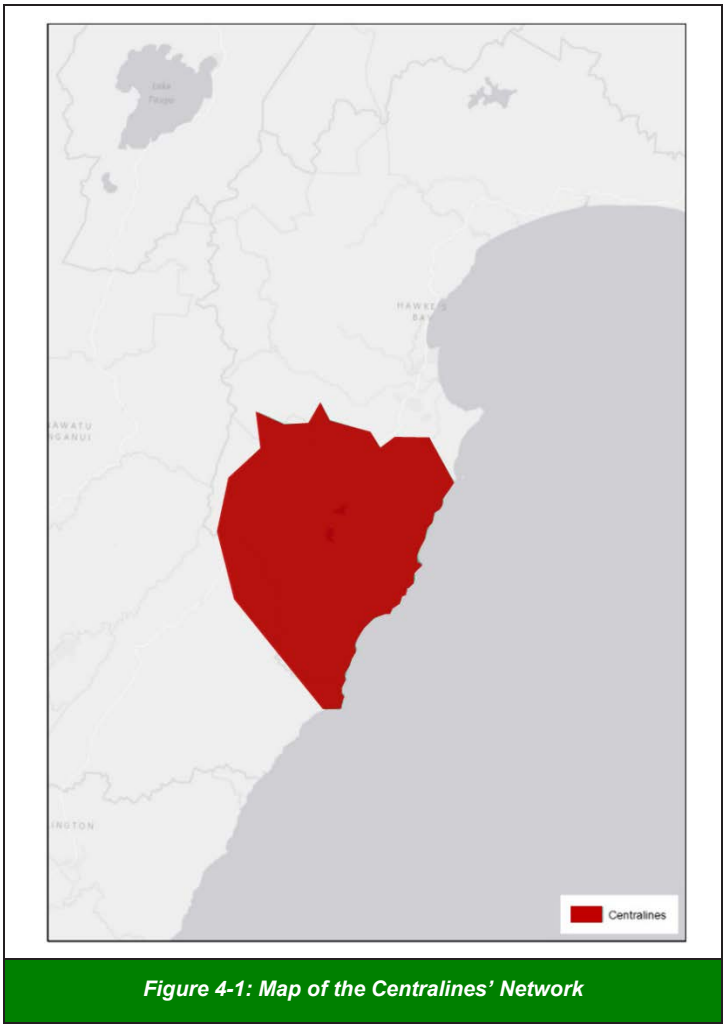

Figure 4-1: Map of the Centralines' Network

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.

Approximately 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*

The network is supplied from a single GXP at Ongaonga and there is no significant embedded generation above 20kW installed on the network.

The GXP is connected by four separate overhead 110kV circuits, two from Dannevirke to the south and two from Fernhill to the north. The GXP is normally supplied by the circuits 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	21	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.

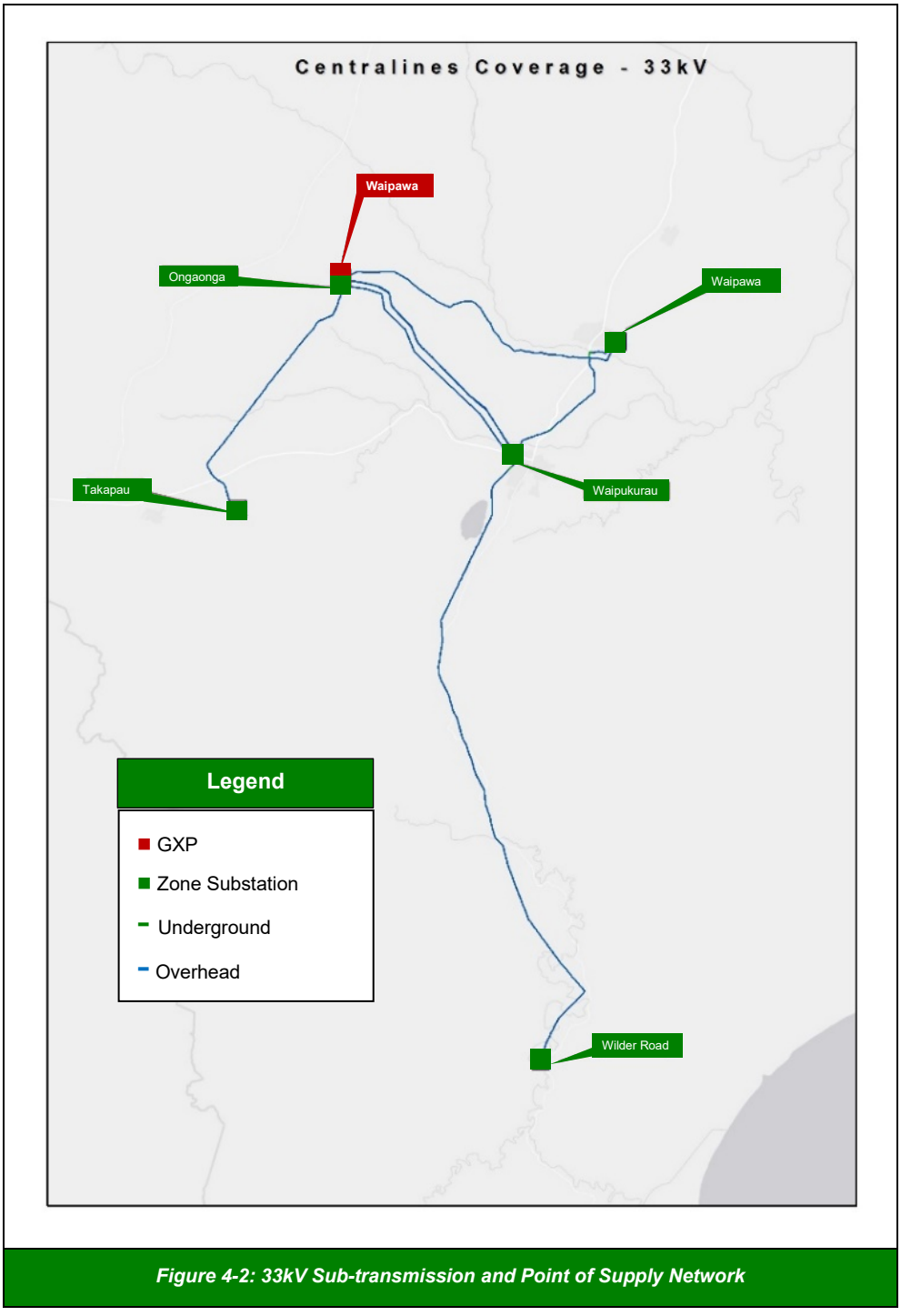

Figure 4-2: 33kV Sub-transmission and Point of Supply Network

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 undertaken 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	2.4%
400V Network	27.3%

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 2020/2021 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 voltage harmonic distortion supplied to customers. Identifying and tracking the source or cause of harmonic distortion is generally very difficult and often involves investigation of several customers' installations, as well as network configuration. Centralines works with all affected parties to identify the cause of harmonic distortion and determine the most cost-effective solution. If a single installation is identified as the cause, Centralines reserves the right to disconnect that installation as a last resort to protect other 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 Tables 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 reviews these criteria and adjusts in its network restoration approach using smart network technologies, network demand profiles and customer expectations (as identified in customer surveys). This is to ensure these criteria remain appropriate and continue to meet 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
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 Class D	Yes	Substation supplies one large customer and the surrounding rural area
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
	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

4.3.1 Introduction

The energy landscape is likely to change dramatically in the coming years and it is important for Centralines to evolve if it is to deliver value for its stakeholders and customers. The timing and exact nature of the changes are unknowable, so it is also critical that Centralines strengths in managing electricity distribution assets continue to be enhanced. As the environment in which Centralines operates is changing faster than ever before, Centralines will need to have an agile strategy and the ability to manage future uncertainties to remain relevant. Increasing support for a decarbonised energy policy coupled with breakthroughs in technology mean uptake of Distributed Energy Resources and the efficient integration of them within the electricity distribution system are becoming almost inevitable.

To prepare for an uncertain future Centralines uses firstly megatrends to explore the social and technology trends that are shaping the world, and which are most likely to be relevant to Centralines, and secondly scenarios for ordering Centralines perceptions about alternative future environments in which today's decisions might be played out.

Megatrends in the energy landscape related to the proliferation of distributed energy resources such as solar panels, batteries and electric vehicles. These trends are not only limited to trends directly impacting the energy sector, it also includes the move to platform-based models, interconnectivity between people and devices, and the digitalisation of intelligence and relationships between various stakeholders. Some, or all of these trends will impact on Centralines' customers and the supply chains used, necessitating changes to Centralines' business model and providing new value creating opportunities.

As the energy landscape begins to evolve to the new energy future, the demarcation between electricity generator, distributor and retailer will become less clear. As a result, it is important when developing Centralines' strategy to consider what organisations, other than electricity distribution businesses, are doing to play a role in the energy landscape of the future. Retailers, in partnership with platform and technology companies, are offering peer to peer energy trading platforms, solar panels, batteries and home energy management tools to enable consumers to lower their overall energy bill.

Internationally, progressive electricity distribution businesses and other energy companies have begun to respond to these trends. While there are differences between each country, lessons can be taken from the strategies electricity distribution businesses are employing to transform themselves from monopoly utilities into customer-centric technology companies. One strategy relevant to Centralines is the transition from a distribution network operator (DNO) to distribution system operator (DSO) to create new opportunities and add value in an environment with increasingly distributed energy resources. To support this, progressive electricity distribution businesses are enhancing their stakeholder and customer engagement. They are also engaging in open innovation models by partnering with other organisations that have complementary capabilities and objectives.

For strategy purposes, Centralines uses scenarios to balance the opportunities available from megatrends tempered against its business risks. The opportunities and attendant risks generally fall under two broad categories, rate of trend development (Incrementalism or Metamorphosis) and ability to manage change (Master or Marionette).

"A scenario is a tool for ordering one's perceptions about alternative future environments in which today's decisions might be played out."[1] Scenarios are powerful planning tools precisely because the future is unpredictable. Unlike traditional forecasting or market research, scenarios present alternative images instead of extrapolating current trends from the present. Scenarios also embrace qualitative perspectives and the potential for sharp discontinuities that econometric models exclude. Consequently, creating scenarios requires decision-makers to question their broadest assumptions about the way the world works so they can foresee decisions that might be missed or denied. Within the organisation, scenarios provide a common vocabulary and an effective basis for communicating complex – sometimes paradoxical – conditions and options.

[1] Peter Schwartz is an American futurist, innovator, author, and co-founder of the Global Business Network (GBN), a corporate strategy firm, specialising in future-think and scenario planning.

4.3.2 Megatrends

A megatrend is defined as “an important shift in the progress of a society”. Although the terminology is recent, the phenomenon of megatrends is not, and megatrends such as globalisation, information technology, the rise of the BRICS nations, and demographic shifts in the developed world have each played their role in shaping the last few decades and continue to have influence in 2019.

The key differences in impact that contemporary megatrends have on today’s businesses are the speed at which they can arise and disrupt existing value networks, and their increased pervasiveness due to the deeply interconnected world that we live in (both in terms of globalisation and digital technologies). Consideration of megatrends is therefore an important starting point when considering long-term strategy.

Figure 4-3 plots megatrends with future influence along the vertical axis and the relevance to Centralines along the horizontal axis. The bubble size provides an indication of current influence. Although all of these trends may be relevant in formulating Centralines strategy, those in the top right quadrant are likely to be most significant. Further detail on how this analysis was undertaken is provided in the following section.

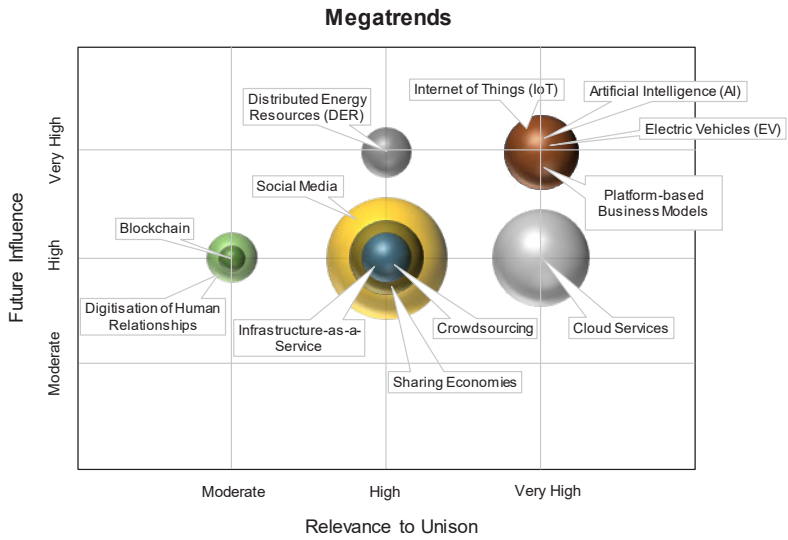

Figure 4-3: Megatrends Chart

The megatrends that were evaluated as having a future relevance to Centralines of three or more were consolidated into Table 4-8. To maintain relevance to future network design and for the purpose of Centralines Regulatory Asset Management Plan, only a subset of the megatrends listed below are discussed in further detail. For more information on an analysis of the other megatrends listed, please contact Centralines.

Score	Current Influence	Future Influence	Future relevance to Centralines
5	A very strong influence on global economics, politics and societies.	The influence of the megatrend is likely to greatly increase over time.	The megatrend will have a direct impact on Centralines' day-to-day operations.
4	A strong influence on global economics, politics and societies.	The influence of the megatrend is likely to increase over time.	The megatrend will have a direct impact on Centralines' strategy and planning.
3	A moderate influence on global economics, politics and societies.	The influence of the megatrend is likely to remain constant over time.	The megatrend will have a direct impact on Centralines' customers or supply chain.
2	A low influence on global economics, politics and societies.	The influence of the megatrend is likely to diminish over time.	The megatrend will have an indirect impact on Centralines' customers or supply chain.
1	A very low influence on global economics, politics and societies.	The influence of the megatrend is likely to greatly diminish over time.	The megatrend will have a minimal impact on Centralines', its customers or its supply chain.

Table 4-8: Scoring Schema for Megatrends

Megatrend	Current Influence	Future Influence	Future Relevance to Centralines
Artificial Intelligence (AI)	3	5	5
Electric Vehicles (EV)	3	5	5
Internet of Things (IoT)	3	5	5
Platform-based Business Models	3	5	5
Cloud Services	4	4	5
Distributed Energy Resources (DER)	2	5	4
Social Media	5	4	4
Crowdsourcing	3	4	4
Sharing Economies	3	4	4
Infrastructure-as-a-Service	2	4	4
Digitalisation of Human Relationships	2	4	3
Blockchain	1	4	3

Table 4-9: Megatrends Consolidated

Electric Vehicles

Electric vehicles are powered by chemical potential energy stored within batteries, rather than the combustion of hydrocarbons. The NZ Transport Agency recognises two main types of electric vehicle:

- Battery electric vehicles (BEVs): powered only by a battery which is charged by connecting to an external source of electricity.
- Plug-in hybrid electric vehicles (PHEVs): vehicles with both an electric motor and an internal combustion engine.

Although EVs first came into existence in the mid-19th century, they have recently gained greater acceptance globally due to technological developments and Government incentives associated with decarbonisation policies, and changing social values around the environment.

The Ministry of Transport reports that the New Zealand EV fleet increased by 5,500 in 2018 (3,500 in 2017) to reach a total of 11,700 electric vehicles. The Government has a target of 64,000 EVs by 2021, which is equivalent to almost 2% of the total vehicle fleet.

EVs are highly relevant to Centralines and other EDBs. An EV with a typical daily commute of 40km requires 6-8kWh of energy to recharge, equivalent to the daily demand of a small household. In an unregulated environment, EV users are likely to plug-in when they get home, around 6:00 p.m., at exactly the time that residential electricity networks experience peak demand further increasing peak load. Early EV buyers tend to have similar levels of income, education and environmental awareness, meaning they are likely to live in the same neighbourhoods – further concentrating the impact of EVs on electricity networks.

Distributed Energy Resources

Although there is still not concrete definition of DER in the literature, a commonly cited definition is a “source of electric power that is not directly connected to a bulk power transmission system” (IEEE). All definitions refer to equipment capable of generating or storing electricity that is connected to the distribution network either at high voltage (embedded) or low voltage (including behind the meter). The most commonly cited technologies are solar photovoltaics (PV), batteries, and micro-wind turbines.

The economics of DERs is rapidly improving. The US Department of Energy reported that between 2008 and 2014, the cost of solar PV reduced 54%, batteries reduced 73% and onshore wind turbines reduced 41%. These trends are expected to continue. The reductions in cost are leading to increases in uptake, and this is evident in New Zealand, as shown in Figure 4-4. Although the levels of solar PV in the New Zealand power system are very small (0.7% of total installed capacity) they are growing rapidly at a compound annual growth rate of over 50% since the end of 2013.

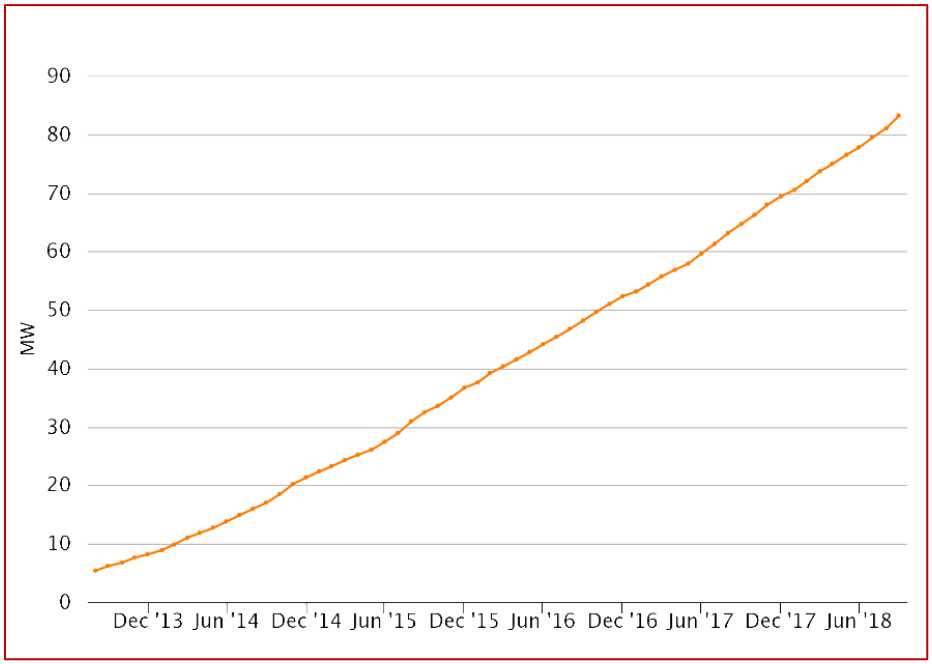

Figure 4-4: NZ Solar PV Installed Capacity

Although DER will clearly have an impact on Centralines, its effect is expected to be more muted than in major cities. This is because of the relatively low socio-economics of Centralines' regions and the high upfront capital costs of installing DER. The affordability issue can however be overcome by third party lease arrangements. The effects on distribution networks from DER uptake include:

1. Lower electricity volumes being distributed from upstream infrastructure, and the potential that parts of the network become net exporters.
2. Two-way power-flows requiring new network architecture, equipment selection criteria and operational processes.
3. The opportunity to use DER to alleviate capacity or voltage constraints instead of upgrading electricity distribution infrastructure.

As well as these technical impacts, how DER will be accommodated by regulation remains an important unanswered question.

4.3.3 Scenarios

For strategy purposes Centralines uses scenarios to balance the opportunities available from megatrends tempered against its business risks. The opportunities and attendant risks generally fall under two broad categories, rate of trend development (Incrementalism or Metamorphosis) and ability to manage change (Master or Marionette).

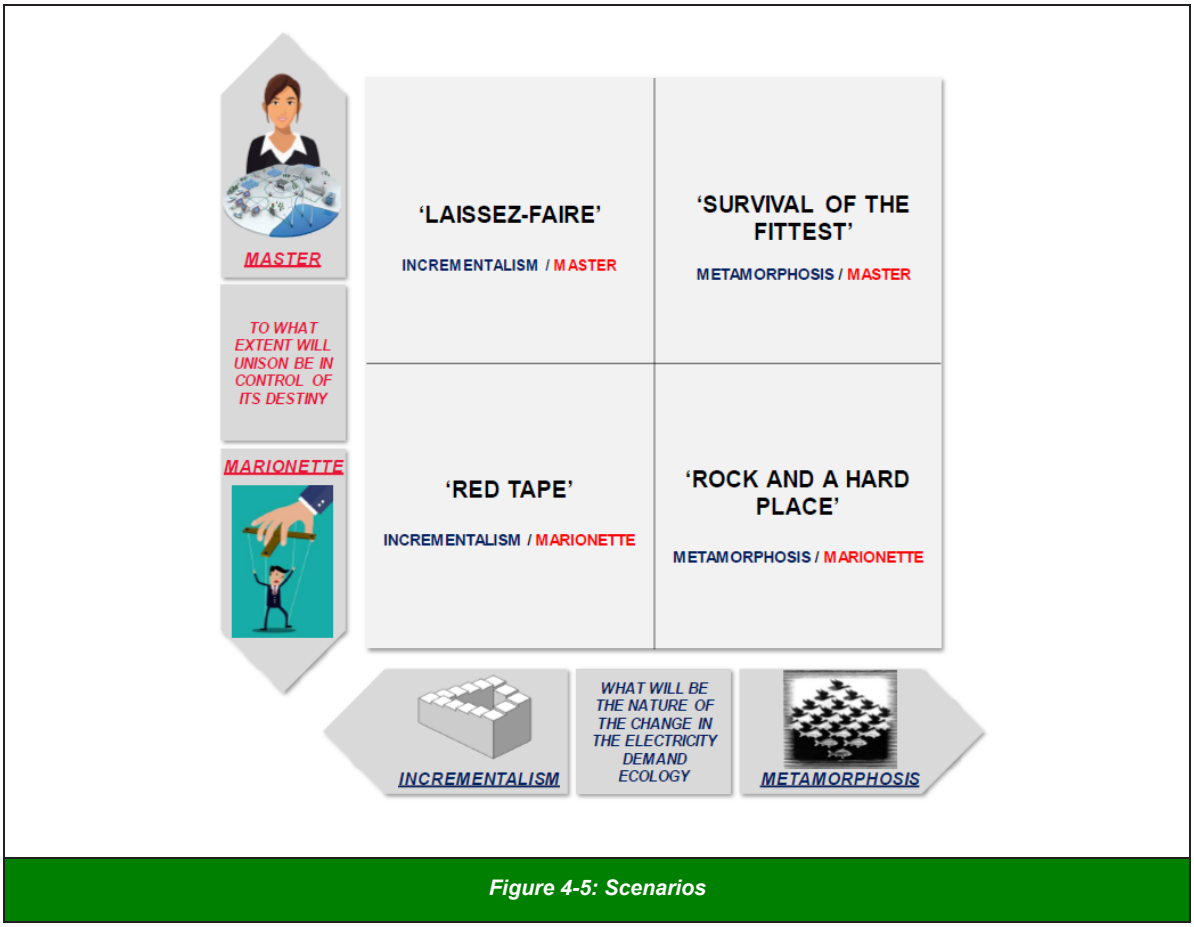

Figure 4-5: Scenarios

Laissez-faire

A world in which policy-makers and regulators have failed to deliver for customers, resulting in an electricity sector that continues to repeat the mistakes of the past: a lack of economies of scale in distribution, poor delineation of roles and responsibilities in the supply chain, limited technical standardisation including interoperability protocols, and no distribution pricing reform.

In this world the customer experience varies dramatically depending on where you live. Several EDBs with sufficient scale and progressive leadership have architected network platforms that take advantage of a permissive regulatory environment and the improving price-performance of DERs to deliver a modicum of choice to customers. But for smaller EDBs and those with shareholders with a short-term focus on cost, little has changed for the customer since the 2010s.

The IEA 2030 Energy Policy review of New Zealand bemoaned the lack of technical standardisation which has led to a heterogenous, non-optimised demand ecology with limited interoperability.

Survival of the Fittest

A world where customers demanded affordability, choice, and environmental sustainability in energy services, and the industry has responded. Successful interventions by both the Commerce Commission and Electricity Authority in the early 2020s clarified the scope of roles of the various participants in the electricity supply chain, including providing for EDBs as facilitator of technology in addition to their central role as DSO and platform provider.

Within this framework, industry participants have been able to collaborate productively and have defined world-leading technical standards for interoperability between the growing number and variety of market participants. These enabling structures result in electricity infrastructure and markets that deliver for customers through unprecedented levels of innovation and competition – in such an environment only the fittest can survive.

Red Tape

A world in which access to affordable, reliable electricity is a basic right guaranteed by the Government. This resulted in sweeping regulatory reform during the early 2020s, and since that time EDBs have been slowly stifled by ring-fencing legislation restricting them to providing a basic distribution service – and nothing more. Tightening price-quality regulation has made it increasingly difficult for EDBs to recover their cost of capital.

The inability of EDBs to facilitate technology uptake and support the emergence of new markets has led to a simplistic and uncompetitive demand-side ecology, leaving customers underserved and dissatisfied. The exception to this is in parts of Auckland, where the size of the market has meant that some innovative new entrants are offering services that deliver genuine choice. This has given regulators confidence that their approach is working but has only served to deepen the dissatisfaction of most customers unable to access these services.

Rock and Hard Place

A world in which the Government establishes a single nationwide distribution system operator (DSO) to coordinate the increasingly complex demand ecology created by progressive energy policy, the decarbonisation agenda and the improving price-performance of DER. EDBs remain responsible for asset management planning however operation of the assets now falls squarely outside their remit.

In this world EDBs are caught between a rock and a hard place. On one side is the centralised DSO with its exacting standards – right down to the point of connection. On the other is the increasingly demanding and engaged customer whose experience is falling short of the lofty expectations set by the Government and its agencies.

4.3.4 Key Factors Affecting the Future Network

To start forming a view of potential future network constraints under each of the four scenarios, Centralines has developed a view on the potential impact of DER and EVs, with the likely uptake highlighted in Figure 4-6 below.

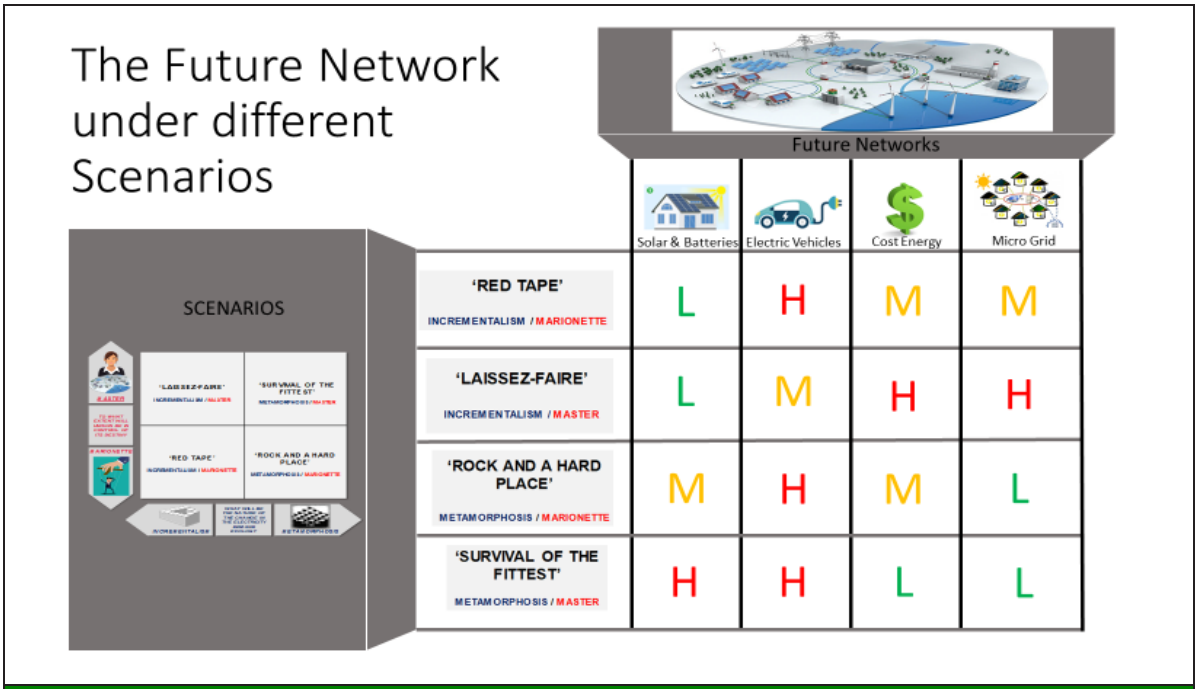

Figure 4-6: Expected

The uptake levels have been incorporated into a simulation tool to identify future network constraints in 2050. See Figure 4-7 below.

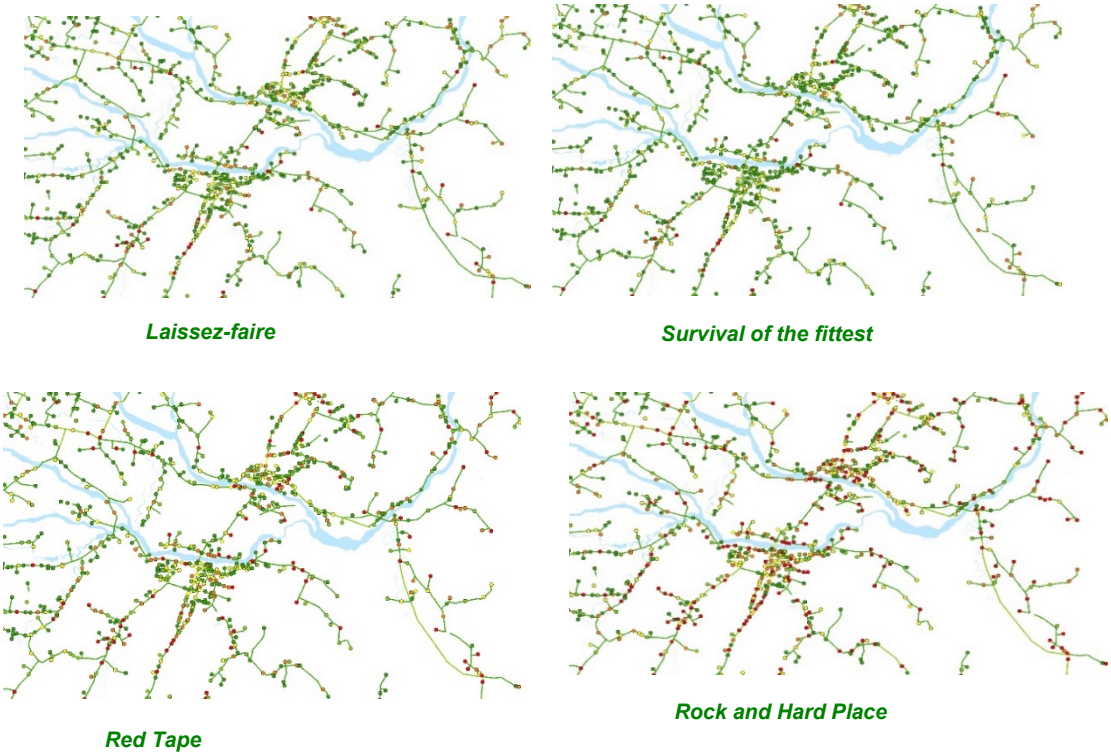

Figure 4-7: Portion of Centralines network under various scenarios

4.3.5 *Future Network Design Considerations*

System Architecture is not just the configuration of a network's physical components, it also includes their functional organisation and operation. The future will not be determined by Centralines, however the System Architecture is Centralines to manage and is the most effective tool to prepare for the future.

It currently takes the form of network design standards, decision support tools, approved equipment, operating processes and procedures, and performance targets.

Three approaches are described below.

Approach	Advantages	Disadvantages
Do nothing and wait	Low risk and effort in the short term.	This approach assumes that the current system architecture is best. It also leaves any response to the last minute when your options will be limited and expensive.
Pick one future and create architecture to suit	Simple process and sets a tangible goal.	At risk of herd mentality. If the future does not eventuate there will be asset redundancy and inefficiency.
Design architecture that works well in many potential futures	Avoids herd mentality a by taking a risk-based approach to the future. Reduces risk of inefficient investment. Sets clear direction for architecture.	This approach requires more effort up front and requires impartial critical thinking.

Table 4-10: Approaches to changing system architecture

Centralines' preference is to design architecture that works well in many potential futures.

This approach creates a system that is resilient to more than one future, is also efficient and performs well under the current environment. To be sure that any proposed change will have positive implications the following questions are asked.

1. Power Quality: Is it going to meet reliability and power quality expectations?
2. Health and safety: Is it inherently safer?
3. Lifecycle cost: What is the lifecycle cost?
4. Transition cost: What is the necessary transition period and what will this add to the cost?

These questions are answered using established modelling and analysis techniques.

When deciding on appropriate changes often simple or inexpensive options can solve a large proportion of issues, with the remainder requiring much more effort. This is often enough to minimise but not eliminate risk. It is also important to recognise that many solutions can be installed in stages.

Prerequisites to some designs may be inexpensive to install in advance but expensive to install in a rush. The following list of proposed architecture change projects are useful for a range high to medium risk demand scenarios and are listed in priority order.

Name	Description	Priority
Improved Capacity Management	Designing transformer and conductor current carrying capacity to be sufficient for all peak demand scenarios. Includes a clear definition of ratings applied. Also useful for reverse power scenarios.	1
Improved Voltage Management	A comprehensive approach to voltage management suitable for both peak demand and reverse power scenarios. Using the following technologies; ZS tap settings, Load drop compensation, 11kV voltage regulator, 400V regulation, manual tap changers. Utilising the strengths and niches of each technology.	2
Network Rationalisation	Rationalise the network by consolidating 400V networks and determining optimal quantity of switch assets. Useful under any scenario.	3
Demand Side Management	Reduce effect of increase in peak demand by implementing price signals or active peak lopping techniques. Includes the use of batteries for discharge peak management.	4
Advanced 400V Protection	Use of 400V circuit breakers to improve reliability and monitoring capability.	5
Enmeshed Networks	Use of permanently interconnected 11kV and 400V networks to leverage demand diversity and voltage support. Appropriately designed this could also improve reliability.	6
Alternative Distribution Voltages	Explore increasing the distribution voltage to allow for greater power capacity and longer circuits.	7
Micro Grids	Use of generation and energy storage to create self-sufficient communities.	8

Table 4-11: List of potential architecture changes ranked in order of priority

The future is inherently unknowable and international megatrends are providing some guidance on how technology trends might influence our customers' behaviours. Scenario work further enables Centralines to narrow down an array of future worlds to start preparing the business to meet these challenges. Some investment risks will need to be taken to ensure we meet customers' expectations, irrespective of what the future looks like, but it is important that we are proactive, establish strong partnerships and invest wisely so that we can embark on a least regrets path towards a changing energy landscape.

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 include:

- potential impact from distributed energy resources and technologies based on the high uptake projections published by the Ministry of Business Innovation and Employment, 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 but within the expected lifecycle of any new assets. As technologies advance, the improving economics of distributed generation resources and technologies will also 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 new 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 may also 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 New Technology Initiatives

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 the impact this range of technologies will have on the distribution system 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 Constraint Forecasting system to plan for expected customer load changes on the Centralines' network. This 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 4-8 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.

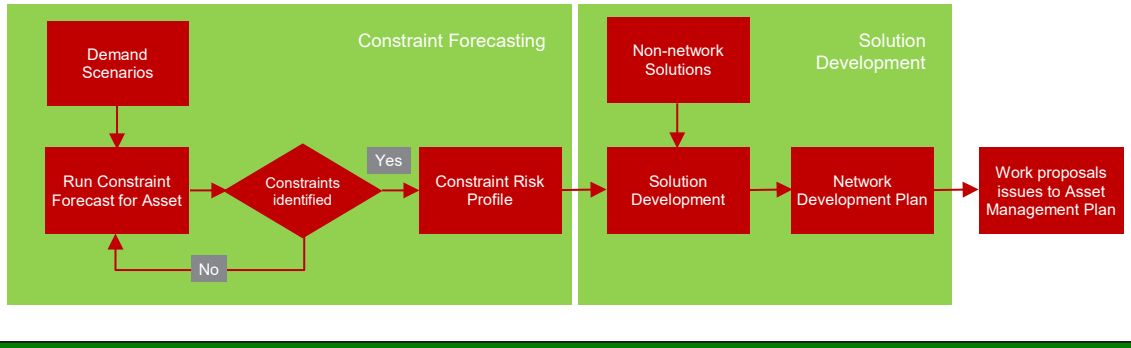

Figure 4-8: Overview of Network Development Planning Process

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.

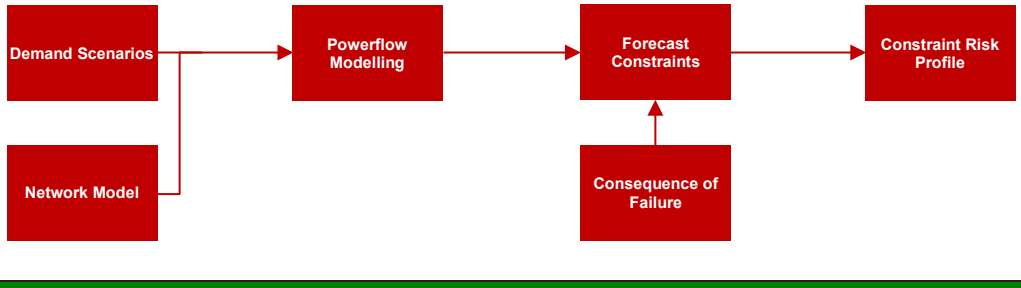

Figure 4-9: Overview of Constraint Forecasting Process

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 4-12: 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.

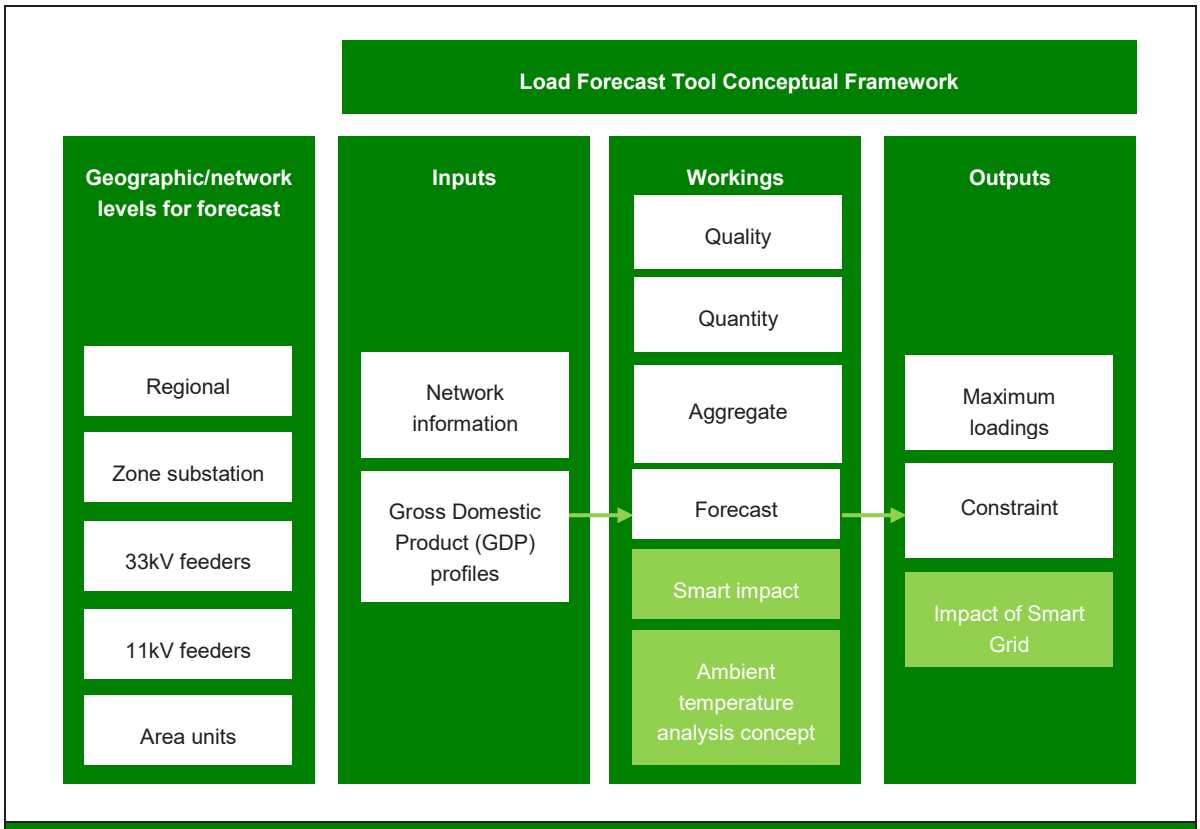

Figure 4-10: Load Forecast Tool

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 grow in 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 a 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 is 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.

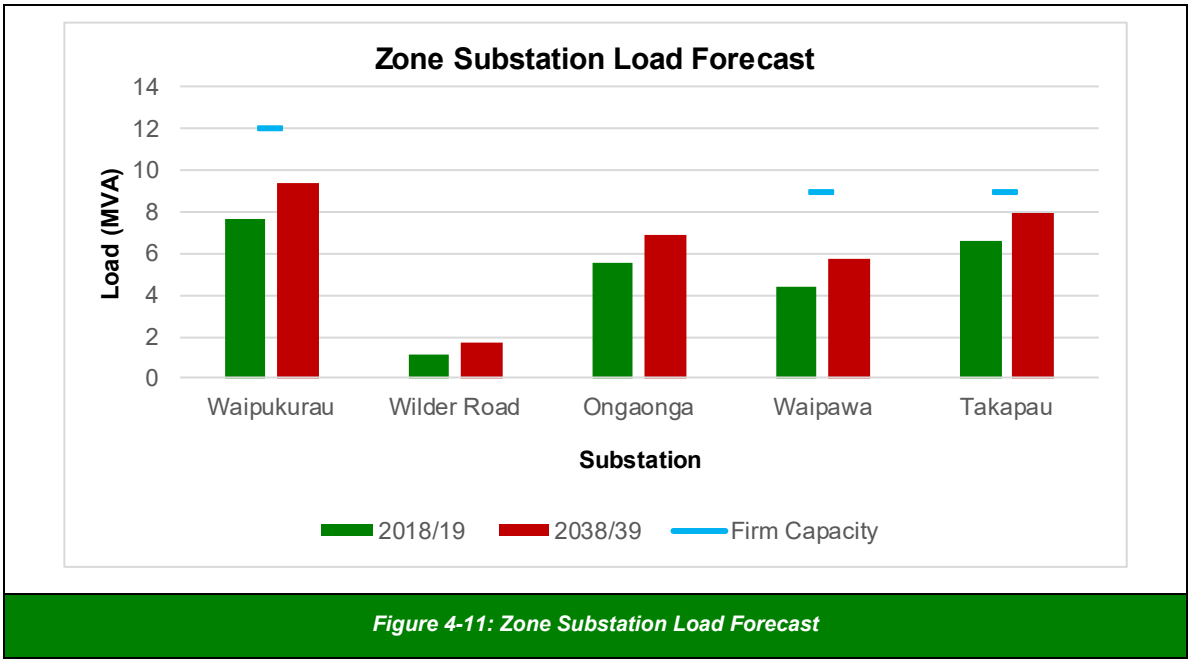

Figure 4-11: Zone Substation Load Forecast

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 4-12 outlines the key elements of Solution Development.

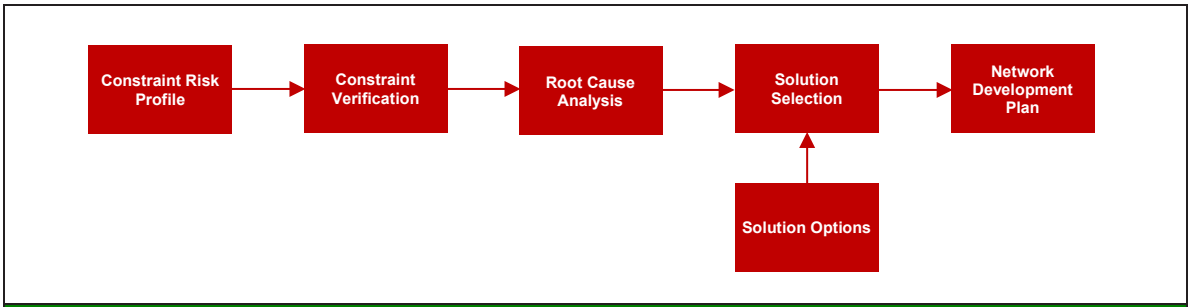

Figure 4-12: Overview of Solution Development Process

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 4-13: 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 4-14. 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 4-14: 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 4-15: 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

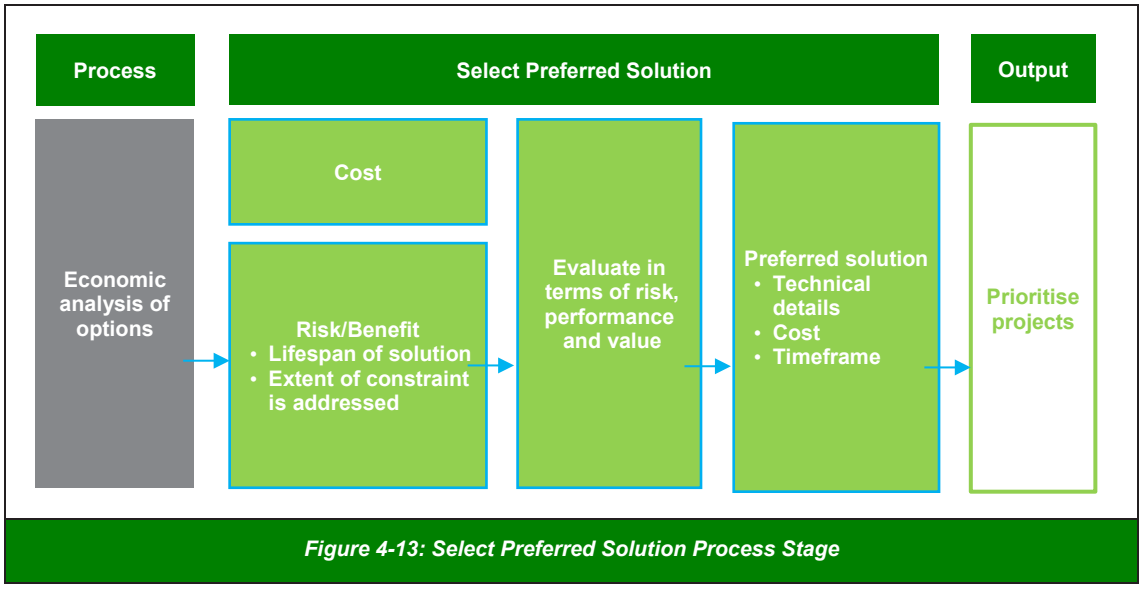

Figure 4-13: Select Preferred Solution Process Stage

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 2019/20 and all material projects proposed for 2020/21-2028/29 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.

Project No.	Constraint	Category	Cost	Section
2019/20 Material				
1148	Voltage Constraint Feeder 2 West	Quality of Supply	$350k	4.6.1
2019/20 Non-Material				
1140	Digital Implementation – Centralines	Quality of Supply	$100k	4.6.2
1150	Feeder 4 - Upgrade ABS 493 to a Remote Control Switch (RCS) on Pole 918362	Quality of Supply	$65k	4.6.2
1151	Feeder 75 - Upgrade ABS 568 to a Remote Control Switch (RCS) on Pole 908462	Quality of Supply	$65k	4.6.2
1152	Feeder 78 - Upgrade ABS 531 to a Remote Control Switch (RCS) on Pole 907296	Quality of Supply	$65k	4.6.2
1153	Feeder 4 - Replace ABS 562 with a Remote Control Switch (RCS) on Pole 901221	Quality of Supply	$65k	4.6.2
1154	Feeder 4 - Upgrade ABS 521 to a Remote Control Switch (RCS) on Pole 901155	Quality of Supply	$65k	4.6.2
1158	Feeder 4 – Replace ABS 570 with a Remote Control Switch (RCS) on Pole 918161	Quality of Supply	$65k	4.6.2
1160	Feeder 46 - Install new Sectionaliser on Pole 913936	Quality of Supply	$65k	4.6.2
1161	Feeder 83 - Convert the Kairakau Temporary Regulator site to a Sectionaliser site at Pole 917714	Quality of Supply	$65k	4.6.2
1162	Feeder 83 - Replace ABS 646 with a Remote Control Switch (RCS)	Quality of Supply	$65k	4.6.2
1147	Feeder 1 - Prepare site to accommodate mobile Voltage Regulator	Quality of Supply	$40k	4.6.2

2019/20 Non-Material				
1164	Feeder 85 - Safety issue - Corner of SH2 and Victoria Street	Other Reliability Safety and Environment	$20k	4.6.2
3015	Power Quality Provision	Power Quality Provision	$100k	4.6.2
3016	Reliability Safety and Environment Provision	Other Reliability Safety and Environment	$20k	4.6.2

Table 4-16: Material and Non-Material Projects for 2019/20

Project No.	Constraint	Category	Cost	Section
2020/21 to 2023/24 Material				
1156	Voltage Regulation Feeder 2 North	Quality of Supply	$350k	4.6.3
1157	Voltage Regulation Feeder 18	Quality of Supply	$350k	4.6.3
1180	Feeder 4 - 11kV Conductor Upgrade	System Growth	$360k	4.6.3

Table 4-17: Material Projects for 2020/21 to 2023/24

Project No.	Constraint	Category	Cost	Section
2024/25 to 2028/29 Material				
1189	Voltage regulation Feeder 19	Quality of Supply	$350k	4.6.4
1194	Voltage constraint Feeder 46	Quality of Supply	$350k	4.6.4
1183	Voltage regulation Feeder 86	Quality of Supply	$350k	4.6.4
1200	Voltage constraint Feeder 88	Quality of Supply	$350k	4.6.4
1145	Install aerial fibre optic cable between Waipawa GXP and Takapau Zone Substation	Quality of Supply	$475k	4.6.4
1205	Provisional sum for 11kV feeder upgrade	System Growth	$300k	4.6.4

Table 4-18: Material Projects for 2024/25 to 2028/29

4.6.1 Material Project for 2019/20

4.6.1.1 Project 1148, Voltage Constraint, Feeder 2 West

Increased irrigation in the area west of Ongaonga has increased the risk of under-voltage in Wakarara Road. This, combined with additional proposals would affect the voltage to 126 customers on 79 distribution transformers in the area. Modelling accuracy has been confirmed through voltage monitoring in 2018. The expected risk of this issue is $103,530 per annum.

Options Considered

Class	Description	Advantages	Disadvantages	Cost
Network	Install Voltage Regulator	Increased operational flexibility Less disruption to existing network and area Compliant voltage	Additional asset maintenance.	$350k
Network	Upgrade existing 11kV lines	Utilises existing assets and infrastructure Low ongoing maintenance cost Moderate investment requirement	Disruptive construction methodology. High construction costs.	$1.2M
Non-Network	Install generator	Moderate construction costs Security during contingency events	High ongoing operational costs. Resource consent required.	$600k
Non-Network	Battery	Less disruptive to existing network Provides security to remote customers	High construction cost.	$1.8M
Non-Network	Do nothing	Lowest cost	Does not resolve issues.	$0

Table 4-19: Solution Options for Network Constraint, Wakarara Road

Preferred Solution

The preferred solution is to install a Voltage Regulator at Pole 918664 (Wakarara Road) and replace the existing Ferret conductor between Poles 920559 and 918664 with Dog conductor. The combined project cost is estimated at $350,000.

Targeted Service Levels

Power Quality

4.6.2 Non-Material Projects for 2019/20

A summary table describing the confirmed non-material projects for the 2019/20 year is included in Section 4.6.

Project No.	Project	Constraint Description	Options	Cost	Preferred Solution
10040	Digital VHF Implementation - Centralines	Coverage to and security of remote operational devices.	Digital VHF, MiMoMax, Hytera, Additional microwave links	$100k	Install Digital VHF
1150	Feeder 4 - Upgrade ABS 493 to a Remote Control Switch (RCS) on Pole 918362	Response time to restore supply between Takapau and Ongaonga in the event of an outage on the 33kV line.	Install Recloser, RCS, RMU or do nothing	$65k	Install RCS
1151	Feeder 75 - Upgrade ABS 568 to a Remote Control Switch (RCS) on Pole 908462	Response time to restore supply between Takapau and Ongaonga in the event of an outage on the 33kV line.	Install Recloser, RCS, RMU or do nothing	$65k	Install RCS
1152	Feeder 78 - Upgrade ABS 531 to a Remote Control Switch (RCS) on Pole 907296	Response time to restore supply between Takapau and Ongaonga in the event of an outage on the 33kV line.	Install Recloser, RCS, RMU or do nothing	$65k	Install RCS
1153	Feeder 4 - Replace ABS 562 with a Remote Control Switch (RCS) on Pole 901221	Response time to restore supply between Takapau and Ongaonga in the event of an outage on the 33kV line.	Install Recloser, RCS, RMU or do nothing	$65k	Install RCS
1154	Feeder 4 - Upgrade ABS 521 to a Remote Control Switch (RCS) on Pole 901155	Response time to restore supply between Takapau and Ongaonga in the event of an outage on the 33kV line.	Install Recloser, RCS, RMU or do nothing	$65k	Install RCS
1158	Feeder 4 - Replace ABS 570 with a Remote Control Switch (RCS) on Pole 918161	Response time to restore supply between Takapau and Ongaonga in the event of an outage on the 33kV line.	Install Recloser, RCS, RMU or do nothing	$65k	Install RCS

Project No.	Project	Constraint Description	Options	Cost	Preferred Solution
1160	Feeder 46 - Install new Sectionaliser on Pole 913936	Isolate long rural line from a concentrated area of customers.	Install Recloser, RCS, Fuses or do nothing	$65k	Install RCS
1161	Feeder 83 - Convert the Kairakau Temporary Regulator site to a Sectionaliser site at Pole 917714	Kairakau area relies on manual switch operation to restore supply during a fault on the primary source.	Install Recloser, RCS, RMU or do nothing	$65k	Install RCS
1162	Feeder 83 - Replace ABS 646 with a Remote Control Switch (RCS)	Kairakau area relies on manual switch operation to restore supply during a fault on the primary source.	Install Recloser, RCS, RMU or do nothing	$65k	Install RCS
1164	Feeder 85 - Safety issue - Corner of SH2 and Victoria Street	Circuits on same and common structure unable to be isolated from common switches.	Reroute line, install cabling, reconfigure feeder	$20k	Reconfigure feeder
1147	Feeder 1 - Prepare site to accommodate mobile Voltage Regulator	Unable to maintain compliant voltage in Ashley Clinton area during an outage on the primary supply at peak times.	Install voltage regulator, upgrade 11kV lines, install site for temporary regulator	$40k	

Table 4-20: Non-Material Projects for 2019/20

4.6.3 Material Projects for 2020/21 to 2023/24

Project No.	Constraint	Constraint Description	Options	Cost	Solution
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 at risk of breaching the regulatory voltage levels in the next ten years. Annual risk for area, $108,000.	Network: Voltage Regulator Network: reconductor Non Network: Do nothing	$350k	Voltage regulator.

Project No.	Constraint	Constraint Description	Options	Cost	Solution
1157	Voltage constraint Feeder 18	Issue 23D2B61BBA Under-voltage indicated in constraint report. Feeder 18 - Farm Road. The report indicated that 38 transformers (72 ICPs) are at risk of breaching the 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.
1180	Feeder 4 - 11kV Conductor Upgrade	Issue 29A2E4A393 Under-voltage indicated in constraint report. Feeder 4 – State Highway 2 area. The report indicated that 26 transformers (72 ICPs) are at risk of breaching the regulatory voltage levels in the next ten-years. Annual risk for the area, $26,850.	Network: Voltage Regulator Network: reconductor Non Network: do nothing	$360k	Conductor Upgrade

Table 4-21: Material Projects for 2020/21 to 2023/24

4.6.4 Material Projects for 2024/25 to 2028/29

All projects for 2024/25 to 2028/29 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.

Project No.	Title	Constraint Description	Options	Cost
1189	Voltage constraint Feeder 19	Issue 8D1D3364E7 Voltage constraint predicted on Feeder 19.	Network: Reconductor Network: Voltage Regulator Non Network: Do nothing	$0-$350k
1194	Voltage constraint Feeder 46	Issue F2BB2193E7 Voltage constraint predicted on Feeder 46.	Network: Reconductor Network: Voltage Regulator Non Network: Do nothing	$0-$350k
1183	Voltage constraint Feeder 86	Issue 2DE5DCE8B9 Voltage constraint predicted on Feeder 86.	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
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
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	$300k

Table 4-22: Material Projects for 2024/25 to 2028/29

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 4-23: Determination Reference Mapping Table

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ASSET MANAGEMENT PLANNING

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5. LIFECYCLE ASSET MANAGEMENT PLANNING 2

5.33 Renewal Project List 2019-2020 2

Table 5-74: Renewal Project List 2019-2020 2

5. LIFECYCLE ASSET MANAGEMENT PLANNING

5.33 Renewal Project List 2019-2020

Asset Category	Project Description	Project Budget
3.3/6.6/11/22kV CB (pole mounted) – reclosers and sectionalisers	Recloser replacement R24 River Road.	$65k
3.3/6.6/11/22kV CB (pole mounted) – reclosers and sectionalisers	Allocation to replace failing remote controlled switches (RCS) with ENTEC switch.	$130k
3.3/6.6/11/22kV Switches and fuses (pole mounted)	Replace ABS 507.	$15k
Distribution OH Open Wire Conductor	11kV reconductor Te Aute College spur.	$105k
Distribution OH Open Wire Conductor	CL 86: Reconductor Drumpeel Road 16mm Copper and Mahanga ABSs.	$231k
Distribution OH Open Wire Conductor	Pole Replacements.	$250k
Distribution OH Open Wire Conductor	Unplanned & Reactive Renewals.	$300k
Zone substations up to 66kV	Wilder Road stage 7 of 8.	$20k

Table 5-74: Renewal Project List 2019-2020

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NON-NETWORK DEVELOPMENT MAINTENANCE & RENEWAL

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6. NON-NETWORK DEVELOPMENT MAINTENANCE & RENEWAL

6.2 Property

6.2.3 Material Capital Expenditure Projects Planned for the Next Five Years

The following table details proposed capital projects.

Project	Description
New Head Office Complex	Assessments which identified requirements to strengthen parts of the existing Peel Street Depot are still on hold pending the purchase of land and construction of a new office complex and depot. It is anticipated an appropriate site will be secured within the next six months with construction to commence once plans have been finalised and contracts let. An approximate budget of $6M has been set aside for this project with a targeted completion date of mid 2020 subject to securing the required site.

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

CENTRALINES LIMITED

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RISK MANAGEMENT

NO MATERIAL CHANGES

8

EVALUATION OF PERFORMANCE

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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

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 2018/19 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 disclosed in March 2018 is reviewed in terms of physical progress (commissioning of works) and financial progress (cost performance). This evaluation is undertaken for the 2017/18 and 2018/19 financial years, for both capital and maintenance programmes.

8.2.1 Planned Capex

Capital projects proposed for each financial year as published in Centralines' 2018 AMP are detailed below and include the status of each project as at February 2019.

An update is also provided for all 17/18 projects not completed at the time of the 2018 AMP as well as all 2018/19 projects.

8.2.1.1 Capex Programme of Works 2017/18

Ref	Constraints and Projects	Category	Status	AMP Budget	Actual Spend	Comments
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	Complete	$125k	$106k	On budget
5630	Centralines Off-Grid Rural Generation Initiative	Research and Development	Cancelled	$100k		Investigated site and determined uneconomic
5628	11kV diversion Porangahau bridge	Other Reliability, Safety, and Environment	Complete	$120k	$77k	On time and under budget
649	Replace Transformer C4/203	Asset Replacement and Renewal	Complete	$65k	$249k	Scope extension due to customer request
5627	Wilder Road Stage 6 of 8	Asset Replacement and Renewal	WIP	$150k		Expected to be completed in March 2019
5590	Transfer load pulses to fibre from radio for ripple plant control	Quality of Supply	Cancelled	$10k		Completed as part of another project
5649	Install online temperature management system to Waipukurau Zone Substation power transformers	Other Reliability, Safety, and Environment	Complete	$25k	$27k	On budget
642	Feeder 83 - Install new Remote Control Switch (RCS) on Pole 917054	Quality of Supply	Complete	$50k	$33k	Below budget
5646	Feeder 15 - 11kV Cable Upgrade	System Growth	WIP	$40k		Expected to be completed in March 2019

Table 8-1: Physical Progress of Planned Network Development Projects - 2017/18

8.2.1.2 Capex Programme of Works – 2018/19

Ref	Constraints and Projects	Category	Status	AMP Budget	Actual Spend	Comments
1166	11kV Reconductor Mathew Street	Asset Replacement and Renewal	WIP	$45k		Expected to complete by March 2019
41167	Reconductor 11kV and LV Higginson Street	Asset Replacement and Renewal	WIP	$50k		Expected to complete by March 2019
41168	Proactive Replacements of Aged ABS Central Lines	Asset Replacement and Renewal	Complete	$14k	$13k	On budget
41169	Replace 2 Pole Structure TX B4/5 with New Pole Mount 300kVA TX - Waverley Street Waipawa	Asset Replacement and Renewal	Carryover	$65k		Deferred due to resource availablity
41170	Replace TX C4/16 with New Pad-mount TX - Jellicoe Street	Asset Replacement and Renewal	WIP	$80k	$249k	Expected to complete by March 2019
41171	Wilder Rd Substation - Substation Upgrade	Other Reliability, Safety, and Environment	WIP	$515k		Expected to complete by March 2019
41172	Centralines Recloser Replacement CB 25	Asset Replacement and Renewal	Complete	$49k	$49k	On time and on budget
41173	Centralines Recloser Replacement CB 36	Asset Replacement and Renewal	Complete	$49k	$47k	On time and on budget
40721	Proactive Replacement of 5 x Failing Peanut Switches	Asset Replacement and Renewal	WIP	$200k		Expected to complete by March 2019
41174	Takapau ZS - Replace existing porcelain lightening arrestors	Other Reliability, Safety, and Environment	Complete	$5k	$4k	On time and under budget
41176	Install online temperature management system to Waipukurau ZS power transformers	Other Reliability, Safety, and Environment	Complete	$28k	$27k	On time and on budget
41177	Seismic strengthening of the Takapau Zone Substation	Other Reliability, Safety, and Environment	Complete	$97k	$63k	On time and on budget

Table 8-2: Physical Progress of Planned Renewal Projects – 2018/19

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 2017/18 to 2018/19

Asset Inspection/Condition Assessment	Progress 2017/18	Progress 2018/19
Annual 33kV Line Visual Inspection	Complete	To be completed early in the new financial year
5-Yearly Overhead Line Feeder Inspections	Complete	Expect to complete by 31 March 2019
Annual Aerial Inspection	Complete	Complete
Annual Ground Mounted Inspection	Complete	Expect to complete 80% by 31 March 2019
Level 1: Fortnightly Substation Visual Inspections	Complete	Expect to complete by 31 March 2019
Level 2: 3-monthly Substation Detailed Inspections	Complete	Complete
Zone Substation Earth Tests – 5-yearly	Complete	N/A
Zone Substation Thermo-vision – Annually	Complete	Complete
Power Transformer – Annual DGA Oil Tests	Complete	Expect to complete by 31 March 2019
Partial Discharge – 2-yearly Test for Circuit Breakers	Complete	Complete
2-monthly Detailed Inspections of Voltage Regulators	Complete	Expect to complete by 31 March 2019
Recloser and Remote-Control Switch – 2-yearly Detailed Inspection and Operational Tests	Complete	To be completed early in the new financial year
Distribution Equipment Earth Tests – 5-yearly	Complete	Expect to complete by 31 March 2019
Distribution Equipment Oil Testing	Complete	Programme not completed due to change in strategy

Asset Inspection/Condition Assessment	Progress 2017/18	Progress 2018/19
5-yearly Inspection of Ground-Mounted Low Voltage Distribution Equipment (including Minor Repairs)	Complete	Expect to complete by 31 March 2019

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

Routine and Corrective Maintenance	Progress 2017/18	Progress 2018/19
Vegetation Control	Complete	Complete
Zone Sub Transformers – 2-yearly Service	Complete	Complete
Tap Changers – 2-yearly or 6-yearly Service, depending on Tap Changer Type	Complete	Expect to complete by 31 March 2019
Station Regulators – 2-yearly, 5-yearly or 10-yearly Service. depending on Make and Model	Complete	N/A
Circuit Breaker SF6 – 3-yearly Service	Complete	To be completed early in the new financial year
Circuit Breaker Vacuum – 3-yearly Service	Complete	Complete
Circuit Breaker Oil – 2-yearly Service	Complete	N/A
Circuit Breaker Oil – Fault Service after every Fault Operation	Complete	Complete
Disconnectors and Earth Switches – 10-yearly	Complete	To be completed early in the new financial year
Annual Ripple Plant Service	Complete	To be completed early in the new financial year
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

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 2018 AMP is reviewed in terms of financial progress (cost performance). This evaluation is undertaken for the 2017/18 and 2018/19 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 2017/18

Category	Forecasted Expenditure from 2017/18 AMP	Actual Expenditure	Variance %
Capex			
Consumer Connection	$527k	$526k	0%
System Growth	$0	$118k	+100%
Asset Replacement and Renewal	$869k	$749k	-14%
Asset Relocations	$0	$0	0%
Reliability, Safety and Environment	$638k	$404k	-37%
Network Capex	$2.03M	$1.8M	-12%
Opex			
Service Interruptions and Emergencies	$317k	$342k	8%
Vegetation Management	$458k	$452k	-1%
Routine and Corrective Maintenance and Inspections	$96k	$66k	-31%
Asset Replacement and Renewal	$341k	$408k	20%
Network Maintenance	$1.21M	$1.27M	5%

Table 8-5: Financial Progress Opex and Capex 2017/18

8.3.1.1 Explanation System Growth

Some projects included in the Other Reliability Safety and Environment forecast were re-categorised to System Growth.

8.3.1.2 *Variance Explanation Asset Replacement and Renewal*

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

8.3.1.3 *Variance Explanation Reliability, Safety and Environment*

The planned distribution transformer monitoring projects were 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. Additionally, some projects included in the forecast were re-categorised to System Growth.

8.3.1.4 *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.

8.3.1.5 *Variance Explanation Routine Asset Replacement and Renewal*

Actual expenditure in 2017/18 was higher than originally forecast due to a focus on completing outstanding work tasks prior to the end of the financial year.

8.3.2 Network Spend Financial Progress 2018/19

Category	Budgeted Expenditure from 2017/18 AMP	Forecast Expenditure	Variance %
Capex			
Consumer Connection	$408k	$1.07M	168%
System Growth	$0	$0	0%
Asset Replacement and Renewal	$1.28M	$1.82M	43%
Asset Relocations	$0	$0	0%
Reliability, Safety and Environment	$1.04M	$805k	22%
Network Capex	$2.72M	$3.7M	36%

Category	Budgeted Expenditure from 2017/18 AMP	Forecast Expenditure	Variance %
Opex			
Service Interruptions and Emergencies	$311k	4341k	10%
Vegetation Management	$442k	$537k	22%
Routine and Corrective Maintenance and Inspections	$185k	$137k	-26%
Asset Replacement and Renewal	$499k	$573k	15%
Network Maintenance	$1.44M	$1.59M	11%

Table 8-6: Financial Progress Opex and Capex 2018/19

8.3.2.1 *Variance Explanation Consumer Connection*

Actual expenditure in 2018/19 is forecasted to be higher than budget due to an upturn in growth in the Centralines Region. In particular there has been a significant increase in the volume of subdivisions and dairy units.

8.3.2.2 *Variance Explanation Asset Replacement and Renewal - Capex*

Actual expenditure in 2018/19 is forecasted to be higher than budget due to the identification of a number of faulty switches requiring urgent renewal and an increase in scope of approximately $200k for the project to replace Transformer C4/203 carried over from 17/18. The change in scope was to accommodate a customer request.

8.3.2.3 *Variance Explanation Reliability, Safety and Environment*

Actual expenditure in 2018/19 is forecasted to be lower than budget due to the deferral of a project to improve the LV supply in the Waipawa CDB. This occurred due to a delay in data logging to confirm project requirements as resources focussed on the increase in customer connections. Additionally, no projects were identified that required utilisation of the power quality allowance.

8.3.2.4 *Variance Explanation Vegetation Management*

Actual expenditure in 2018/19 is forecasted to be above budget due to staff shortages resulting in the utilisation of external resources.

8.3.2.5 *Variance Explanation Routine and Corrective Maintenance and Inspection*

This programme is tracking under budget for the 2018/19 year as there are a couple of programmes that are not expected to be completed by 31 March as detailed in section 8.2.2.1.

8.3.2.6 *Variance Explanation Asset Replacement and Renewal - Opex*

Forecast expenditure in 2018/19 is expected to be above budget due to an increase in minor works identified following feeder inspections.

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 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 compared to actual results for the 2017/18 Financial Year.

Asset Management Objective	Service Level	Unit/Type	Forecast 2017/18	Actual 2017/18	Comments
Health and Safety Performance	Accidents causing harm to a member of the public	Number of accidents	0	0	As forecast
	Serious harm or lost-time injury to employees or contractors	Number of injuries	1	1	As forecast
	Injuries to employees or contractors requiring medical treatment	Number of injuries	1	1	As forecast
Customer Service Performance	Surveyed customer satisfaction with delivery of customer works	%	>95%	100%	As forecast
	SAIDI	Minutes	133.5	131.67	As forecast

Asset Management Objective	Service Level	Unit/Type	Forecast 2017/18	Actual 2017/18	Comments
	SAIFI	Interruptions	2.4	2.23	As forecast
	Revenue per ICP	$ (nominal)	$1,734	$1,873	
	Restoration of supply for unplanned interruptions	Urban	Unavailable	1	Target of ≤ 20 Met
		Rural	Unavailable	10	Target of ≤ 10 Met
		Remote rural	Unavailable	0	Target of ≤ 5 Met
Cost and Efficiency Performance	Forward work planning horizon at a project level provided to contracting services providers	Years	2 Years	2 Years	As forecast
	Operating expenditure per ICP (nominal)	$ (nominal)	$449	$462	As forecast
	Faults per 100km of network	33kV Overhead	<8.4	1.04	As forecast

Table 8-7: Service Level performance 2017/18

8.4.2 *Service Level Performance 2018/19*

The table below shows the current service level framework with targets as per Section 3 and the forecast information as per the 2018 AMP compared to forecasted results for the 2018/19 Financial Year.

Asset Management Objective	Service Level	Unit/Type	Target 2018/19	Forecast 2018/19	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	Not Achieved
	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	98.80 – 119.07	112.09	On Target
	SAIFI	Interruptions	2.84 – 3.52	2.13	Ahead of Target
	Revenue per ICP	$ (nominal)	$1,710	$1,696	On Target
	Restoration of supply for unplanned interruptions	Urban	≤ 20 events ≥ 3 hours	0	Ahead of Target
		Rural	≤ 10 events ≥ 6 hours	7	On Target
		Remote rural	≤ 5 events ≥ 12 hours	0	Ahead of Target
Cost and Efficiency Performance	Forward work planning horizon at a project level provided to contracting services providers	Years	≥ 2 rolling	2 years	On target
	Operating expenditure per ICP (nominal)	$ (nominal)	$474	$429	On target
	Faults per 100km of network	33kV Overhead	6.4	0	Ahead of Target

Table 8-8: Service Level Performance 2018/19

8.4.2.1 *Variance Explanation - Serious harm or lost-time injury to employees or contractors*

The lost time injury occurred when a staff member reaggravated a pre-existing back injury while riding in a light utility vehicle. The injury was not classified as serious harm.

8.4.2.2 *Variance Explanation - SAIFI*

Centralines has experienced strong SAIFI performance year to date with SAIFI below or equal to historical averages for seven out of nine months. Performance was above historical averages in May and June, due to bird strikes on the CL 18 feeder.

8.4.2.3 *Variance Explanation - Faults per 100km of network*

There have been no sustained faults on the 33kV network year to date, resulting in a strong faults per 100km performance and forecast for the year.

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CAPABILITY TO DELIVER

NO MATERIAL CHANGES

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SCHEDULES

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CENTRALINES LIMITED REGULATORY ASSET MANAGEMENT PLAN UPDATE 2019

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*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
for year ended		31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26	31 Mar 27	31 Mar 28	31 Mar 29
		$000 (in nominal dollars)										
	Consumer connection	1,071	408	417	425	434	442	451	460	469	479	488
	System growth	65	-	68	-	-	398	-	-	-	359	427
	Asset replacement and renewal	1,810	1,445	1,407	1,297	2,545	1,272	1,376	2,255	1,479	1,209	1,172
	Asset relocations	-	-	-	-	-	-	-	-	-	-	-
	Reliability, safety and environment:											
	Quality of supply	33	1,261	766	755	770	470	801	742	827	772	940
	Legislative and regulatory	-	-	-	-	-	-	-	-	-	-	-
	Other reliability, safety and environment	707	89	214	90	190	97	96	92	76	78	128
	Total reliability, safety and environment	**740**	**1,350**	**980**	**845**	**960**	**567**	**897**	**834**	**904**	**850**	**1,068**
	Expenditure on network assets	**3,686**	**3,204**	**2,871**	**2,567**	**3,938**	**2,680**	**2,724**	**3,550**	**2,852**	**2,897**	**3,156**
	Non-network assets	1,625	3,710	3,705	537	342	515	598	219	223	227	232
	Expenditure on assets	**5,311**	**6,913**	**6,576**	**3,104**	**4,279**	**3,195**	**3,322**	**3,768**	**3,075**	**3,125**	**3,388**
plus	Cost of financing	-	-	-	-	-	-	-	-	-	-	-
less	Value of capital contributions	-	-	-	-	-	-	-	-	-	-	-
plus	Value of vested assets	-	-	-	-	-	-	-	-	-	-	-
	Capital expenditure forecast	**5,311**	**6,913**	**6,576**	**3,104**	**4,279**	**3,195**	**3,322**	**3,768**	**3,075**	**3,125**	**3,388**
	Value of commissioned assets	5,311	6,913	6,576	3,104	4,279	3,195	3,322	3,768	3,075	3,125	3,388
		$000 (in constant prices)										
	Consumer connection	1,071	400	400	400	400	400	400	400	400	400	400
	System growth	65	-	65	-	-	360	-	-	-	300	350
	Asset replacement and renewal	1,810	1,415	1,350	1,220	2,347	1,150	1,220	1,960	1,260	1,010	960
	Asset relocations	-	-	-	-	-	-	-	-	-	-	-
	Reliability, safety and environment:											
	Quality of supply	33	1,235	735	710	710	425	710	645	705	645	770
	Legislative and regulatory	-	-	-	-	-	-	-	-	-	-	-
	Other reliability, safety and environment	707	87	205	85	175	88	85	80	65	65	105
	Total reliability, safety and environment	**740**	**1,322**	**940**	**795**	**885**	**513**	**795**	**725**	**770**	**710**	**875**
	Expenditure on network assets	**3,686**	**3,137**	**2,755**	**2,415**	**3,632**	**2,423**	**2,415**	**3,085**	**2,430**	**2,420**	**2,585**
	Non-network assets	1,625	3,633	3,555	505	315	466	530	190	190	190	190
	Expenditure on assets	**5,311**	**6,770**	**6,310**	**2,920**	**3,947**	**2,889**	**2,945**	**3,275**	**2,620**	**2,610**	**2,775**
Subcomponents of expenditure on assets (where known)												
	Energy efficiency and demand side management, reduction of energy losses	-	-	-	-	-	-	-	-	-	-	-
	Overhead to underground conversion	-	-	-	-	-	-	-	-	-	-	-
	Research and development	-	-	-	-	-	-	-	-	-	-	-

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	Current Year	*CY+1*	*CY+2*		*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
for year ended	31 Mar 19	31 Mar 20	31 Mar 21		31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26	31 Mar 27	31 Mar 28	31 Mar 29
Difference between nominal and constant price forecasts	$000											
Consumer connection	-	8	17		25	34	42	51	60	69	79	88
System growth	-	-	3		-	-	38	-	-	-	59	77
Asset replacement and renewal	-	30	57		77	198	122	156	295	219	199	212
Asset relocations	-	-	-		-	-	-	-	-	-	-	-
Reliability, safety and environment:												
Quality of supply	-	26	31		45	60	45	91	97	122	127	170
Legislative and regulatory	-	-	-		-	-	-	-	-	-	-	-
Other reliability, safety and environment	-	2	9		5	15	9	11	12	11	13	23
Total reliability, safety and environment	**-**	**28**	**40**		**50**	**75**	**54**	**102**	**109**	**134**	**140**	**193**
Expenditure on network assets	**-**	**66**	**116**		**152**	**306**	**257**	**309**	**465**	**422**	**477**	**571**
Non-network assets	-	77	150		32	27	49	68	29	33	37	42
Expenditure on assets	**-**	**143**	**266**		**184**	**332**	**306**	**377**	**493**	**455**	**514**	**613**

11a(ii): Consumer Connection

	Current Year	*CY+1*	*CY+2*		*CY+3*	*CY+4*	*CY+5*
for year ended	31 Mar 19	31 Mar 20	31 Mar 21		31 Mar 22	31 Mar 23	31 Mar 24
Consumer types defined by EDB*	$000 (in constant prices)						
All Customers	1,071	400	400		400	400	400
Consumer connection expenditure	**1,071**	**400**	**400**		**400**	**400**	**400**
less Capital contributions funding consumer connection	300	300	300		300	300	300
Consumer connection less capital contributions	**771**	**100**	**100**		**100**	**100**	**100**

11a(iii): System Growth

Sub-transmission	-	-	-	-	-	-
Zone substations	-	-	-	-	-	-
Distribution and LV lines	-	-	-	-	-	360
Distribution and LV cables	65	-	-	-	-	-
Distribution substations and transformers	-	-	65	-	-	-
Distribution switchgear	-	-	-	-	-	-
Other network assets	-	-	-	-	-	-
System growth expenditure	**65**	**-**	**65**	**-**	**-**	**360**
less Capital contributions funding system growth	-	-	-	-	-	-
System growth less capital contributions	**65**	**-**	**65**	**-**	**-**	**360**

11a(iv): Asset Replacement and Renewal

Sub-transmission	-	-	-	-	-	-
Zone substations	-	20	300	40	1,200	-
Distribution and LV lines	754	954	660	780	747	750
Distribution and LV cables	-	-	-	-	-	-
Distribution substations and transformers	327	-	-	-	-	-
Distribution switchgear	728	440	390	400	400	400
Other network assets	-	-	-	-	-	-
Asset replacement and renewal expenditure	**1,810**	**1,415**	**1,350**	**1,220**	**2,347**	**1,150**
less Capital contributions funding asset replacement and renewal	-	-	-	-	-	-
Asset replacement and renewal less capital contributions	**1,810**	**1,415**	**1,350**	**1,220**	**2,347**	**1,150**

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11a(v):Asset Relocations

	for year end	Current Year 31 Mar 19	CY+1 31 Mar 20	CY+2 31 Mar 21	CY+3 31 Mar 22	CY+4 31 Mar 23	CY+5 31 Mar 24
	*Project or programme**	$000 (in constant prices)					
	NZTA	-	-	-	-	-	-
	Councils	-	-	-	-	-	-
	Other Customers	-	-	-	-	-	-
	All other asset relocations projects or programmes	-	-	-	-	-	-
	Asset relocations expenditure	**-**	**-**	**-**	**-**	**-**	**-**
less	Capital contributions funding asset relocations	-	-	-	-	-	-
	Asset relocations less capital contributions	**-**	**-**	**-**	**-**	**-**	**-**

11a(vi):Quality of Supply

	*Project or programme**						
		-	-	-	-	-	-
		-	-	-	-	-	-
		-	-	-	-	-	-
		-	-	-	-	-	-
	All other quality of supply projects or programmes	33	1,235	735	710	710.	425
	Quality of supply expenditure	**33**	**1,235**	**735**	**710**	**710**	**425**
less	Capital contributions funding quality of supply						
	Quality of supply less capital contributions	**33**	**1,235**	**735**	**710**	**710**	**425**

11a(vii): Legislative and Regulatory

	*Project or programme**						
		-	-	-	-	-	-
		-	-	-	-	-	-
	All other legislative and regulatory projects or programmes	-	-	-	-	-	-
	Legislative and regulatory expenditure	**-**	**-**	**-**	**-**	**-**	**-**
less	Capital contributions funding legislative and regulatory	-	-	-	-	-	-
	Legislative and regulatory less capital contributions	**-**	**-**	**-**	**-**	**-**	**-**

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

	*Project or programme**						
		-	-	-	-	-	-
		-	-	-	-	-	-
		-	-	-	-	-	-
		-	-	-	-	-	-
		-	-	-	-	-	-
	All other reliability, safety and environment projects or programmes	707	87	205	85	175	88
	Other reliability, safety and environment expenditure	**707**	**87**	**205**	**85**	**175**	**88**
less	Capital contributions funding other reliability, safety and environment	-	-	-	-	-	-
	Other reliability, safety and environment less capital contributions	**707**	**87**	**205**	**85**	**175**	**88**

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11a(ix): Non-Network Assets

Routine expenditure for year end	*Current Year* 31 Mar 19	*CY+1* 31 Mar 20	*CY+2* 31 Mar 21	*CY+3* 31 Mar 22	*CY+4* 31 Mar 23	*CY+5* 31 Mar 24
Project or programme*	$000 (in constant prices)					
Motor Vehicles	666	345	500	450	260	411
Plant, Equipment and Tools	170	166	40	40	40	40
Office Furniture	14	72	15	15	15	15
Land and Buildings	-	50	-	-	-	-
All other routine expenditure projects or programmes	-	-	-	-	-	-
Routine expenditure	**850**	**633**	**555**	**505**	**315**	**466**
Atypical expenditure						
Project or programme*						
Construction of new office complex and depot	775	3,000	3,000	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
All other atypical projects or programmes						
Atypical expenditure	**775**	**3,000**	**3,000**	**-**	**-**	**-**
Non-network assets expenditure	**1,625**	**3,633**	**3,555**	**505**	**315**	**466**

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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*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
for year ended	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26	31 Mar 27	31 Mar 28	31 Mar 29
Operational Expenditure Forecast	$000 (in nominal dollars)										
Service interruptions and emergencies	333	325	318	324	331	337	344	351	358	365	372
Vegetation management	509	564	573	585	596	608	620	633	645	658	672
Routine and corrective maintenance and inspection	98	200	196	200	204	208	212	216	221	225	230
Asset replacement and renewal	543	495	485	494	504	514	525	535	546	557	568
Network Opex	**1,483**	**1,584**	**1,572**	**1,603**	**1,635**	**1,668**	**1,701**	**1,735**	**1,770**	**1,805**	**1,841**
System operations and network support	200	233	248	253	258	263	268	274	279	285	291
Business support	2,073	2,335	2,293	2,339	2,385	2,433	2,482	2,531	2,582	2,634	2,686
Non-network opex	**2,273**	**2,568**	**2,541**	**2,592**	**2,643**	**2,696**	**2,750**	**2,805**	**2,861**	**2,918**	**2,977**
Operational expenditure	**3,756**	**4,152**	**4,112**	**4,195**	**4,278**	**4,364**	**4,451**	**4,540**	**4,631**	**4,724**	**4,818**
	$000 (in constant prices)										
Service interruptions and emergencies	333	318	305	305	305	305	305	305	305	305	305
Vegetation management	509	552	550	550	550	550	550	550	550	550	550
Routine and corrective maintenance and inspection	98	196	188	188	188	188	188	188	188	188	188
Asset replacement and renewal	543	485	465	465	465	465	465	465	465	465	465
Network Opex	**1,483**	**1,551**	**1,508**	**1,508**	**1,508**	**1,508**	**1,508**	**1,508**	**1,508**	**1,508**	**1,508**
System operations and network support	200	228	238	238	238	238	238	238	238	238	238
Business support	2,073	2,287	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200	2,200
Non-network opex	**2,273**	**2,515**	**2,438**	**2,438**	**2,438**	**2,438**	**2,438**	**2,438**	**2,438**	**2,438**	**2,438**
Operational expenditure	**3,756**	**4,066**	**3,946**	**3,946**	**3,946**	**3,946**	**3,946**	**3,946**	**3,946**	**3,946**	**3,946**
Subcomponents of operational expenditure (where known)											
Energy efficiency and demand side management, reduction of energy losses	-	-	-	-	-	-	-	-	-	-	-
Direct billing*	-	-	-	-	-	-	-	-	-	-	-
Research and Development	-	-	-	-	-	-	-	-	-	-	-
Insurance	-	-	-	-	-	-	-	-	-	-	-
Difference between nominal and real forecasts	$000										
Service interruptions and emergencies	-	7	13	19	26	32	39	46	53	60	67
Vegetation management	-	12	23	35	46	58	70	83	95	108	122
Routine and corrective maintenance and inspection	-	4	8	12	16	20	24	28	33	37	42
Asset replacement and renewal	-	10	20	29	39	49	60	70	81	92	103
Network Opex	**-**	**33**	**64**	**95**	**127**	**160**	**193**	**227**	**262**	**297**	**333**
System operations and network support	-	5	10	15	20	25	30	36	41	47	53
Business support	-	48	93	139	185	233	282	331	382	434	486
Non-network opex	**-**	**53**	**103**	**154**	**205**	**258**	**312**	**367**	**423**	**480**	**539**
Operational expenditure	**-**	**86**	**166**	**249**	**332**	**418**	**505**	**594**	**685**	**778**	**872**

Direct billing expenditure by suppliers that direct bill the majority of their consumers

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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.

				Asset condition at start of planning period (percentage of units by grade)							
Voltage	Asset category	Asset class	Units	H1	H2	H3	H4	H5	Grade unknown	Data accuracy (1–4)	% of asset forecast to be replaced in next 5 years
All	Overhead Line	Concrete poles / steel structure	No.	-	0.50%	33.25%	33.25%	33.00%	-	3	1.00%
All	Overhead Line	Wood poles	No.	-	18.00%	38.00%	38.00%	6.00%	-	3	20.00%
All	Overhead Line	Other pole types	No.	-	-	-	-	-	-	N/A	-
HV	Subtransmission Line	Subtransmission OH up to 66kV conductor	km	-	-	47.00%	47.00%	6.00%	-	2	-
HV	Subtransmission Line	Subtransmission OH 110kV+ conductor	km	-	-	-	-	-	-	N/A	-
HV	Subtransmission Cable	Subtransmission UG up to 66kV (XLPE)	km	-	-			100.00%	-	3	-
HV	Subtransmission Cable	Subtransmission UG up to 66kV (Oil pressurised)	km	-	-	-	-	-	-	N/A	-
HV	Subtransmission Cable	Subtransmission UG up to 66kV (Gas pressurised)	km	-	-	-	-	-	-	N/A	-
HV	Subtransmission Cable	Subtransmission UG up to 66kV (PILC)	km	-	-	-	-	-	-	N/A	-
HV	Subtransmission Cable	Subtransmission UG 110kV+ (XLPE)	km	-	-	-	-	-	-	N/A	-
HV	Subtransmission Cable	Subtransmission UG 110kV+ (Oil pressurised)	km	-	-	-	-	-	-	N/A	-
HV	Subtransmission Cable	Subtransmission UG 110kV+ (Gas Pressurised)	km	-	-	-	-	-	-	N/A	-
HV	Subtransmission Cable	Subtransmission UG 110kV+ (PILC)	km	-	-	-	-	-	-	N/A	-
HV	Subtransmission Cable	Subtransmission submarine cable	km	-	-	-	-	-	-	N/A	-
HV	Zone substation Buildings	Zone substations up to 66kV	No.	-	-	16.50%	16.50%	67.00%	-	3	-
HV	Zone substation Buildings	Zone substations 110kV+	No.	-	-	-	-	-	-	N/A	-
HV	Zone substation switchgear	22/33kV CB (Indoor)	No.	-	-	-	-	-	-	N/A	-
HV	Zone substation switchgear	22/33kV CB (Outdoor)	No.	-	-	-	-	100.00%	-	4	-
HV	Zone substation switchgear	33kV Switch (Ground Mounted)	No.	-	-	-	-	-	-	N/A	-
HV	Zone substation switchgear	33kV Switch (Pole Mounted)	No.	-	5.00%	20.00%	20.00%	55.00%	-	3	-
HV	Zone substation switchgear	33kV RMU	No.	-	-	-	-	-	-	N/A	-
HV	Zone substation switchgear	50/66/110kV CB (Indoor)	No.	-	-	-	-	-	-	N/A	-
HV	Zone substation switchgear	50/66/110kV CB (Outdoor)	No.	-	-	-	-	-	-	N/A	-
HV	Zone substation switchgear	3.3/6.6/11/22kV CB (ground mounted)	No.	-	3.70%	44.40%	18.50%	33.40%	-	4	-
HV	Zone substation switchgear	3.3/6.6/11/22kV CB (pole mounted)	No.	-	-	-	-	100.00%	-	4	-
HV	Zone substation Transformer	Zone Substation Transformers	No.	-	-	14.30%		85.70%	-	4	-
HV	Distribution Line	Distribution OH Open Wire Conductor	km	-	1.00%	47.50%	47.50%	4.00%	-	2	1.00%
HV	Distribution Line	Distribution OH Aerial Cable Conductor	km	-	-	-	-	-	-	N/A	-
HV	Distribution Line	SWER conductor	km	-	-	-	-	-	-	N/A	-
HV	Distribution Cable	Distribution UG XLPE or PVC	km	-	-	2.50%	2.50%	95.00%	-	3	0.50%
HV	Distribution Cable	Distribution UG PILC	km	-	-	2.50%	2.50%	95.00%	-	3	0.50%
HV	Distribution Cable	Distribution Submarine Cable	km	-	-	-	-	-	-	N/A	-
HV	Distribution switchgear	3.3/6.6/11/22kV CB (pole mounted) - reclosers and sectionalisers	No.	-	3.00%	22.50%	22.50%	52.00%	-	3	5.00%
HV	Distribution switchgear	3.3/6.6/11/22kV CB (Indoor)	No.	-	-	-	-	-	-	N/A	-
HV	Distribution switchgear	3.3/6.6/11/22kV Switches and fuses (pole mounted)	No.	-	1.00%	23.50%	23.50%	52.00%	-	2	2.00%
HV	Distribution switchgear	3.3/6.6/11/22kV Switch (ground mounted) - except RMU	No.	-	-	-	-	100.00%	-	4	-
HV	Distribution switchgear	3.3/6.6/11/22kV RMU	No.	-				100.00%	-	4	
HV	Distribution Transformer	Pole Mounted Transformer	No.	-	1.00%	34.50%	34.50%	30.00%	-	3	1.50%
HV	Distribution Transformer	Ground Mounted Transformer	No.	-	1.00%	10.00%	10.00%	79.00%	-	3	1.00%
HV	Distribution Transformer	Voltage regulators	No.	-			50.00%	50.00%	-	3	2.00%
HV	Distribution Substations	Ground Mounted Substation Housing	No.	-	-	-	-	100.00%	-	2	-
LV	LV Line	LV OH Conductor	km	-	0.50%	44.75%	44.75%	10.00%	-	2	0.50%
LV	LV Cable	LV UG Cable	km	-	-	13.50%	13.50%	73.00%	-	2	0.50%
LV	LV Streetlighting	LV OH/UG Streetlight circuit	km	-	-	13.50%	13.50%	73.00%	-	2	0.50%
LV	Connections	OH/UG consumer service connections	No.	0.15%	-	-	-	99.85%	-	2	0.50%
All	Protection	Protection relays (electromechanical, solid state and numeric)	No.	-	-	16.67%	16.67%	66.67%	-	2	5.00%
All	SCADA and communications	SCADA and communications equipment operating as a single system	Lot	-	-	-	-	100.00%	-	2	-
All	Capacitor Banks	Capacitors including controls	No.	-	-	-	-	100.00%	-	4	-
All	Load Control	Centralised plant	Lot	-	-	-	-	100.00%	-	4	-
All	Load Control	Relays	No.	-	-	50.00%	50.00%	-	-	1	-
All	Civils	Cable Tunnels	km	-	-	-	-	-	-	N/A	-

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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 %		Installed Firm Capacity +5 years (MVA)	Utilisation of Installed Firm Capacity + 5yrs %	Installed Firm Capacity Constraint +5 years (cause)	Explanation
Waipukurau	8.6	10.0	N-1		86%		10.0	86%	No constraint within +5 years	
Waipawa	4.5	7.5	N-1		60%		7.5	60%	No constraint within +5 years	
Takapau	6.5	7.5	N	2.4	87%		7.5	87%	No constraint within +5 years	Two transformer site supplied by single 33kV line
OngaOnga	5.5	-	N-1 Switched	10.0	-		-	-	No constraint within +5 years	Load transfer from adjacent substations available using remote switches.
Wilder Road	0.6	-	N-1 Switched	2.4	-		-	-	No constraint within +5 years	Load transfer from adjacent substations available using remote switches.

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

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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*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
for year ended	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24
Consumer types defined by EDB*	Number of connections		Number of connections			
Residential	60	40	30	20	20	20
Commercial	8	3	1	1	1	1
Connections total	**68**	**43**	**31**	**21**	**21**	**21**

****include additional rows if needed***

Distributed generation

Number of connections	12	12	12	12	12	12
Installed connection capacity of distributed generation (MVA)	0	0	0	0	0	0

12c(ii) System Demand

Maximum coincident system demand (MW) for year ended	Number of connections		Number of connections			
GXP demand	21	21	22	22	22	22
plus Distributed generation output at HV and above	-	-	-	-	-	-
Maximum coincident system demand	**21**	**21**	**22**	**22**	**22**	**22**
less Net transfers to (from) other EDBs at HV and above	-	-	-	-	-	-
Demand on system for supply to consumers' connection points	**21**	**21**	**22**	**22**	**22**	**22**

Electricity volumes carried (GWh)						
Electricity supplied from GXPs	116	116	116	113	113	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	**116**	**116**	**116**	**113**	**113**	**113**
less Total energy delivered to ICPs	106	107	106	106	106	106
Losses	**10**	**9**	**10**	**7**	**7**	**7**
Load factor	**63%**	**63%**	**60%**	**59%**	**60%**	**56%**
Loss ratio	**8.6%**	**7.8%**	**8.6%**	**6.2%**	**6.2%**	**6.2%**

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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 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**
SAIDI						
Class B (planned interruptions on the network)	99.5	70.6	70.6	70.6	70.6	70.6
Class C (unplanned interruptions on the network)	57.7	83.8	83.8	83.8	83.8	83.8
SAIFI						
Class B (planned interruptions on the network)	0.55	0.29	0.29	0.29	0.29	0.29
Class C (unplanned interruptions on the network)	1.58	3.38	3.38	3.38	3.38	3.38

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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		Why	Who	Record/documented Information	Maturity narrative for assessed score
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.		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.
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.		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.
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.		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.
26	Asset management plan(s)	How does the organisation establish and document its asset management plan(s) across the life cycle activities of its assets and asset systems?	2	A strategic driver roadmap (Lifecycle Framework) is in place to establish and document asset management plan(s) across the life cycle activities of assets and asset systems at Centralines. This strategy commences at Unison and will include the documentation of plans for assets and asset systems at Centralines.		The 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.

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Question No.	Function	Question	Score	Evidence—Summary		Why	Who	Record/documented Information	Maturity narrative for assessed score
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.		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.
29	Asset management plan(s)	How are designated responsibilities for delivery of asset plan actions documented?	3	Centralines has appriopriate documentation in place defining the responsibility for delivery of Capital and Maintenance Plans.		The 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.
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.		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.
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).		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.

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Question No.	Function	Question	Score	Evidence—Summary		Why	Who	Record/documented Information	Maturity narrative for assessed score
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.		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.
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.		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.
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.		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.

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Question No.	Function	Question	Score	Evidence—Summary		Why	Who	Record/documented Information	Maturity narrative for assessed score
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.		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.
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.		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).
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.		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.

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Question No.	Function	Question	Score	Evidence—Summary		Why	Who	Record/documented Information	Maturity narrative for assessed score
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.		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.
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.		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.
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.		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.

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Question No.	Function	Question	Score	Evidence—Summary		Why	Who	Record/documented Information	Maturity narrative for assessed score
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.		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.
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.		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.
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.		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.
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.		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.

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Question No.	Function	Question	Score	Evidence—Summary		Why	Who	Record/documented Information	Maturity narrative for assessed score
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.		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.
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.		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.
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.		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.

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Question No.	Function	Question	Score	Evidence—Summary		Why	Who	Record/documented Information	Maturity narrative for assessed score
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.		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.
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.		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.
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.		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.

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Question No.	Function	Question	Score	Evidence—Summary		Why	Who	Record/documented Information	Maturity narrative for assessed score
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.		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.
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.		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.
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.		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		Why	Who	Record/documented Information	Maturity narrative for assessed score
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.		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.

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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

APPENDIX GLOSSARY OF TERMS

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, Jon Edmond Nichols 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 2012 in all material respects complies with that determination.

b) The prospective financial or non-financial information included in the attached information has been measured on a basis consistent with regulatory requirements or recognised industry standards.

c) The forecasts in Schedules 11a, 11b, 12a, 12b, 12c and 12d are based on objective and reasonable assumptions which both align with Centralines Limited's corporate vision and strategy and are documented in retained records.

Director

Date: 27th March 2019

Director

Date: 27th March 2019

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