Asset Management Plan

1 April 2016 – 31 March 2026

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Foreword

It gives me great pleasure to introduce the eleventh publication of Network Waitaki's Asset Management Plan (AMP). Network Waitaki is a rural consumer trust-owned electricity distribution business. The management, maintenance, operation and future extension of our network is an integral part of our day-to-day operations. This AMP intends to provide comfort to our consumers, regulators and stakeholders that Network Waitaki takes its responsibility of providing a safe, reliable, efficient and cost effective electricity network service very seriously. In this regard the AMP details the service levels to consumers that we adhere to and also the service targets that we strive towards.

Similarly, our focus is to maintain security of supply to our continuously growing consumer base by planning for and investing in assets with a view not only on immediate but also long term future demand expectations. In a nutshell, the AMP aims to inform readers comprehensively on all our actions pertaining to our network.

We value comments or questions that you might have on anything raised in this AMP. Please feel welcome to send it to service@networkwaitaki.co.nz, for the attention of Tod Trotman.

Graham Clark

Chief Executive

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Plan Summary

Introduction

Welcome to our asset management plan for the planning period 1 April 2016 to 31 March 2026. This edition of the AMP follows a new structure that we believe is easier to read and makes the information contained within more accessible.

Our AMP is one of the key means of communicating our vision and direction to our stakeholders. It allows us to describe the assets that we manage, and the methodologies that we apply to managing them, as well as laying out the development plans for our network.

Our AMP plays a central role in determining appropriate levels of network planning and investment required to operate a reliable network that meets the needs of our consumers.

Purpose and Key themes

The purpose of this AMP is to align the management of our assets with our corporate objectives and our mission statement:

> *"To be a locally-owned and operated electricity distribution company that provides the benefits of local consumer trust ownership by:*
>
> - *owning and operating a safe, reliable and efficient distribution system that meets the evolving needs of its consumers;*
> - *supporting the economic growth and wellbeing of the community it serves."*

The objectives of this AMP are to:

- Ensure asset lifecycle management is systematically planned with a long term view towards minimising lifecycle costs;
- Link our asset management practices to consumer and stakeholder preferences for prices, supply reliability, and public safety; and
- Provide a foundation for the ongoing management of risks surrounding operation of the network.

The Key themes for the planning period within the Waitaki area are:

- We expect continued growth in demand in the rural areas based on further irrigation development in the region;
- In the urban areas it is expected that load changes will be due to the gradual uptake of new technologies (such as plugin electric vehicles) and migration from traditional heat sources to heat pumps.
- Resilience to natural events is becoming a more important issue for our communities
- The importance of making the network a safe workplace for our staff and a safe utility for the public.

Ownership

We have a single shareholder, the Waitaki Power Trust (The Trust). The shares of NWL are held on behalf of the NWL consumers by the Trust, which has appointed NWL to carry out the governance and management functions of the business. The Trust has five Trustees of which three stand for election by the connected consumers every three years. The Trust Deed holds all Trustees collectively accountable to the New Zealand judiciary for compliance with the Deed.

Operating Environment

The operating environment of the Waitaki region is a mixture of coastal plains and alpine areas, traditionally dry and cold in winter, and dry and hot in summer.

Extreme weather events can include wind and snow storms, and floods. We expect to experience at least one significant weather event every year. The impact of these events is typically restricted to the inland area of the network, but can affect the whole region.

The major urban population is centred on Oamaru itself, a town of approximately 12000 people located on the East coast. The rural economy of the region is based on a mixture of beef and sheep farming, crops and dairy. Irrigation is used widely throughout the region and is a major source of the growth in on our network.

Despite the typically dry conditions, vegetation growth is robust throughout most of our network, and tree management is an ongoing concern.

Consumer Profile

A summary of the load served by our network for the year 2014/15 is shown in Table 1

Parameter	Value
Number of connected consumers	12,581
Coincident max demand	51 MW
GWh energy throughput	291 GWh
Percentage of consumers in urban areas	54%

Table 1 Summary of load served

We only have two consumers that would be considered large by national standards, and no significant distributed generation.

Our Network

We are predominantly a rural network supplying the North Otago, Hakataramea, and Ahuriri regions. Our area of supply and the subtransmission network is shown in Figure 1 below.

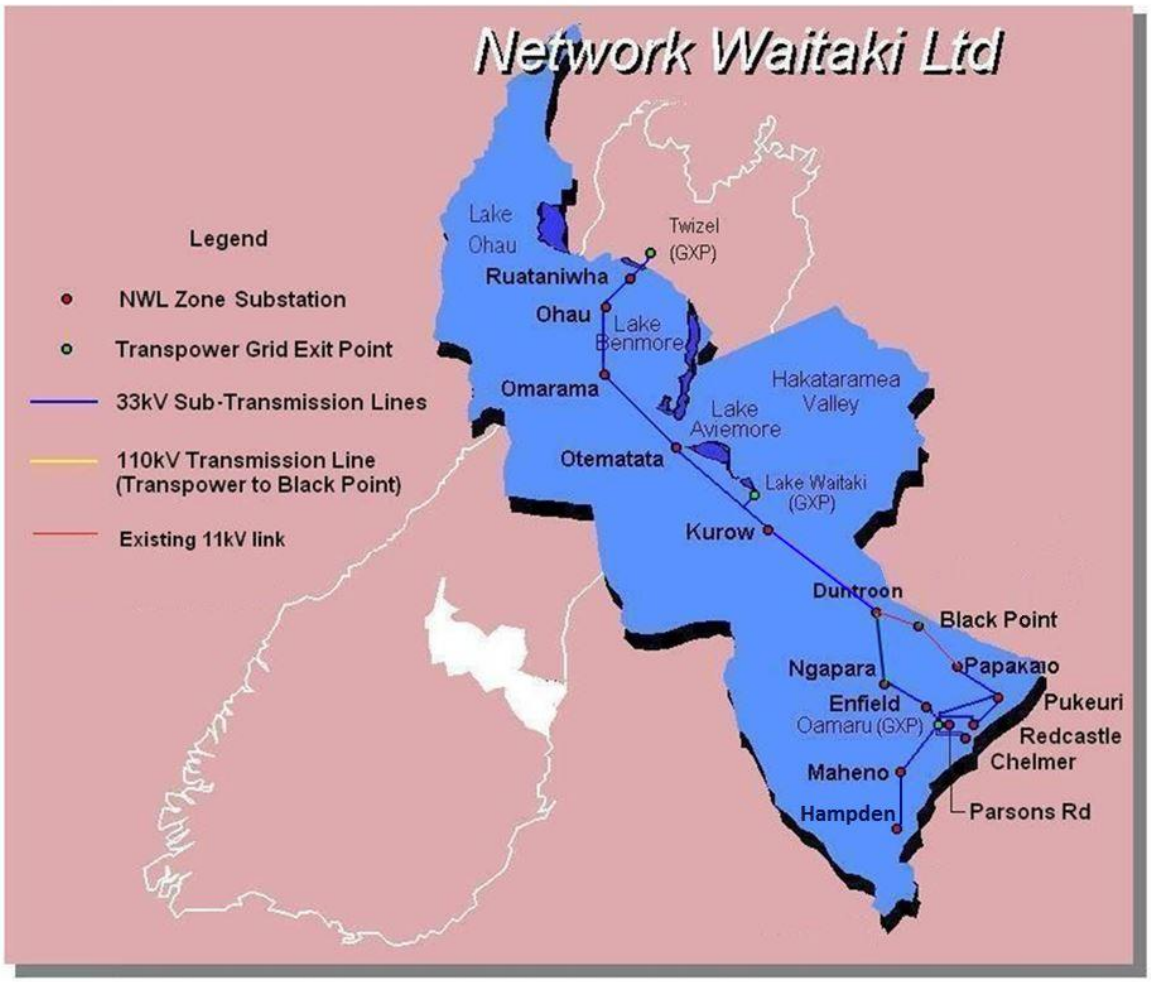


Figure 1 Our network and area of supply

We take supply from Transpower at four GXPs, the details of which are summarised in Table 2.

Supply point	Voltage	Firm capacity	Max demand 2015/16	Energy throughput 2014/15	Zone Substations supplied
Oamaru GXP	110/33kV	40 MVA	43.0 MW	230.4 GWh	9
Black Point GXP	110/11kV	25 MVA	10.9 MW	31.5 GWh	1
Waitaki GXP (supplied from Meridian 11kV generator bus)	11/33kV	24 MVA	10.5 MW	15.8 GWh	3
Twizel GXP	220/33kV	20 MVA	3.2 MW	12.65 GWh	3*
* Includes Ruataniwha, which is a large customer substation feeding directly from the subtransmission system at 33kV.					

Table 2 Characteristics of our Grid Exit Points (GXPs) as at 10 March 2016

Key features of the network are shown in Table 3:

Parameter	Value
Length of 33kV lines and cables	209 km
Length of 11kV lines and cables	1426 km
Length of LV lines and cables	335 km
Number of zone substations	15
Number of connected consumers	12554
Coincident max demand	57 MW

Table 3 Key features of our network

Service Levels

Stakeholder engagement

We engage with our stakeholders through consumer surveys, face to face interviews with major consumers, and participation in industry forums and conferences. This helps us identify Stakeholder requirements that are incorporated into our asset management planning processes.

Safety

We are committed to ensuring that our network remains safe at all times, and we are focused on enhancing and developing a positive safety environment for staff and the public. We work to make sure that we are always improving in this area.

We have achieved accreditation for our Public Safety Management System to NZS 7901:2008.

Network Performance

We monitor the performance of our network against several metrics designed to ensure that consumers are getting suitable service, and that our asset management practices are achieving our objectives.

Key amongst these are the SAIDI and SAIFI figures, which are shown in Figure 2 and Figure 3 below.

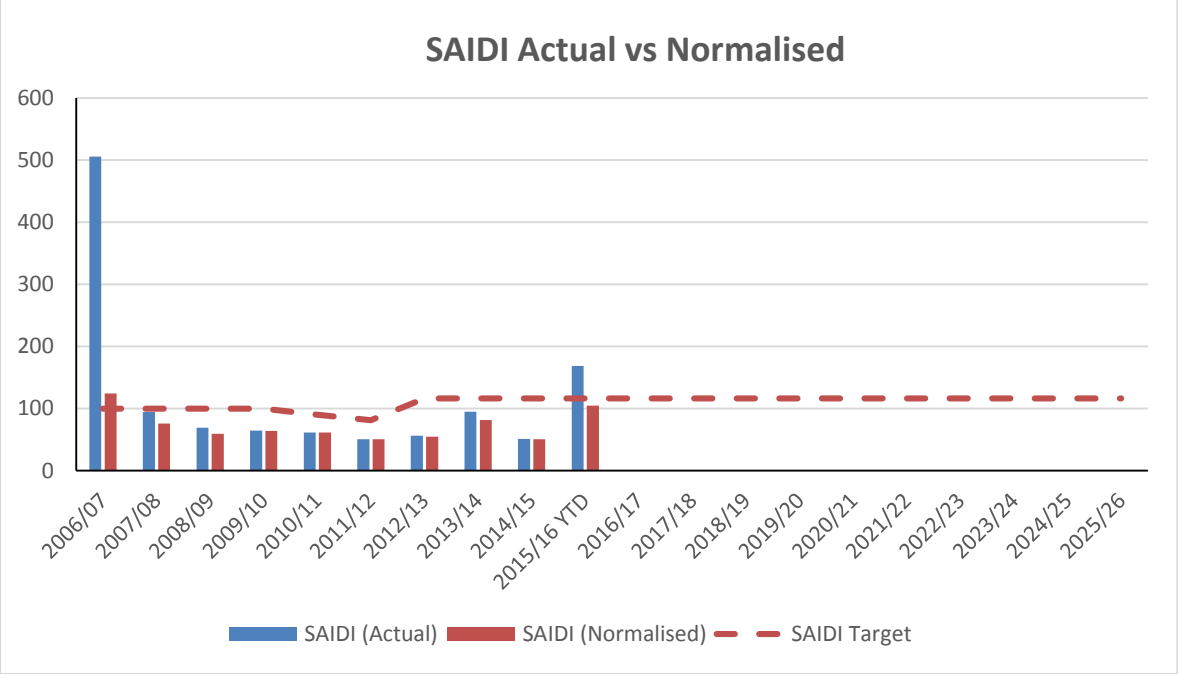


Figure 2 Historical SAIDI Performance Compared to Target

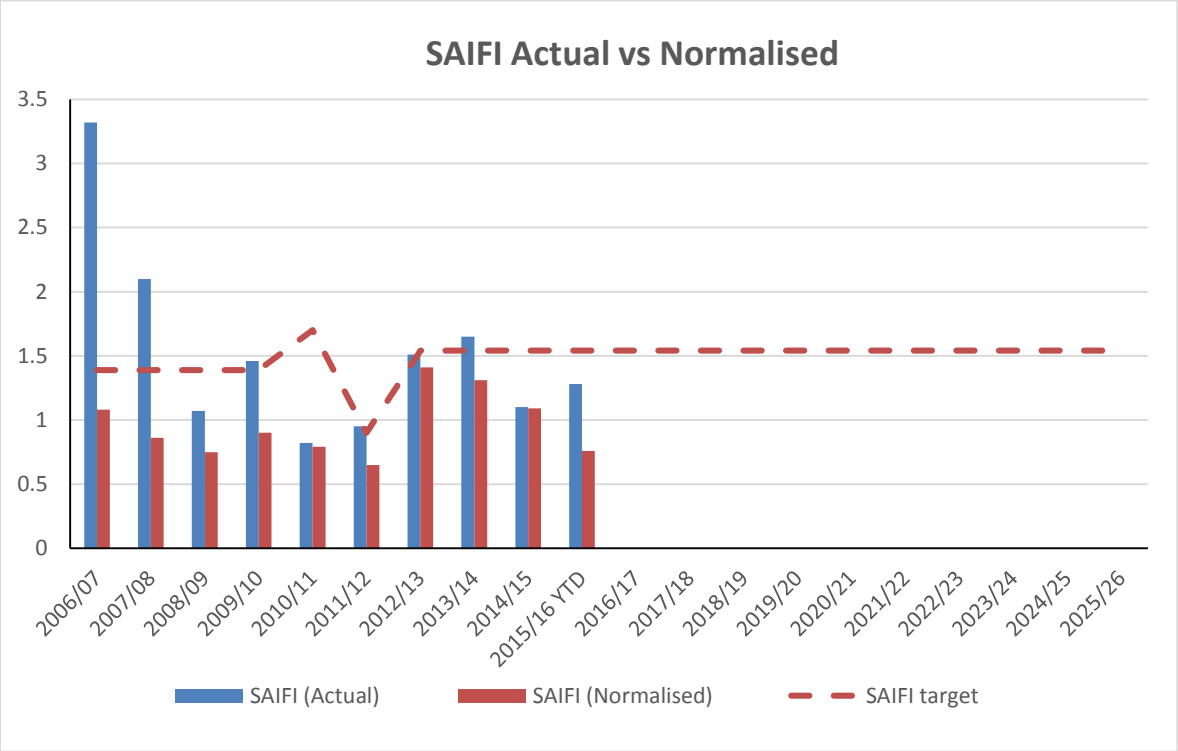


Figure 3 Historical SAIFI Performance compared to target

We believe that the performance of the network against our reliability targets shows our maintenance and renewal practices are targeted correctly, and that we are delivering good value to our stakeholders.

Approach to Asset Management

We view effective asset management as a continual cycle, with direction, planning, implementation and review working together to improve our performance.

Our documentation such as the Asset Management Policy, Asset Management Strategy, and this AMP are all aligned with our corporate objectives. This alignment flows through to the delivery of the works programme.

We report monthly to our Board and quarterly to the Trust on our performance including progress on the delivery of our works programme.

We operate a robust risk management system, based on ISO31000. This has allowed us to incorporate risk management across the entire business from strategic planning through to daily activities such as fault responses. Our treatment of risk includes planning for major events, and working with other local authorities to align our response planning.

We have carried out a self-assessment using the Commerce Commission's Asset Management Maturity Assessment Tool (AMMAT). This shows that our asset management practices are generally mature, although there are a few areas around asset information where we scored lower than we would like. We are in the final stages of a major project to install a new works and asset management system (OneEnergy from Technology One). This system is a major step change in our asset management tools, and used in conjunction with our other systems such as GIS will enable us to close the gaps in how we record, analyse and act on asset data.

Renewals and Maintenance

We currently operate a time based inspection regime to develop our renewals and maintenance programme. All assets are regularly inspected to identify any defects. Other information to trigger renewals or maintenance can come from analysis of fault reports, or from the experience of our staff or the wider industry with a particular asset population.

In order to justify any maintenance expenditure, the maintenance proposals are assessed for each asset on the basis of:

- Safety;
- Severity of the defect;
- Criticality of the particular asset;
- Serviceability and performance of the asset;
- Economic consequences of failure; and
- Environmental consequences of failure.

Our performance against reliability targets shows that this approach is working well at this stage, although as we develop our asset management practices we will be looking at adopting more predictive methods for asset condition assessment.

We tailor our inspection efforts according to a hierarchy of importance, with Subtransmission and Zone Substations having the shortest inspection cycles, and consequently the highest focus.

We actively seek out tools and methods that will improve our outcomes, and have recently started fielding Gopro cameras, and non-invasive testing systems (Portascan pole Xray system and Thor's Hammer acoustic tester) in our field inspections.

Our asset base is generally in reasonable condition, and we are not seeing any trends which indicate any particular areas of the asset population are in need general need of renewal.

Network Development Plan

Over recent years there has been significant load growth in the irrigation and dairying area. Based on the number of large development projects that we are aware of, we believe this will remain the main driver in our network for the current planning period. Development of our network to meet consumer demand growth continues to be a significant component of our total investment.

Our GXP demand forecast is shown in Figure 4 below.

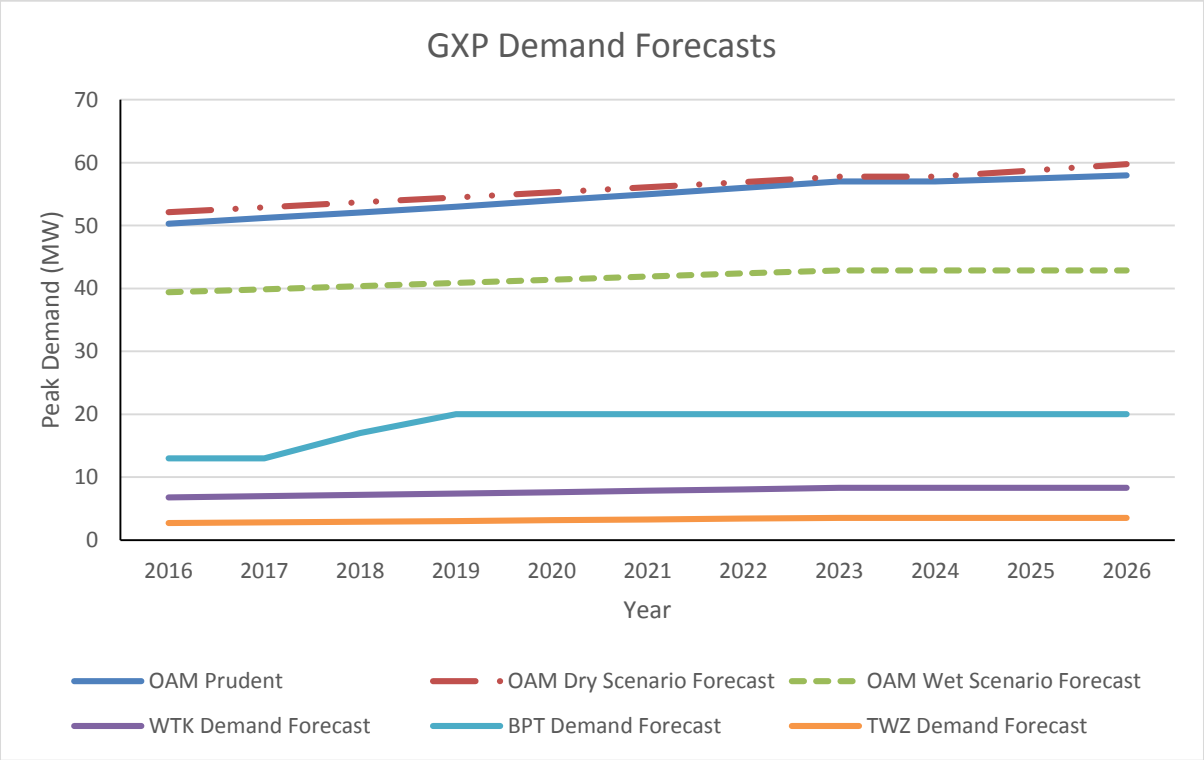


Figure 4 GXP Demand Forecasts

The impact of this demand on our network is shown by the fact that we are planning to add three new zone substations to our network within the next three years.

We are subject to a constraint on the Transpower 110kV network that supplies our Oamaru GXP which means that we are having to connect much of the predicted growth onto our Waitaki GXP, which was upgraded last year.

Key Projects for the planning period include:

- Investigating options to increase capacity into the Oamaru area;
- Upgrading the Waitaki GXP to supply 24MVA with N-1 security;

- Upgrading some 33kV subtransmission lines to 66kV to allow more load to be connected to Waitaki GXP;
- Construction of three new zone substations and their supporting subtransmission circuits in areas of expected load growth:
    - Five Forks
    - Awamoko
    - Otekaieke;
- Upgrade and/or extending the following feeders to meet new load and provide interconnection between zone substations:
    - Five Forks feeder
    - McHenrys Rd – Station Peak feeder
    - Windsor feeder;
- Installing voltage regulators to provide voltage support where high load growth has effected voltage stability, especially near the ends of feeders; and
- Upgrading our radio network, used for voice and SCADA communications.

In addition to our electricity network we also own and operate a fibre optic network through part of the region. During the planning period we will be extending the network to provide high bandwidth communications to our substations and other critical assets. This will allow us to utilise new technologies such as cameras at substations, and remote access to asset information.

Summary of Expenditure

The summary of our forecast expenditure for the planning period is shown in Table 4.

These estimates are considered to be fairly accurate for the first 5 years of the planning period, with the figures being indicative only beyond that point. Many of our investment, maintenance and renewal decisions will be very dependent the outcomes of inspections in the first 5 years, consumer growth, and other issues that are currently out of our control.

Forecast Expenditure ($k)										
Expenditure Type	**2016/17**	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
Consumer connection	505	516	526	537	549	449	346	272	278	283
System growth	5,520	1,521	2,710	2,927	2,825	1,953	1,371	1,399	1,429	1,459
Asset replacement & renewal	1,159	1,241	1,267	1,293	1,320	1,348	1,376	1,405	1,435	1,465
Asset relocations	0	0	0	0	0	0	0	0	0	0
Reliability, safety & environment: Quality of supply	1,409	2,570	1,036	327	247	679	807	939	959	979
Reliability, safety & environment: Legislative & regulatory	50	51	52	53	54	55	57	58	59	60
Other reliability, safety & environment	0	0	0	0	0	0	0	0	0	0
Subtotal Capital Expenditure:	**8,643**	**5,898**	**5,592**	**5,138**	**4,995**	**4,485**	**3,956**	**4,074**	**4,159**	**4,246**
Service interruptions & emergencies	273	279	285	291	297	303	309	316	322	329
Vegetation management	300	306	313	319	326	333	340	347	354	362
Routine & corrective maintenance & inspection	582	594	607	619	632	646	659	673	687	702
Asset replacement & renewal	770	786	803	820	837	854	872	891	909	928
Subtotal Operational Expenditure:	**1,925**	**1,965**	**2,007**	**2,049**	**2,092**	**2,136**	**2,181**	**2,226**	**2,273**	**2,321**
Total Expenditure	**10,568**	**7,864**	**7,598**	**7,186**	**7,087**	**6,620**	**6,136**	**6,300**	**6,432**	**6,567**

Table 4 Summary of Expenditure Forecasts

1. Introduction

Welcome to our Asset Management Plan (AMP) for the planning period 1st April 2016 to 31st March 2026. As we provide an essential service to the communities we serve, it is vital that our electricity network is reliable and meets the evolving needs of our consumers. Our AMP plays a central role in determining appropriate levels of network planning and investment required to achieve this.

This chapter introduces the AMP and is structured as follows:

- **Purpose:** explains the purpose and objectives of the AMP, the period and assets covered, the date it was approved by our Board of Directors (Board) and the intended audience.
- **Key Themes and Initiatives:** summarises the key themes and initiatives that have been outlined throughout the AMP.
- **Document Structure:** an illustration of how the AMP is structured.

1.1 Purpose

The purpose of this AMP is to align the management of our assets with our corporate objectives and our mission of "owning and operating a safe, reliable, and efficient distribution system that meets the evolving needs of our consumers, while supporting the economic growth and wellbeing of the community we serve."

This AMP is an integral part of our business planning process alongside other key corporate documents, including our Statement of Corporate Intent, annual business plan and budget, Network Development Plan, monthly Board Reports, and our emergency preparedness documents. The objectives of this AMP are to:

- Ensure asset lifecycle management is systematically planned with a long term view towards minimising lifecycle costs;
- Link our asset management practices to consumer and stakeholder preferences for prices, supply reliability, and public safety; and
- Provide a foundation for the ongoing management of risks surrounding operation of the network.

1.1.1 Approval Date

The 2016-20126 AMP was approved by the Network Waitaki Ltd's (NWL) Board of Directors on 31 March 2016. See Appendix C for a copy of the signed Certificate of Approval.

1.1.2 Scope of AMP

The scope of the AMP includes all areas of planning that relate to NWL's electrical distribution services as an Electrical Distribution Business (EDB). This does not include business streams outside the core EDB business, such as Electrical Contracting, Metering Services, and the Fibre Optic Network.

1.1.3 Intended Audience

The AMP is published on our website (www.networkwaitaki.co.nz) and is aimed at the following readership:

- The Commerce Commission;
- Our Trustees, Directors and Management;
- Our staff;
- Our other Stakeholders;
- Interested members of the general public; and
- Other Electricity Distribution Businesses (EDBs).

1.2 Key Themes

The Key themes for the planning period within the Waitaki area are:

- We expect continued growth in demand in the rural areas based on further irrigation development in the region;
- In the urban areas it is expected that load changes will be due to the gradual uptake of new technologies (such as plugin electric vehicles) and migration from traditional heat sources to heat pumps.
- Resilience to natural events is becoming a more important issue for our communities
- The importance of making the network a safe workplace for our staff and a safe utility for the public.

1.3 Document Structure

Figure 5 below illustrates the structure of this AMP.

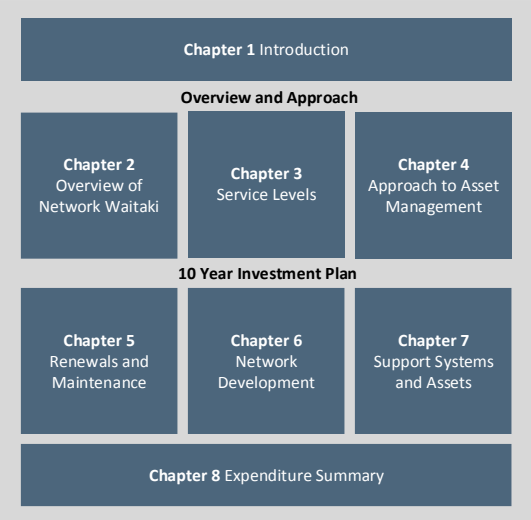


Figure 5 Structure of Network Waitaki Ltd 2016-2026 AMP

2. Overview of Network Waitaki

This chapter describes who we are and what we want to achieve. It provides an overview of our company, who our stakeholders and consumers are, our network area and our assets. This chapter is structured as follows:

- **Our Company:** outlines our corporate objectives, organisational and governance structures.
- **Operating Environment:** an overview on the issues that have an impact on us and our approach to asset management such as geography, vegetation management, and changes in demand.
- **Stakeholders:** this section describes who our stakeholders are, their interests and expectations, and how these interests and expectations are accounted for in our asset management practices.
- **Our Consumers:** an overview of our consumers including total number of connections; our major consumers and their impact on network operations and our asset management objectives; and the load characteristics of our network.
- **Our Network:** an overview of the network including coverage areas; the extent it is overhead and underground; and our substation arrangements.
- **Our Assets:** a population summary of our assets by category.

2.1 Our Company

We have a single shareholder, the Waitaki Power Trust (The Trust). The shares of NWL are held on behalf of the NWL consumers by the Trust, which has appointed NWL to carry out the governance and management functions of the business. The Trust has five Trustees of which three stand for election by the connected consumers every three years. The Trust Deed holds all Trustees collectively accountable to the New Zealand judiciary for compliance with the Deed.

We operate primarily as an Electrical Distribution Business (EDB), although other business opportunities within the utilities sector may be investigated. We also, where appropriate, support the growth and wellbeing of the wider community.

2.1.1 Corporate Objectives

Our corporate objectives and Mission require us to manage our assets efficiently and effectively to facilitate the delivery of a safe and reliable supply of electricity to our consumers. In order to achieve this, we have aligned our asset management practices and objectives with our corporate objectives and mission.

Our Mission Statement is:

> *"To be a locally-owned and operated electricity distribution company that provides the benefits of local consumer trust ownership by:*
>
> - *owning and operating a safe, reliable and efficient distribution system that meets the evolving needs of its consumers;*

- *supporting the economic growth and wellbeing of the community it serves."*

Our Corporate Objectives cover eight areas:

Health and Safety
- To ensure our activities cause no harm to staff, contractors, the public and property;
- To operate health and safety systems that meet all of our regulatory requirements.

Shareholders
- To pursue policies which will secure the Company's financial position as a consumer trust-owned business for present and future consumers.

Consumers
- To provide consumers with the delivery of a safe, efficient and reliable electricity distribution system.

Efficient Use of Resources
- To promote the efficient use of energy as required under the Energy Companies Act 1992 clause 36 (2);
- To efficiently and effectively utilise the resources of the Company.

Public and Social Responsibility
- To be a good corporate citizen by being a law abiding company; and
- Supportive of activities that provide economic growth in the area serviced by the network.

Employer
- To be an equal opportunity employer;
- To recruit and retain competent, motivated, committed staff;
- To provide training opportunities that will enable individual staff members to attain their fullest potential in the service of the Company.

Environmental
- To ensure compliance with the Resource Management Act;
- To operate in a way that minimises the impact on the environment.

Compliance
- To continue with our comprehensive compliance programmes currently in place and to comply with all obligations under relevant legislation and regulators

Together these eight areas form the basis for establishing our Asset Management practices and processes

2.1.2 Corporate Documents

The company maintains a number of internal and external documents as part of its annual business planning process. The main ones are:

- the Statement of Corporate Intent (SCI), which is agreed annually between the Directors and the Waitaki Power Trust, and sets out the objectives, goals, and related performance targets for the company for the following three years;
- the regulatory disclosure documents, including those associated with information disclosure, financial accounts, and the Commission's price-quality threshold regime;
- the 10 year Network Development Plan which details the demand growth forecast and the planned augmentation of the network to meet that demand;
- the annual business plan and budget which detail the current activity budgets approved by the Directors for the current financial year, along with detail of the planned activity budgets for the following two years;
- monthly Board Reports, which update the Directors on the progress against the annual budget, along with other issues that they need to approve or be made aware of; and
- the suite of emergency preparedness documents that detail the plans to maintain and restore supply following emergency events.

2.1.3 Organisation Structure

The Trustees appoint our Board of Directors (Directors) to govern the company and they in turn appoint the Chief Executive Officer (CEO). Ultimate accountability for the network assets lies with the Directors, who approve this AMP. Directors are also accountable to the Trustees for meeting the requirements set out in the Statement of Corporate Intent (SCI), which includes specific asset management objectives and service targets.

Directors have an involvement in approving projects and budgets needed to support the AMP. The AMP and Network Development Plan signal the need for future investments so that Directors can assess the long term issues such as funding requirements. Directors ensure that members of the public have access to the AMP and other disclosure documents on the company's website.

The Management team report outage statistics, network performance, and work programme progress to the Directors on a monthly basis. Quarterly reports comparing year to date performance against the SCI are provided to the Trust. Annual reports are prepared by both NWL and the Waitaki Power Trust.

On 31 March 2015 Network Waitaki Contracting Ltd (NWCL) was amalgamated with NWL. Prior to this NWCL was a wholly owned subsidiary of NWL, operating at arm's length. Following a review of the future of the contracting business, and recognition of the efficiencies of an in house field service provider, it was determined that amalgamation offered benefits in the form of reduced overheads and improved alignment of the goals of the management and field delivery sides of the business.

The majority of the annual works programme is undertaken by the Contracting group, which has a staff of approximately 25 people located in Oamaru.

The management of the assets is the responsibility of our executive management. Our organisation structure is shown in Figure 6 below.

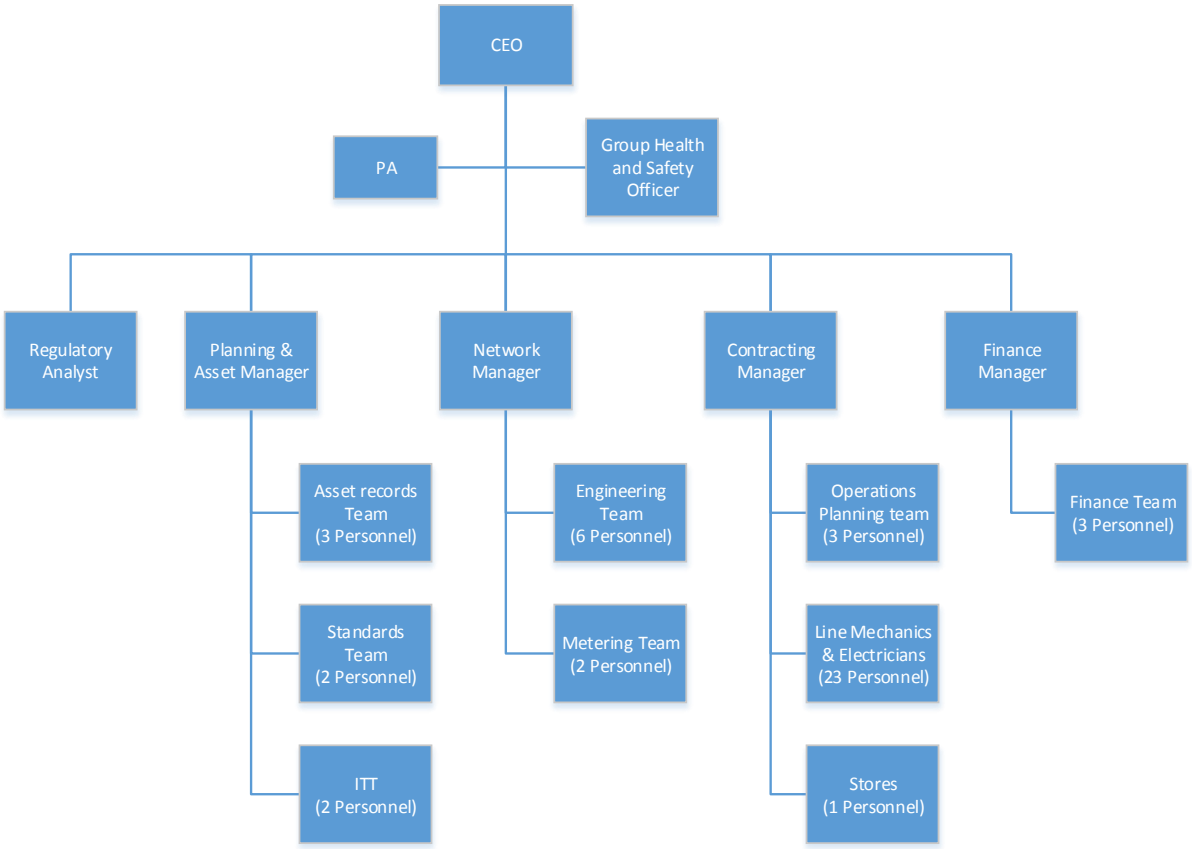


Figure 6 NWL organisation structure

2.1.4 Asset Management Governance

NWL has a relatively small staffing establishment intended to resource a narrow business model i.e. operational management of a lines business. Our organisation structure encourages team work across defined roles and areas, which reduces the risk of information silos forming, and encourages ownership of planning and delivering network performance by all staff. An example of this approach is that the entire engineering team, from the Network Manager to the Engineering Officer, man the Control Room on a roster basis.

The following is a description of management responsibilities.

Chief executive

The Chief Executive is accountable to the Directors to ensure that the strategic objectives of the Board and the Trust are delivered.

Asset management responsibilities are allocated between the engineering managers as follows:

Network Manager

The Network Manager has responsibility for the day to day operation of the network and the implementation of the annual capital and maintenance work programmes.

Planning and Asset Manager

The Planning and Asset Manager is responsible for network planning and the supporting services such as maintaining the Asset Management information and data systems, and the development of standards and policies.

Regulatory Analyst

Pricing and disclosure duties are the responsibility of the Regulatory Analyst with assistance and input from the Finance Manager.

Contracting Manager

The Contracting Manager is responsible for the provision of field services in order to complete the annual works plan in those areas of service provided by our in house contract team. They are also responsible for managing any work outside our network, for other network companies or private customers, provided that the NWL works programme is given the focus that it requires.

2.1.4.1 Expenditure Approvals

Operational and Capital budgets are prepared annually and approved by the Board of Directors. For larger projects, investments in new areas, and projects committing the company to expenditure over several years the approval process includes a formal Sanction for Expenditure (SFE). This provides Directors with technical detail and presents the business case for the proposal. Following the completion of a major project the Directors will review any associated SFE to confirm delivery on the benefits stated.

All roles within the company also have approved delegated financial authorities. Any expenditure beyond these limits requires specific approval from a manager or the CEO or board, depending on the absolute amount of the expenditure.

Work is generally prioritised in the following order:

- Emergency works
- Planned Consumer works
- Planned Maintenance works
- Planned Capital works

2.1.4.2 Asset Management Capability

Our organisational and governance arrangements are structured in a way to ensure that we have the necessary capability to implement this AMP. As stated in our Policy on Delegation and Authorisation we have

"*a culture of empowering staff to take responsibility for projects assigned to them. This includes incurring costs through contracts and purchasing of materials.*"

This policy provides clarity to each staff member on their role in the delivery of projects that make up the AMP.

We ensure that our AMP work programme can be achieved by regular formal reporting on the physical and financial progress of the work programme against our plans and budgets, as well as comparing our achieved service levels against targets. We also regularly review and forecast our future revenue streams to ensure there is sufficient funding to develop and maintain the network. This involves annual price reviews, discounts returned to consumers, and capital connection levies.

An important part of the annual work programming is to review staffing levels and competencies to make sure that we have the resources available to realise our projected future work programmes.

At the same time, we have to recognise that it is not cost effective to maintain a work force that is too specialised. Accordingly, the skill set of our field staff is focussed on the core line construction and maintenance trades, such as live line work, cable jointing and line construction. Specialist trade experience such as communications and power technicians and electrical fitters have been contracted in from outside suppliers for a number of years. This approach is successful due to strong relationships with a number of preferred service providers, many of whom are local to the Waitaki area.

2.2 Operating Environment

The operating environment of the Waitaki region is a mixture of coastal plains and alpine areas.

The climate is traditionally dry and cold in winter, and dry and hot in summer. The area is known to suffer from drought conditions.

Extreme weather events can include wind and snow storms, and floods. We expect to experience at least one significant weather event every year. The impact of these events is typically restricted to the inland area of the network, but can affect the whole region.

The coastal conditions are comparatively benign, although coastal erosion is starting to impact in some areas of the region.

The major urban population is centred on Oamaru itself, a town of approximately 12000 people located on the East coast. There are several small townships in the region, the majority of which are located on the two state highways that run North to South (SH1) and East to West (SH83) through the region.

The rural economy of the region is based on a mixture of beef and sheep farming, crops and dairy. Irrigation is used widely throughout the region, via schemes that include border dyke systems, direct pumping from a local water source, or reticulated systems to the farm gate. Irrigation is a major source of the growth in on our network.

Despite the typically dry conditions, vegetation growth is robust throughout most of our network, and tree management is an ongoing concern.

2.3 Stakeholders

2.3.1 Stakeholders and their Interests

Our stakeholders are the people or organisations that can affect, be affected by, or perceive themselves to be affected by our decisions or activities. As a consumer trust, stakeholder requirements are important to us and we place considerable focus on identifying and meeting

stakeholder expectations. Our stakeholders are described in Table 5 below, along with their requirements, how those requirements are identified and how they are incorporated into our asset management practices.

Stakeholder	Requirements	Identification of Requirements	Requirements Incorporated into Asset Management Practices
Consumers	Safety; reliability; effective communication particularly during emergencies and faults; emergency and lifeline preparedness.	Bi-annual surveys; face to face interviews with major consumers; feedback.	Safety initiatives; price/quality trade off; Network Development Plans, Investment Planning; Asset Fleet Management.
Public, and landowners	Safety; emergency and lifeline preparedness; protection of property and amenity values; effective communication regarding access and maintenance	Meetings; feedback; consultations.	Safety initiatives; emergency preparedness planning; service levels.
Councils	Alignment with District and Regional requirements; statutory compliance.	Meetings; consultations on regional and district plans.	Network Development Planning for system and load growth.
Electricity generators and retailers	Safety, reliability, effective communication; statutory and regulatory compliance; fair contractual arrangements; transparent; effective delivery of business to business services.	Industry forums, conferences and seminars; regular consultation, statutory and regulatory requirements; contractual arrangements.	Network Development Planning; service levels
Regulators and Governmental Agencies	Statutory and regulatory Compliance; ensure consumers receive a reliable supply of electricity accounting for price/quality trade off;	Statutory and regulatory requirements; consultations; industry forums, conferences and seminars.	Network Development Planning; service levels; risk management; governance arrangements.

Stakeholder	Requirements	Identification of Requirements	Requirements Incorporated into Asset Management Practices
Transpower (as Grid and System Operator)	Security of supply; new grid investment and planning provisions; effective and timely communication; Statutory and regulatory requirements; sustainable earnings from connected and interconnected assets	Operational standards and procedures; Regular meetings;	Network Development Planning; Investment Planning; Fleet Management; Risk Management
Staff and other workers	Safe and enjoyable work environment; job satisfaction; assurance of work continuity; visibility of forward workload requirements; work/life balance; career development opportunities; fair remuneration; effective support	Staff feedback; regular staff briefings and communications; Staff input into decisions affecting work environment and methods	Safety Initiatives and reporting; integration of Risk Management into all processes; forward planning of work;
Waitaki Power Trust	Fair and reasonable rate of return on equity; incentives to invest and innovate; good governance; risk management ; business sustainability; good reputation with the community; Good asset management	Trustee Meetings; performance measures.	Network Development Planning; Investment Planning; Fleet Management; organisation and governance structures; integration of Risk Management into all business processes Quarterly and annual reporting
Board of Directors	Governance; risk management; business direction and sustainability; Performance of Chief Executive; statutory and regulatory compliance.	Regular Board meetings and directives; performance measures.	Integration of Risk Management into all business processes; regular reporting.

Table 5 Network Waitaki Stakeholders

2.3.2 Managing Conflicting Interests

Any conflicts in stakeholder requirements are normally resolved by prioritising the requirements on a risk and obligation basis. All stakeholders want to minimise the risk of injury to the public, staff or other workers, and any significant property damage, and these concerns are given the highest priority. NWL also has obligations to maintain supply to existing consumers at the security levels set out in the SCI.

Priorities for managing conflicting interests are:

- Safety - we will give top priority to safety of people, followed by minimisation of significant property damage.
- Compliance – We will give second priority to compliance that is not safety related.
- Viability – We will give third priority to viability (as defined above), in order for our management of the network to be sustainable.
- Pricing – We will give fourth priority to pricing as a follow on from viability (noting that pricing is only one aspect of viability). We recognise the need to adequately fund its business to ensure that consumer's businesses can operate successfully.
- Supply quality – We will give fifth priority to supply quality because a reliable electricity supply is a key input to a prosperous and orderly community.

2.4 Our Consumers

2.4.1 Consumer Profiles

A summary of the load served by our network for the year 2014/15 is shown in Table 6

Parameter	Value
Number of connected consumers	12,581
Coincident max demand	51 MW
GWh energy throughput	291 GWh
Percentage of consumers in urban areas	54%

Table 6 - Summary of load served

2.4.2 Major Consumers

NWL has two consumers who could be considered as individually large by national standards. These are:

Consumer	Supply arrangement
North Otago Irrigation Company (NOIC)	Supplied from the dedicated Black Point GXP with n level security and no 11kV interconnection to NWL's network.
Alliance Pukeuri Works	Supplied from the Pukeuri Substation via dedicated dual 11kV connections to their own 11kV network. Pukeuri is an n level security substation but has an ***N-1*** 33kV sub transmission supply and multiple 11kV substation interconnections. The 11kV interconnections cannot supply the full load of the works but do provide sufficient capacity to maintain the freezers and essential services.

Table 7 Large Consumers on NWL network

None of these installations have a significant impact on network operations, however the network is configured to specifically service the load they present at their existing locations.

2.4.3 Distributed Generation

We have no distributed generation connections larger than 1MW.

The penetration of Distributed Generation in our network is not presently very large. The typical distributed generation connection is around 5-7kW of solar panels on a domestic dwelling.

2.5 Our Network

We are predominantly a rural network supplying the North Otago, Hakataramea, and Ahuriri regions. Key economic activities in our coverage area are dairy farming, sheep farming and rural servicing. NWL distributes electricity to more than 12,500 consumers over approximately 1,906 km of lines and cables, of which 92% is overhead. Our area of supply and the subtransmission network is shown in Figure 7 below.

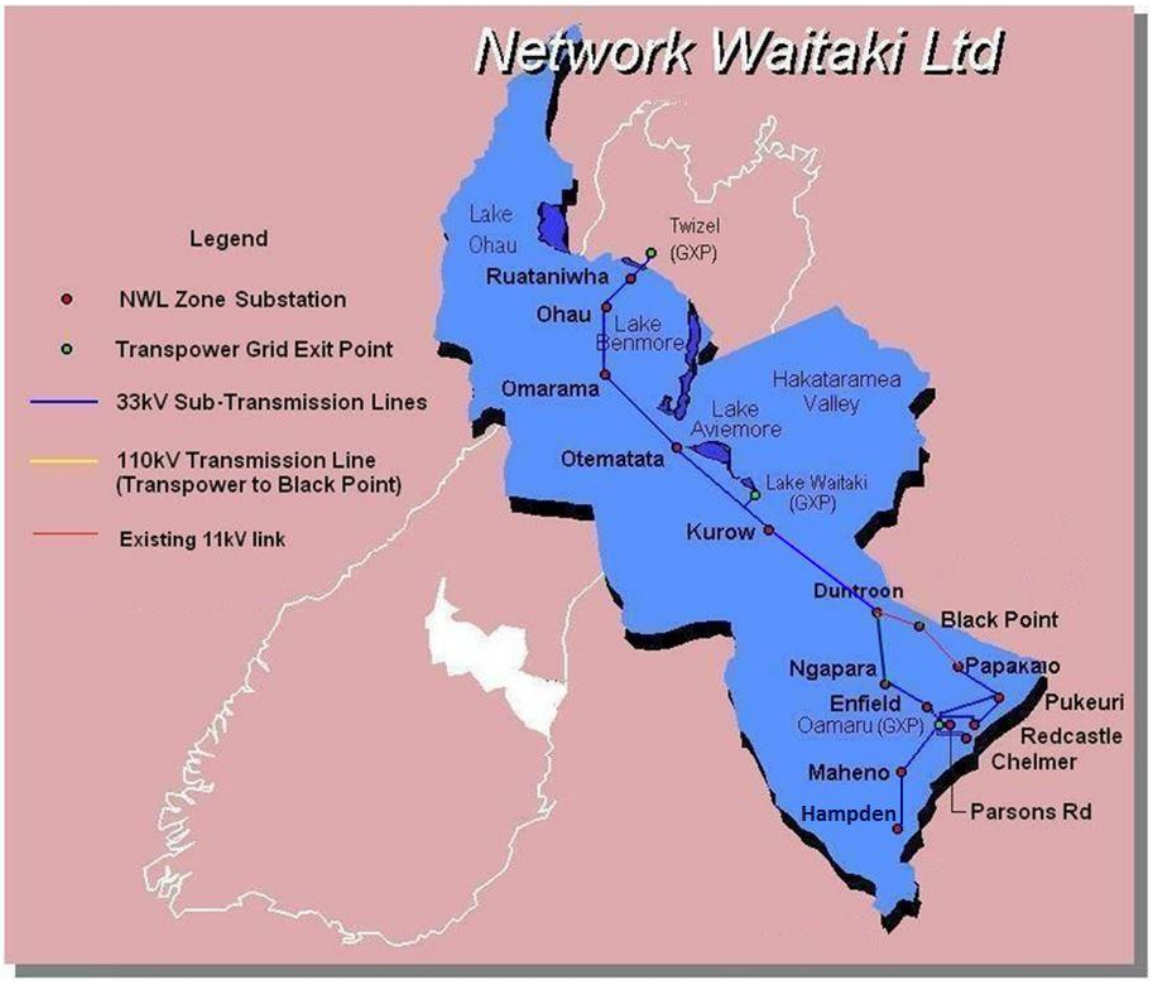


Figure 7 Map of NWL Area of Supply with Subtransmission Network

2.5.1 Subtransmission and Zone Substation Network

We are connected to the Transpower network at four Grid Exit Points (GXPs). The characteristics of these are listed in Table 8.

Supply point	Voltage	Firm capacity	Max demand 2015/16	Energy throughput 2014/15	Zone Substations supplied
Oamaru GXP	110/33kV	40 MVA	43.0 MW	230.4 GWh	9
Black Point GXP	110/11kV	25 MVA	10.9 MW	31.5 GWh	1
Waitaki GXP (supplied from Meridian 11kV generator bus)	11/33kV	24 MVA	10.5 MW	15.8 GWh	3
Twizel GXP	220/33kV	20 MVA	3.2 MW	12.65 GWh	3*
* Includes Ruataniwha, which is a large customer substation feeding directly from the subtransmission system at 33kV.					

Table 8 Characteristics of NWL Grid Exit Points as at 10 March 2016

It should be noted that Waitaki GXP has recently been upgraded from 5.5MVA capacity to 25MVA capacity, and the Energy throughput figures in the table above are based on pre-upgrade configuration.

A 33kV sub-transmission network connects the GXPs to our zone substations. The 33kV sub-transmission network is predominantly overhead construction, apart from a few short cable sections. The total route length of the sub-transmission network is 166km, of which 5km is underground cable

2.6 Our Assets

Key features of the network are shown in Table 9 :

Parameter	Value
Length of 33kV lines and cables	209 km
Length of 11kV lines and cables	1426 km
Length of LV lines and cables	335 km
Number of zone substations	15
Number of connected consumers	12554
Coincident max demand	57 MW

Table 9 Key features of NWL Network

These assets are discussed in more detail in Section 5 Renewals and Maintenance

3. Service Levels

This chapter outlines our stakeholder engagement; our service levels objectives, initiatives, measures, and targets. It also provides context for our Service Level measures and targets by providing information on our historical performance. The Service Levels outlined in this AMP reflect our Mission of owning and operating a safe, reliable, and efficient distribution system. This chapter is structured as follows:

- **Stakeholder Engagement:** provides an overview of how we interact with our stakeholders, identify their requirements, and how those requirements are incorporated into our asset management processes.
- **Safety Measures and Targets:** describes our safety objectives, initiatives, measures, and targets.
- **Consumer Oriented Measures and Targets:** describes our reliability objectives, initiatives, measures, and targets.
- **Asset Performance and Efficiency Measures and Targets:** describes our network performance and efficiency objectives, initiatives, measures, and targets.
- **Performance against Measures and Targets:** provides details of our historical performance to provide context for the Service Level targets we have set for this AMP.

3.1 Stakeholder Engagement

As illustrated in section 2.3 we have many stakeholders with varying requirements. We identify our stakeholder requirements through consumer surveys, face to face interviews with major consumers, and participation in industry forums and conferences. We also participate in consultations on statutory and regulatory changes and Regional and District Plans. Stakeholder requirements are incorporated into our asset management planning processes through our safety initiatives, service level measures and targets, Network Development Plans and Asset Fleet Management processes.

3.1.1 Consumer Surveys

We undertake regular representative surveys to enable a better understanding of the electricity priorities. The most recent survey was done in February 2015. In that survey, 400 mass market consumers were interviewed by telephone. The survey respondents were selected randomly from our full consumer database. 70% of the respondents were Urban and 30% were Rural, which corresponds with our overall Urban to Rural mix.

At the same time we conducted face to face interviews with 14 of our major consumers, picked at random from a sample of our top 25 users by volume of electricity used. This survey had representative respondents from large industrial, commercial, and farming (mostly irrigation and dairy farming operations) users.

The key findings from the surveys were:

- The service attributes most highly valued by consumers are “keeping the power on” and “getting the power back on if it goes off”;

- The vast majority of respondents who had experienced unexpected outages indicated that supply had been restored within an acceptable timeframe; and
- The vast majority of respondents indicated that they would prefer to pay the same as they are now in return for a similar level of service.

We have used these key findings to inform our asset management practices, investment plans and service level measures and targets.

3.2 Service Level: Safety

We are committed to ensuring that our network remains safe at all times and seek to mitigate the potential which could result from any health and safety incidents. To facilitate this, we are focused on enhancing and developing a positive safety environment for staff and the public. Policies, procedures and staff training have been reviewed and undertaken. This initiative is ongoing and improvement is continuous.

We have implemented a Public Safety Management System where all known hazards and risks to the public are documented, along with the controls used to resolve them (eliminate, or minimise the hazard or likelihood of it occurring). This is an accredited system and is audited annually by an accredited external auditor. The outcomes of the audit process are analysed by our staff to make improvements to the system and how we use it.

3.2.1 Health and Safety Objectives

Our overall objective is that staff, workers, the public, and their property are safe and free from harm due to the operation of our business. We will not compromise the health or safety of our staff, workers, the public or property. In summary, our safety objectives are:

- That safety is a top priority in all aspects of our business;
- The promotion of a health and safety culture amongst all of our staff and workers;
- Staff, workers and the public are not harmed due to the operation of our business; and
- Any identified health and safety hazard is assessed for risk, prioritised and mitigated as soon as possible.

3.2.2 Initiatives

In order to achieve our objectives, we have undertaken the following initiatives:

- To raise public awareness of the hazards associated with working or playing in the proximity of electricity reticulation assets, we have employed newspaper and radio safety advertisements;
- All known hazards and risks to the public are documented by staff in our Public Safety Management System as they are discovered, along with the actions taken to resolve them;
- The instigation of reporting and monitoring of near miss incidents. Staff are encouraged to report near miss incidents with the purpose of identifying cause, mitigating risk, and learning. To facilitate this we have adopted the Incident Cause Analysis Method (ICAM) system for incident investigation;

- The installation of the Vault Safety Management system for recording and analysing workplace safety and training data;
- Involvement in the EEA Safety Climate Project, “Orange Umbrella”;
- Wide ranging staff involvement on our Health and Safety committee;
- Involvement in community safety initiatives such as Safer Waitaki;
- Introduction of vehicle training for staff in 4WD and 2WD vehicles;
- We regularly review our safety policies, procedures, and staff training so that they are continuously improved;
- Improvements in the type of Personal Protective Equipment (PPE) used by staff to improve comfort in the field, such as using climbing helmets for construction crews rather than ordinary hard hats;
- Providing incentives to staff to encourage them to submit ideas that improve the safety of network operations;
- Trialling the use of HD digital cameras to reduce the amount of pole climbing that inspection crews have to carry out;
- Installing GPS tracking systems with “man-down” functionality in all vehicles; and
- Coordination with neighbouring EDBs to align safety procedures where possible.

3.2.3 Measures and Targets

Tracking our safety performance is a focus of our operation. We track a number of safety metrics and indicators, including the following:

- Monitoring of staff safety behaviours for compliance with targets, e.g.
    - number of safety observances or site audits (leading indicators);
    - lost time injuries, near misses, plant damage or environmental incidents (lagging indicators);
- Monitoring indicators of organisational safety behaviours, such as:
    - the number of times staff have worked to the stage where they need to stand down (leading indicators);
    - the amount of sick leave and ACC hours taken across the whole company (lagging indicators);
- Monitoring the number of incidents and accidents on our network involving the public ;
- Annual accreditation to NZS7901:2008 for our Public Safety Management System – using Telarc as independent auditors; and
- Monitoring mitigation of specific risks such as the removal of red tag poles from the network.

Our targets for safety performance are:

- Zero lost time injuries per annum;
- Monitor the number of reported public incidents compared against network expansion to ensure a downward trend;
- Reduce the number of deliberate or unsafe acts by the public from year to year;
- Zero privately owned HV service lines disconnected for safety;
- Carry out at least 25 safety audits on work sites per year.

3.3 Service Level: Reliability

Reliability of our network is of utmost importance to us and to our consumers. Our consumer surveys have revealed that the service attributes most highly valued by consumers are “keeping the power on” and “getting the power back on if it goes off”.

3.3.1 Objectives

An important part of our corporate mission and objectives is to operate a reliable and efficient distribution network. Results from our surveys tell us that most of our consumers have expressed a preference for similar levels of reliability to what they receive now. Hence our objective is to retain the same levels of reliability over the term of this AMP as we currently provide and minimise outages to as short a time as possible.

3.3.2 Initiatives

We will meet our reliability objectives by:

- Deploying automated and remotely controlled devices, such as reclosers, sectionalisers, and tie-switches to limit the number of consumers affected by faults;
- Building ties between neighbouring spurs to form open rings as load growth makes this economically viable. This strategy enables adjacent feeders to provide back-up capacity during planned or unplanned outages;
- Leveraging subtransmission developments that are driven by load growth to increase the number of zone substations with supplies available from alternative GXPs;
- Utilising live line techniques where possible;
- Monitoring, analysing, and benchmarking service level performance and reacting quickly when adverse trends appear; and
- Examining network performance after major events such as snow storms to gain insight in to Asset Management changes that may improve performance. Despite the fact that these events are normalised out of the SAIDI and SAIFI statistics we realise that they do have an impact on consumers, and aim to improve our resiliency against them.

3.3.3 Measures and Targets

The two indicators we use to monitor the reliability of our network are the industry performance measures of System Average Interruption Duration Index (SAIDI) and System Average Interruption Frequency Index (SAIFI). SAIDI is the accumulated total time that the average consumer connected to the network will be without supply in any measurement year as a result of faults and planned outages on our network. The units are in minutes. SAIFI is the total number of supply interruptions that the average consumer connected to the network will experience in a measurement year as a result of faults and planned outages on the network. The units are outages per consumer per year. It should be noted that, while an individual consumer can only experience a whole number of outages, the target is set as a real number to allow for the effect of averaging.

In our view SAIDI and SAIFI effectively measure the extent to which we are able to achieve our objectives of supplying a safe, reliable, and efficient electricity supply to our consumers. SAIDI and SAIFI are also used by the Commission for setting a quality threshold which it uses to determine

whether the EDBs that it regulates are performing to an acceptable standard. As a consumer owned EDB we are exempt from this default price-quality path regulation, however we believe that it makes good sense to use the same methodology used for regulated EDBs.

In line with the approach taken by the Commission, our SAIDI and SAIFI targets are normalised. Normalisation is designed to exclude the impact of events (such as extreme weather event or interruptions due to an outage on the Transpower network) that are outside our reasonable control. We believe that setting targets using normalised measures will provide a better indication of the success of our asset management strategies by limiting the extent to which events outside our control impact on our measured performance.

Our normalised and weighted SAIDI and SAIFI targets for this AMP period are detailed in Table 10 below.

Service Level Target	YE 2017 Target	YE 2018 Target	YE 2019 Target	YE 2020 Target	YE 2021 Target
SAIDI	116.50	116.50	116.50	116.50	116.50
SAIFI	1.54	1.54	1.54	1.54	1.54

Table 10 NWL SAIDI and SAIFI Targets

Our SAIDI results are affected by the length of time it takes us to restore power from an unplanned outage. While keeping safety paramount, we are committed to restoring power to our consumers as soon as possible should an unplanned outage occur. Our restoration time targets are shown in Table 11 below.

Consumer type	Maximum time to restore power	Maximum number of power interruptions
Urban	6 hours	4 events per annum
Rural	10 hours	10 events per annum
Remote Rural	12 hours	20 events per annum

Table 11 Restoration Time Targets

3.4 Service Level: Economic Efficiency

As well as delivering supply reliably, there is a need to ensure consumers are supplied in an economically efficient and cost effective manner. We use a number of measures to understand whether our asset investment strategies are delivering efficient outcomes. The measures reflect the effectiveness with which we manage our asset base for the benefit of electricity consumers in the region.

3.4.1 Objectives

We have two economic efficiency objectives. These are to:

- Minimise energy losses on our network. Energy loss is the percentage difference between the energy coming into the network and the energy being delivered out of it. Loss ratio

compares Electricity Retailer sales declarations with units recorded by the various GXPs and exported from Distributed Generation (DG) installations; and

- Effectively utilise current assets and manage operating costs to minimise the overall supply costs to our consumers.

3.4.2 Initiatives

To meet our Economic Efficiency measures and targets we:

- Have moved load between GXPs and have constructed a 66kV subtransmission network to improve the efficiency of energy transmission to consumers;
- Have improved operational efficiency by amalgamating our previously separate contracting team back into the parent company;
- Will continually improve our Works delivery model and processes;
- Will investigate new technology options for improved performance; and
- Actively manage capacity and asset utilisation, and balance equipment loadings where an under or over use becomes apparent.

3.4.3 Measures and Targets

The three economic efficiency measures and targets we employ are network loss ratio, distribution transformer capacity utilisation, and operational expenditure per connection point.

3.4.3.1 Loss Ratio

Loss ratio is a measure of the amount of energy that is consumed in losses compared to the total energy consumed in the network. We consider loss ratio to be a valid performance measurement indicator as the minimisation of losses benefits all parties in the energy supply chain, including consumers. Energy losses on the network can be reduced through the design, asset selection and operation of the network. The target levels chosen are consistent with the long run average past performance.

Service Level Target	YE 2017 Target	YE 2018 Target	YE 2019 Target	YE 2020 Target	YE 2021 Target
Loss Ratio	6%	6%	6%	6%	6%

Table 12 Loss Ratio Target Levels

3.4.3.2 Distribution Transformer Capacity Utilisation.

This is an indicator of the efficient use of network equipment. Distribution Transformer Utilisation is calculated based on the coincident maximum demand versus the installed capacity of all distribution transformers. Typically some level of under-utilisation is expected due to the fact that transformers can only be purchased in certain sizes and are generally selected such that the capacity exceeds the estimated after diversity maximum demand. Tracking this statistic also ties into our asset management objective of ensuring all asset lifecycle activities, plans and associated costs are systematically planned with a long-term view towards minimising lifecycle costs. If higher transformer utilisation can be achieved, or at least the same level can be maintained over time, then

fewer transformers will need to be replaced when the time comes to replace them when they reach the end of their lifecycle. The target levels are consistent with the load demographics of our network, the quantity of controllable load, the high level of seasonal supplies, and past performance.

Service Level Target	YE 2017 Target	YE 2018 Target	YE 2019 Target	YE 2020 Target	YE 2021 Target
Distribution Transformer Capacity Utilisation	27%	27%	27%	27%	27%

Table 13 Transformer Capacity Utilisation Targets

We believe that our target for transformer capacity utilisation reflects the predominately rural nature of most of our network, where the opportunities for connection of multiple ICPs to a single transformer are rare.

3.4.3.3 Opex costs per Connection Point.

This measure provides an understanding as to whether operating expenditures are appropriate and efficient given the operating parameters of our company. The target levels chosen are consistent with the performance of peer EDBs.

Service Level Target	YE 2017 Target	YE 2018 Target	YE 2019 Target	YE 2020 Target	YE 2021 Target
OPEX per Connection Point	$290.00	$290.00	$290.00	$290.00	$290.00

Table 14 Operational Expenditure per Connection Point

3.5 Performance against Measures and Targets

This section provides the context for the measures and targets by linking our historical performance to our expected performance. Due to our continuous improvement initiatives, some of the measures and targets outlined in this AMP are new and accordingly there is no applicable historical data.

3.5.1 Safety Service Levels

Historically measurement of safety performance has focussed on lost time injuries and incidents reported. These are lagging indicators, and while they are of some use, they are not as effective as leading indicators at improving safety outcomes.

An example of this is to follow the trend of public incidents and accidents on our network, as shown in Table 15 below.

Summary of Electrical Accidents and Incidents Involving the Public							
Activities	2009	2010	2011	2012	2013	2014	2015
Rural Farming	13	9	10	9	17	19	19
Construction and Trades	9	10	11	12	8	18	9
Leisure, Sports and Consumer/Residential	17	13	10	6	8	1	9

Vandalism	1	4	4	2		1	
Motor Vehicles	14	13	9	13	13	13	19
Total	54	49	49	42	46	52	56

Table 15 Public Incidents and Accidents

As can be seen from the historical figures, the number of incidents involving the public has increased since 2012. When compared against the target of reducing the ratio of incidents to load growth, the trend is downwards, although it should be noted that we are working to reduce this to the minimum we can achieve.

Actions taken to address this issue include:

- Increasing the use of print advertising to raise public awareness around the hazards of electricity;
- Engaging directly with contractors to discuss the hazards and processes of working around electricity network equipment; and
- Streamlining permitting processes for close approach for contractors such as tree trimmers, to encourage voluntary use of the safety systems available.

Moving our safety management systems from traditional spreadsheet/access database based systems to a fit for purpose system (the Vault Safety Management System) has provided better opportunities for monitoring our performance.

Assuring that our public safety management system conforms to the New Zealand standard NZS 7901:2008 is an annual exercise carried out in conjunction with Telarc. This accreditation was continued in 2015 with a satisfactory audit resulting in no Unattained or Critical Partially Attained issues. Any items raised as Partially Attained or Opportunities for Improvement are corrected as soon as possible.

With the introduction of the Vault Safety Management System, recording of our safety performance against targets is simplified. A Health and Safety report is tabled and discussed at each monthly Board meeting, and includes performance figures against our goals. Table 16 is an example of the detail supplied in this reporting:

Network Waitaki Group Health & Safety Report	COMBINED MONTH	COMBINED YTD
SAFETY:		
Lost Time	0	3
Medical Treatment	0	1
First Aid	1	4
Discomfort, Pain, Injury	0	9
Total Recordable Injuries	**1**	**17**
PLANT DAMAGE & NEAR MISSES:		
Near Miss	0	4
Vehicle Damage	2	20
Equipment Damage	0	18
Environment Incidents	0	0
SAFETY OBSERVANCES:	27	303
SAFETY AUDITS:	2	12
FIELD VISITS:	4	4
RED TAG POLES: Not Replaced after 3 Months		
HUMAN RESOURCES:		
Stand down after 13hrs	1	8
Stand Down after 70hrs	0	4
Sick Leave Taken hrs	100	1670
ACC Hours Used	0	99

Table 16 Executive Summary of Safety Performance

We have achieved our target of reducing unauthorised access to our network – there were no unauthorised accesses in the last year. We believe this shows that our site security and public awareness programs are successful.

No HV service lines were disconnected for safety reasons in the last year, which meets our safety target for this metric. This indicates that the safety audit program that we operate for these lines is successful.

26 work site audits were carried out during the last year, which met our target for work site inspections. This reflects the high level of staff engagement in maintaining a safe work environment.

The number of lost time incidents for the 12 months to March 2016 is 3. This has not met our target for performance, but it should be noted that the use of LTI's as a safety metric is falling out of favour as a useful tool in a mature health and safety culture. We are considering replacing the use of LTI's with other positive indicators that will achieve our outcome of maintaining a safe work environment.

3.5.2 Reliability Service Levels

Our historical SAIDI and SAIFI performance data is shown in Table 17. The performance levels shown exclude the impact of Transpower outages, and have been normalised for major event days.

Year	SAIDI (Actual)	SAIDI (Normalised)	SAIDI Target	SAIFI (Actual)	SAIFI (Normalised)	SAIFI target
2006/07	505.55	124.17	100.00	3.32	1.08	1.39
2007/08	94.67	76.01	100.00	2.10	0.86	1.39
2008/09	69.36	59.29	100.00	1.07	0.75	1.39
2009/10	64.29	64.28	100.00	1.46	0.90	1.39
2010/11	61.33	61.33	90.00	0.82	0.79	1.7
2011/12	50.85	50.85	81.07	0.95	0.65	0.9
2012/13	56.20	54.73	116.50	1.51	1.41	1.54
2013/14	95.13	81.40	116.50	1.65	1.31	1.54
2014/15	51.10	50.8	116.50	1.10	1.09	1.54
2015/16 YTD (January 2016)	168.68	104.65	116.50	1.28	0.76	1.54

Table 17 Historical Performance for Consumer Service Levels

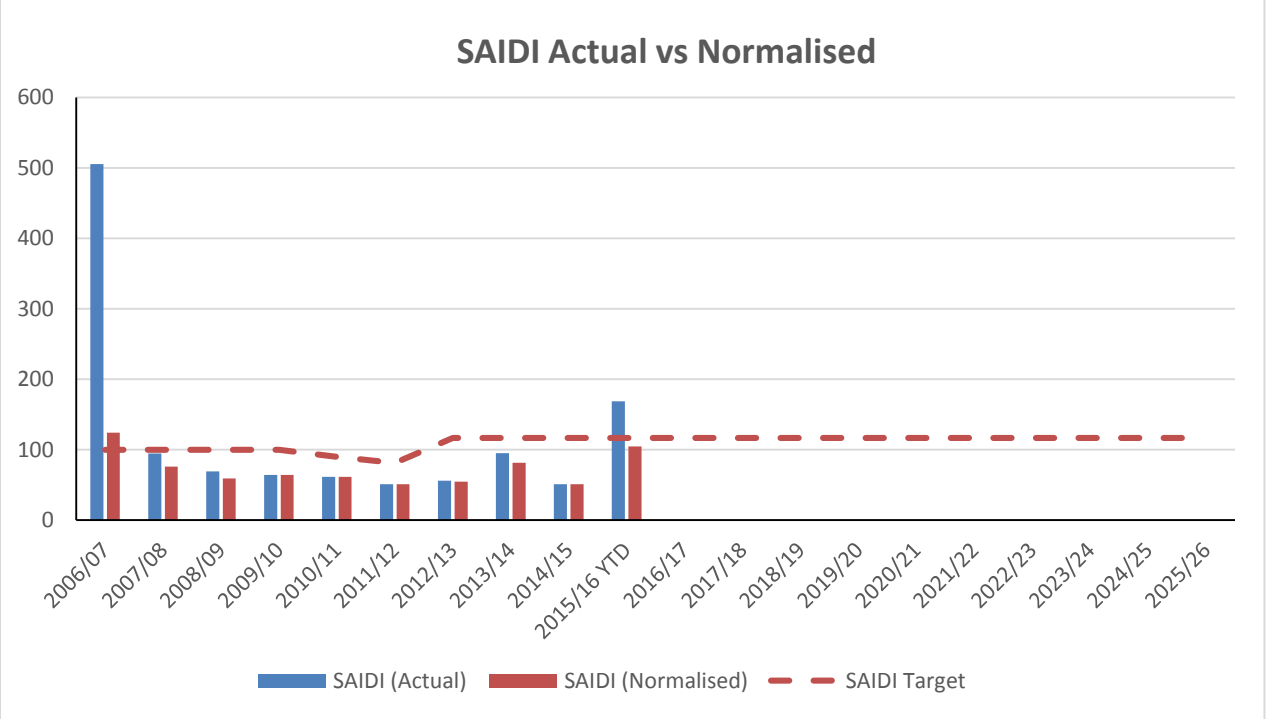


Figure 8 Historical SAIDI Performance Compared to Target

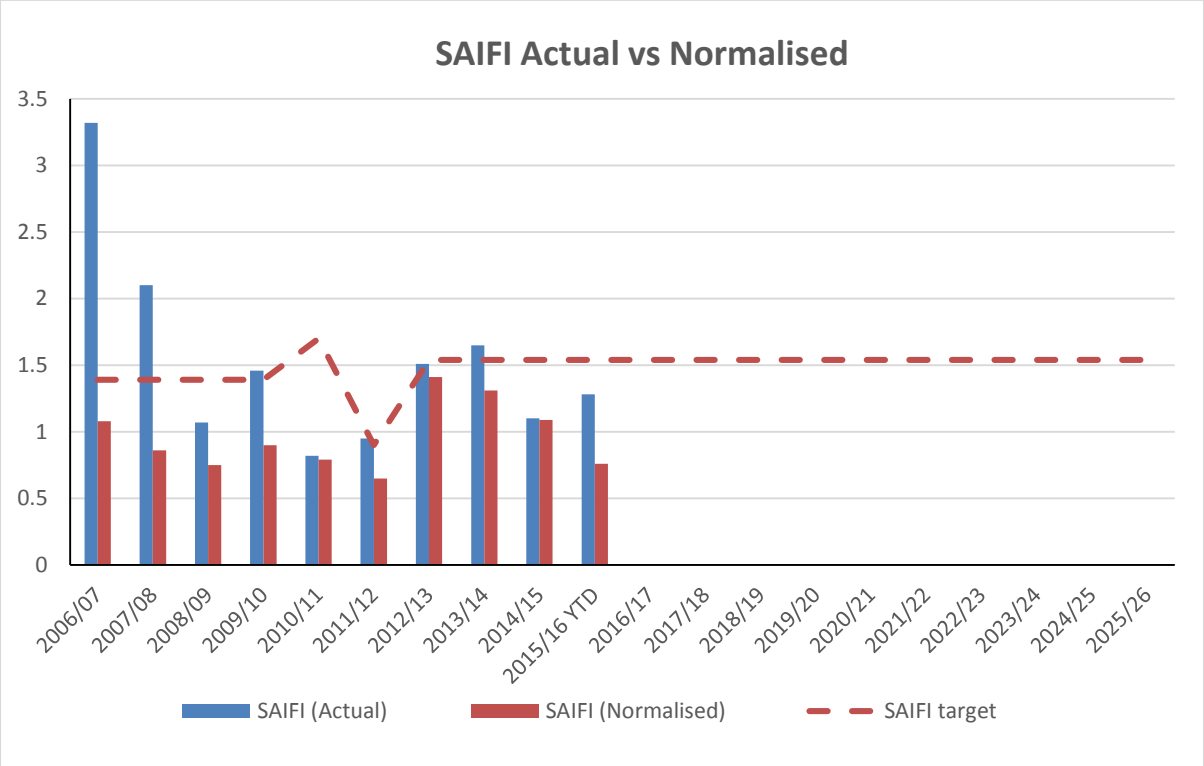


Figure 9 Historical SAIFI Performance compared to target

As can be seen from the graphs, over the last few years the normalised performance of the network in both SAIDI and SAIFI is better than our targets. We have undertaken a lot of work to address reliability and resilience, and it is likely that programs such as vegetation management and installing sectionalisers are improving the performance of the network. Further analysis of future data will help confirm this, and if this trend is clear, it may lead to a reduction in SAIDI and SAIFI targets.

The normalised SAIDI figures for the 2015/16 year to date are looking to be closer to our SAIDI target than previous years in part because of a major snow storm that affected the Western part of our network in 2015. Although the normalisation process helped mitigate the impact of this on the SAIDI figure, it still had an effect on the measure. An extensive review into the performance of the network was carried out by the Network Manager. The findings of this review will direct operational changes in areas that may help the network in future events.

This year's SAIDI and SAIFI figures have also been affected by some of the major construction projects that have been undertaken. The nature of these large projects (such as the 66kV line from Kurow to Duntroon) means that we have had more planned outages than in some previous years.

We believe that this indicates the SAIDI and SAIFI targets that we have set are realistic and provide a good target for the operation of our network.

3.5.3 Economic Efficiency Service Levels

The Economic Efficiency targets are justified as follows:

3.5.4 Loss Ratio

Tracking this statistic also ties into the AMP objective of linking asset management processes to consumer preferences for prices. Figure 10 below illustrates the historic performance for Loss Ratio, and shows the target levels for the planning period.

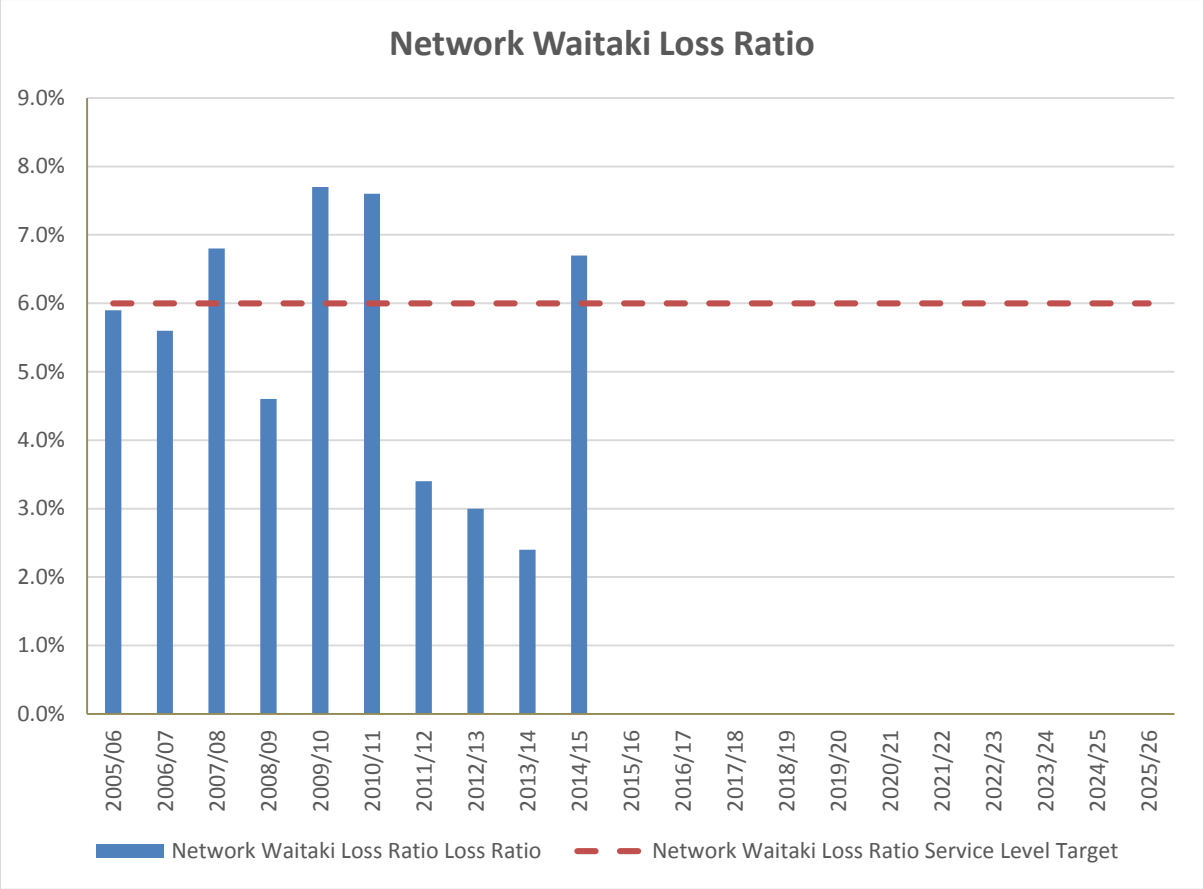


Figure 10 Historical performance of Loss Ratio compared to our future targets

Our calculated loss ratio for 2014/15 is slightly higher than our target. This is not of particular concern, since this measure is based on information supplied by retailers on our network and historically there is a high degree of uncertainty about the final figures. If there are any errors in the information from the retailers the loss ratio will be incorrect, as is the case for the figures for 2011-2014 in the graph above.

3.5.5 Distribution Transformer Utilisation Capacity

We have changed from a winter to summer peaking network in a relatively short period of time and we have a large number of transformers that supply summer irrigation loads. However, the majority of connections comprise small to medium residential and commercial supplies which are winter peaking. Having diverse groups of highly seasonal load where peak demands occur at different times of the year contributes to the low capacity utilisation factor. We also have a significant level of controllable load which is used to reduce the peak system demand which in turn reduces the transformer utilisation ratio. It is unlikely that the utilisation factor will move much in the period of this plan.

Figure 11 below illustrates our historical transformer capacity utilisation performance.

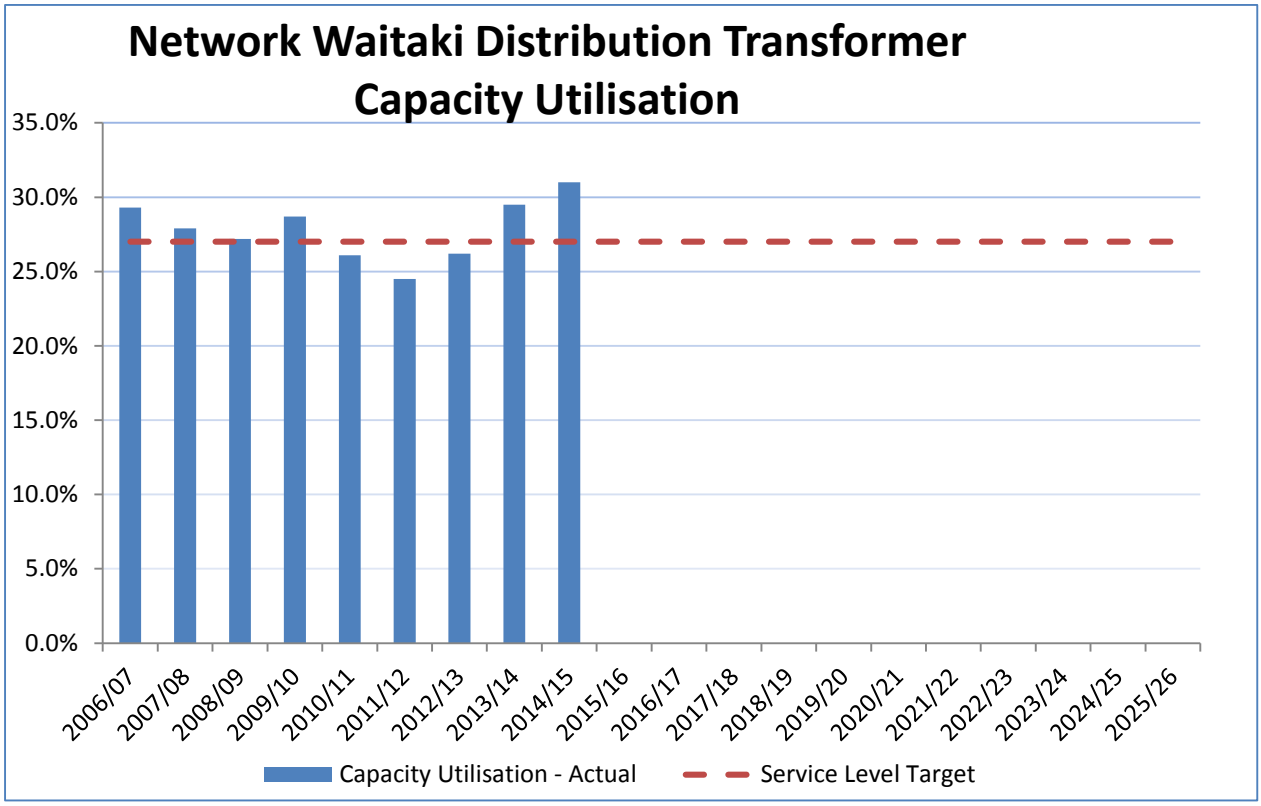


Figure 11 Historical performance of Distribution Transformer capacity utilisation compared to our future targets

Our transformer utilisation is on par with the utilisation of similar networks. It has increased over the last few years, which is at least in part due to the nature of much of the new irrigation load, where the pump motor demand is closer to installed transformer capacity.

3.5.6 Operational Expenditure per Connection Point

Tracking this measure links our asset management processes to consumer and stakeholder preferences for supply reliability. A constant level of operational expenditure per connection point is a good indication that there is an adequate level of maintenance being conducted in order to maintain overall system reliability. Figure 12 below illustrates the historical performance of our Operational Expenditure per Connection Point compared to our future targets.

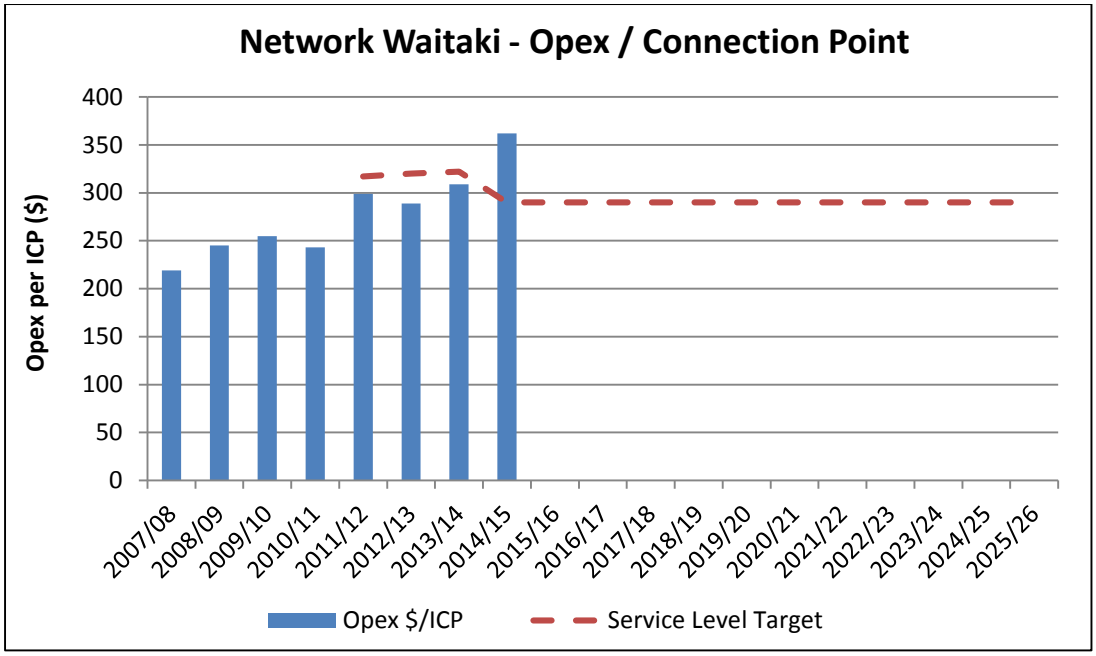


Figure 12 Historical performance of our Operational Expenditure per Connection Point compared to our future targets.

It should be noted that despite the clear upwards trend in Opex spend per ICP for 2014/15, the operational expenditure for 2014/15 was only 3% higher than approved budget. The reasons for the increase may include:

- Increasing costs of contracting operations, including equipment and training, that must be recovered in contracting rates;
- Increasing operational costs of support systems, such as financial packages, billing systems, asset management packages and GIS;
- Increased maintenance costs of aging network equipment; and
- Historic underspend in maintenance areas.

It should be noted that, adjusted for inflation, the average cost per ICP for the last 8 years is $292 which matches our target. We believe that our operational budgets are realistic to meet the performance targets that we have set, and that the performance in recent years reflects that our Opex spending patterns are more cyclic than linear. It is expected that our new asset management information system can help reduce the variability of Opex spend year to year.

4. Approach to Asset Management

This chapter outlines the approach that we take to managing our Network assets. It provides an outline of the key parts of the planning and the delivery areas of this discipline. This chapter is structured as follows:

- **Asset Management Process:** provides an overview of how we view Asset Management as a process, and provides detail of how key elements fit the process.
- **Asset Lifecycle Management:** describes how we approach the different aspects of the lifecycle of our assets, including initial investment, ongoing maintenance and refurbishment, and how we make decisions on asset investment.
- **Risk Management Framework:** describes how we apply Risk Management to our business, especially around the treatment of assets.
- **Public Safety Management, High Impact Low Probability Events and Emergency Response Policies and Contingency Plans:** these sections outline processes that we use to manage keeping our network safe for the public, and how we manage our preparedness for major events.
- **Asset Management Maturity:** this section reflects on how mature we believe our asset management processes are, specifically using the Commission's AMMAT system for analysis.
- **Improvement Initiatives/Continuous Improvement:** this sections outlines the ways in which we are working to improve our asset management capability.

4.1 Asset Management Process

The process that we apply to planning our Asset Management is illustrated in Figure 13 below.

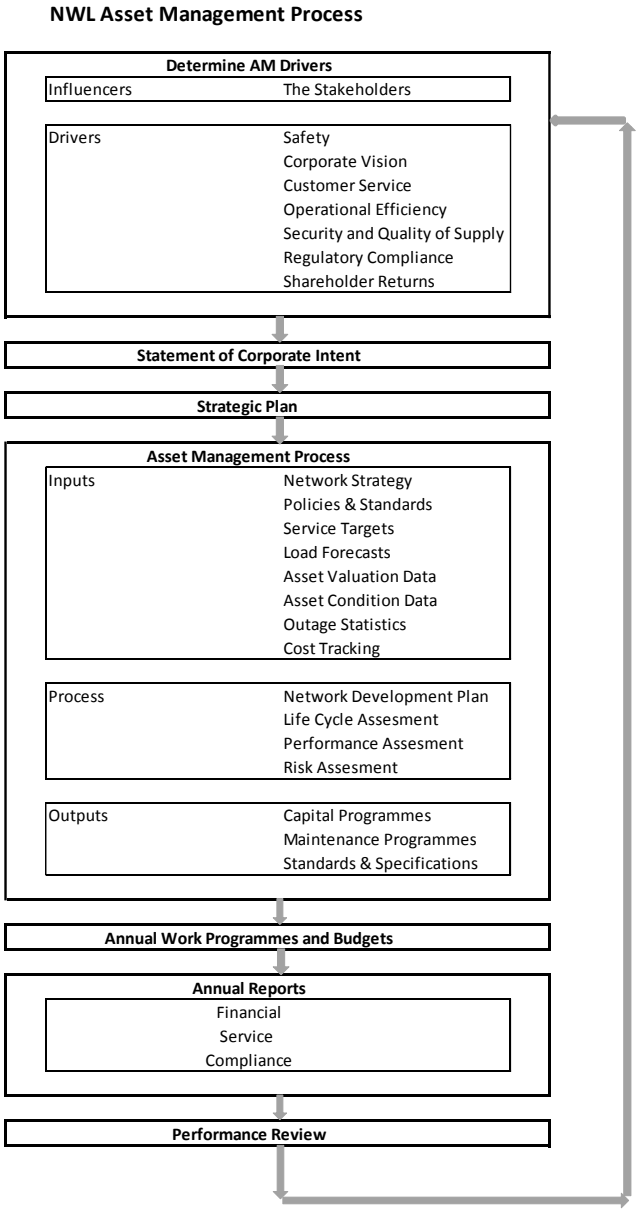


Figure 13 NWL Asset Management Process

The planning process should be viewed as a continuous cycle rather than a hierarchy of documents. Details of some of the key components of this process are described below.

4.1.1 Asset Management Policy

The purpose of our Asset Management Policy is to ensure that our asset management activities occur within a structured and systematic framework. This framework provides a focus on delivering a safe, reliable, secure, resilient, and cost effective supply of electricity that meets the performance expectations of our consumers, while complying with all relevant New Zealand laws, regulations, and codes of practice.

4.1.2 Asset Management Strategy

Our asset management strategy is to ensure that our asset management practices continue to deliver agreed service levels as set out in this AMP at minimum long term cost.

Our Asset Management Strategy aligns with our asset management policy and corporate objectives, it encompasses the components listed below.

4.1.2.1 Asset Configuration

The following strategies are applied to our consideration of asset configuration:

- We will take a long term view of asset requirements, noting that consumers ultimately benefit from well planned investments;
- We will construct all future subtransmission lines at either 66 kV or 33 kV, depending on location, in line with its subtransmission development strategy, with the expectation of operating at 33 kV in the short-term;
- When building new substations we will purchase sufficient land to enable dual transformer 66 kV substations to be built; and
- We will consider using portable or semi-portable generators to meet security of supply standards. When installing new, or upgrading existing, distribution boxes, consideration will be given to installing generator connection plugs to enable quick and easy connection of portable generators.

4.1.2.2 Resourcing

The key strategies applied to resourcing for our company are:

- We will identify the required skill sets needed for effective asset management and have a well-developed recruitment and training plan in place;
- We will retain our internal contracting business for fault restoration, maintenance, inspections, and growth and renewal work;
- We will ensure that our contracting business has a well-developed recruitment and training plan;
- We will continue to engage suitable contractors to maintain our communications and SCADA networks, and other specialist trades; and
- We will continue to engage suitable consultants for specialist work including civil design, protection, and regulatory advice.

4.1.2.3 Materials

We recognise that decisions made around material selection for construction projects can have long term implications on capital and operational expenditure. We apply the following principles to purchasing decisions:

- We will use only materials and equipment approved by our internal policies and standards, or by specific design where necessary; and
- In assessing offers to supply materials or equipment, we shall consider the total life cycle costs of the offer.

4.1.2.4 Delivery of Works Programme

With approved budgets available, our engineering staff begin to prepare work packs for projects in the financial year prior to the works programme. This allows a seamless planning process between our engineers and our contracting team, and any external contractors.

This also provides opportunities to order long lead material items so that they can arrive earlier in the financial year.

Progress against the works programme is monitored by the Engineering and Contracting managers and their teams throughout the year, with careful attention paid to the resourcing and prioritisation of work.

This can be challenging, especially in a year where weather related faults and consumer work may take priority over planned work. Where it becomes obvious that a particular piece of work may not be completed before the end of the financial year in which it was issued, that work will be reassessed and may be either:

- reissued with the same priority the following year;
- Given a higher priority, thereby "bumping" another job; or
- Removed from the work programme.

This last situation is uncommon, and usually only occurs when the job analysis indicates that in the time since the job was issued the original job has been superseded by another job, e.g. a job to paint a distribution transformer is made irrelevant by a project to replace the transformer with a larger one because of growth.

4.1.2.5 Performance Reporting for Asset Management

We believe that the asset management of our network should be implemented in an open and transparent manner. The key formal reporting mechanisms that we employ are shown in Table 18.

Reporting line	Reporting mechanisms and content
Trust to consumers and wider community	Trust's AGM. Trust's annual report and audited accounts. The company website includes the AMP, Company Annual Report, and other disclosure documents.
Board to Trust	Company annual report, includes Chairman and Chief Executives' statements and audited accounts. Annual information disclosure. Quarterly presentation includes financial and operational performance.

Reporting line	Reporting mechanisms and content
Chief Executive to Board	Chief Executive's statement in company annual report includes narrative of year's highlights. Monthly board report includes progress on significant Capital projects and major outages. Email updates between meetings on significant developments.
Network Manager to Chief Executive and Board	Annual report on budget and major projects Monthly report includes year to date performance and progress against budget. Individual reports on major projects. Daily updates on areas of concern
Internal contractor to Operations Manager	Weekly progress meeting Monthly meetings on progress to budget
Internal and External contractors to Project Engineer	Regular progress meetings on individual projects

Table 18 Key Asset Management Reporting Mechanisms

4.1.3 The Asset Management Plan

This AMP provides a summary of the information contained in these internal planning documents, to enable stakeholders to assess our asset management practices. Our AMP is also the main document for communicating our asset management practices and planning processes to our stakeholders.

In particular, the objectives of this AMP are to:

- Link the asset management processes to consumer and stakeholder preferences for prices, supply reliability, and public safety;
- Ensure that all asset lifecycle activities, plans and associated costs are systematically planned with a long term view towards minimising lifecycle costs, which promotes productive efficiency; and
- Ensure that physical, commercial and regulatory risks are correctly managed throughout the life of the asset.

The AMP is written once the majority of the works programme for the following year has been planned, and the budgets required for that year, as well as any changes to the Network Development plan have been approved by the Board. This provides certainty to the stakeholders on the plans contained within the AMP.

4.2 Asset Lifecycle Management

Investment in the life cycle of assets in operation on our network falls into four categories:

- Planned Refurbishment Maintenance
- Planned Routine and Preventative Maintenance
- Unplanned Fault based Maintenance
- Capital Replacement

4.2.1 Planned Refurbishment

Planned refurbishments are undertaken to ensure network safety and reliability. This strategy uses the assets criticality, serviceability, safety, performance, economic viability, and the environmental consequences of failure to justify this expenditure. The key drivers that drive the refurbishment programme are age and condition of the assets. This is determined to a large extent from the routine inspections and preventative maintenance programme.

In certain circumstances we may choose to refurbish an asset according to the manufacturer's recommendations, or good industry practice. These refurbishment intervals are usually quite long (in the order of 10-25 years) or based on operational conditions (e.g. clearance of a certain number of high current faults).

We expect that refurbishment of an asset is not a regular occurrence, i.e. it may occur once or twice in the asset's life cycle. Refurbishment generally either increases an asset's expected operational life, or enhances it performance beyond what the previous capabilities were.

4.2.2 Planned Routine and Preventative Maintenance

We currently operate a time based inspection and preventative maintenance programme, where all assets are either maintained at regular intervals or inspected at regular intervals to identify defects such as wear and tear. The frequency of inspections is tailored to focus the highest scrutiny on our most critical assets, such as subtransmission systems. We are moving towards using more condition based maintenance planning, and the installation of our new Asset Management software will help with this initiative.

This sort of work may include cleaning and maintenance of a circuit breaker, or the retightening of bolts on a particular stretch of line.

Defects are presently managed on a standalone database. In the next year this process will change to having defects entered directly against the relevant network assets in the OneEnergy Asset Management system. This will allow better visibility of progress with rectifying defects, with integration of work packs, ongoing maintenance and fault costs per asset and better reporting.

4.2.3 Reactive Maintenance

Unplanned fault based maintenance not only includes responding to faults but also to near fault situations, and critical safety situations. Examples of critical safety situations include such things as disconnecting power to property which is on fire, or isolating a section of line for a car versus pole situation.

NWL operates a 24 hour fault service that provides prompt and effective response to faults, near faults, and emergency situations.

4.2.4 Capital Replacement

The primary driver for replacing assets versus repairing them is economic, where the discounted cost of on-going repairs exceeds the replacement cost, or the cost to refurbish or enhance the asset to meet new service criteria (e.g. capacity) is not economic. The other major drivers for replacement which may override taking the most economic course of action are where:

- The risk and consequences of failure of an asset warrant replacement;
- Removal of risk where an asset is unique in the fleet and may not have spares; and
- Where the performance of the asset is likely to be poor following repairs.

4.2.5 Development Options Available

Whenever a development of the network is required due to a constraint on the network, consideration is given to the options laid out in Table 19 as alternatives to investment in new assets.

Class of option	Description	Prudency	Efficiency	Remarks
Do Nothing	Connect new load without installing more capacity	No – a prudent operator would not allow utilisation of specific asset classes to be exceeded.	No – this is not dynamically efficient	
Non-Network	Restrict new load to off-peak periods	Yes – provided that customers understand the implication of off-peak supply, which may be aided by pricing incentives.	Yes – provided the usage of off peak power is energy efficient for the load in question	

Class of option	Description	Prudency	Efficiency	Remarks
	Cycle loads to reduce overall peak demand and to utilise energy at times of low use	Yes – as a short term measure non-critical loads could be cycled until a permanent solution is put in place.	Yes – can utilise existing assets to transport more energy units over a given period	Load controlling irrigation pumps over 30kVA allows the connection of new load with minimal disruption. Load control of hot water load is encouraged for new consumers
	Install special protection schemes to shed load for contingent events	Yes – allows connection of load that would otherwise require large, uneconomic investment	Yes – utilises existing assets to a higher level than would be acceptable otherwise	
	Use of onsite generation, battery storage, etc.	Yes – DG is a valid option for consumers to consider when connecting load.	Yes – provided the mixture of technology is correct. For the majority of consumers the payback and efficiency of these systems is still too low to displace the network.	As DG becomes more common, developments will drive the viability of these systems closer to Network supply.
Network	Supply from upgraded 11kV with no subtransmission upgrades	Yes – provided that utilisation of critical equipment can be managed to minimise risk to the network.	No – not dynamically efficient. There is a point when the load in an area warrants higher voltage circuits.	

Class of option	Description	Prudency	Efficiency	Remarks
Network	Installation of distributed generation to remove constraint locally	Yes – provided the constraint is only during part of the daily load cycle, and the system performance can be modelled with confidence	No – DG of a size suitable for displacing traditional investment is generally Diesel, and not as efficient as distributed electricity	We have three diesel generators located in the network to help when a transmission constraint is in effect. One of these also improves the security of supply to the Oamaru town water supply.

Table 19 Options for dealing with Network Constraints

4.2.6 Investment Prioritisation

Prioritisation of network developments is done by assessing each of the proposed projects against a number of categories. Each category is given a weighting and the weighted sum of all the categories gives a total project score. The total score for each of the projects enables them to be ranked relative to each other.

The categories that the projects are assessed against are:

- Mitigation of identified health and safety hazards;
- Mitigation of identified environmental hazards;
- Conformance with legal and statutory requirements;
- Conformance with power supply quality standards;
- Conformance with network security standards;
- Conformance with network capacity requirements;
- Improvement in network reliability (consumer service levels); and
- Projected net cost-benefits.

The main constraint that determines where the cut-off point is for deciding which projects are included and which are not, is the available total budget.

4.2.7 Expenditure Approvals

Following on from this initial prioritisation process, a Sanction for Expenditure (SFE) is prepared for all high priority, high cost projects. The SFE will be presented to the board for approval.

The SFE details:

- The issue that the project is designed to address;
- The options that have been considered;
- The rationale for the chosen option;
- The financial benefits that will accrue from this project; and
- Any other benefits that will accrue from this project in terms of security, quality, consumer/community perception etc.

Our Board requires all requests for major capital funding to be supported by a SFE.

4.3 Risk Management Framework

Like all businesses, we face a wide range of risks. Some of those risks relate specifically to our network assets and the physical environment in which they are located, whilst other risks include business risks that all businesses face. Risk management is a fundamental part of good management practice, corporate governance, and it is pivotal to effective stewardship of our assets. Our approach to risk management ensures that it strengthens our asset management decision making and practices. We apply risk management in all our business activities, including policy development, business planning and change management. We adopt a systematic risk management process that is based on the international standard ISO 31000: 2009 – Risk management – Principles and guidelines (ISO 31000:2009).

Figure 14 below illustrates at a high level the process we have adopted.

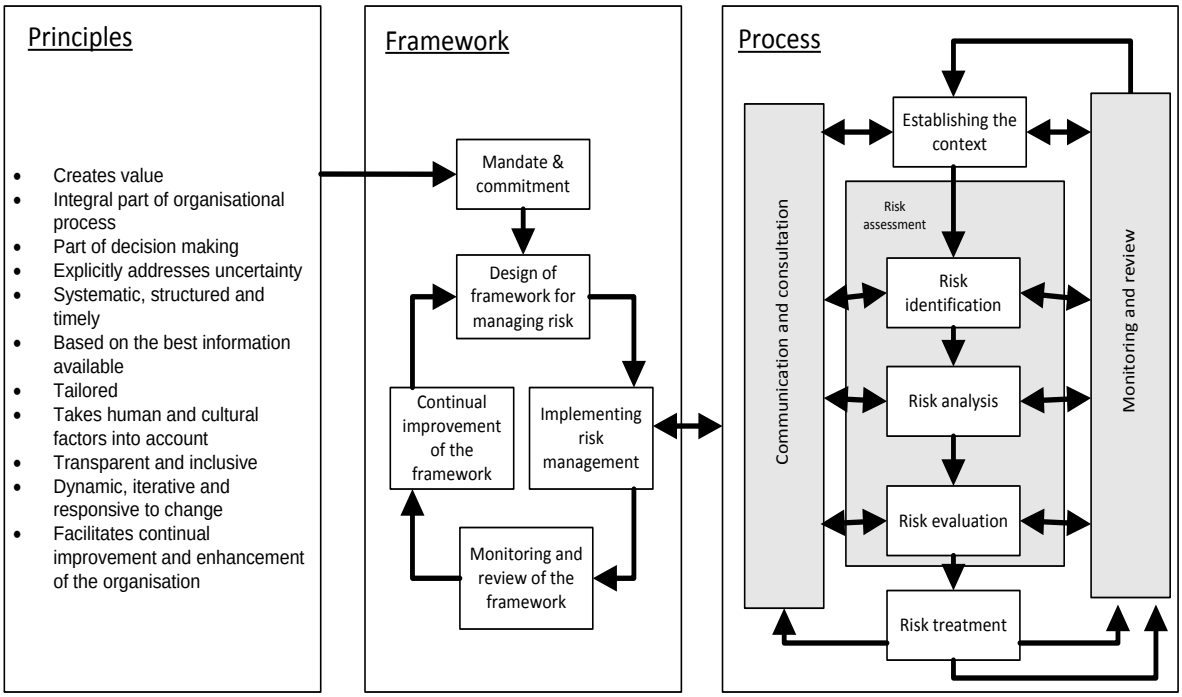


Figure 14 From ISO 3100:2009 Relationships between the risk management principles, framework and process

Our risk management consists of the following components:

- Specific Risk Management Policy
- NWL Risk Management Framework (Framework);

- Risk management process;
- Risk management plans;
- Risk registers; and
- Risk reporting.

4.3.1 Risk Management Policy

Our "Risk Management Policy" details the treatment of several specific risks identified by the network, namely:

- Capacity allocation for new consumer connections
- Capital investment for network security
- Specific equipment risks around catastrophic earthquakes
- Specific risks with Transpower's local network
- Environmental effects of oil filled equipment and noise pollution
- The need for coordination with Civil Defence Emergency Management planning

This is a prescriptive approach to providing a risk policy, which addresses specific threats rather than providing direction for a strong risk management system. This policy is out of step with the rest of the risk management system, and will be rewritten in the coming year to reflect a modern, fully integrated approach to risk management, as demonstrated in the other Risk management documentation.

4.3.2 Risk Management Framework

Our "Network Risk Management Framework" document defines the approach we take to manage risk within our business. It ensures that risk management is integrated into all aspects of our business including governance, strategic planning, operational planning and reporting.

4.3.3 Risk Management Process

Our risk management process ensures our risks are identified, understood and managed consistently across all levels of our business. We access our known risks in accordance with our likelihood and consequence criteria, to determine which risks need treatment and the priority for treatment.

Our risk management process involves the following steps:

1. **Establishing the context** in which we operate in. This involves understanding our business objectives and values, defining the internal and external environment which we operate in, and setting the scope and risk criteria for the remaining risk management process. We consider many factors including accessibility of our assets by the public, asset age, and location.
2. **Risk identification** is the process of identifying, recognising and describing our risks and the effect those risks have on the ability to achieve our objectives. Our risks are identified through operational processes including hazard identification recording in our Hazard Register by employees in the field, team and project meetings, our Health and Safety management process which includes recording and tracking workplace safety and training data into our Safety Management System, and our public safety processes.

3. **Risk analysis.** We use both qualitative and quantitative methods during the risk analysis stage. All our identified risks are analysed in terms of likelihood and consequence. The risk matrix we apply is shown in Figure 15 below.

RISK MATRIX

Measure of Consequence and/or Impact

	DESCRIPTION			
CONSEQUENCE	Injury/Illness	Property Damage/ Process Loss	Environmental	Business Impact / Public Perception
Noticeable	Minor Injury, (First Aid) Headache	Low financial loss (<$1,000)	On-site released contained within site	Isolated adverse local media reference Public complaints (telephone)
Important	All Medical Treatment Injury	Medium financial loss ($1,000 - $10,000)	On-site released not contained, no impact.	Repeated adverse local media coverage.
Moderate	All Injury/illness requiring light duties & All Lost Time Injuries.	High financial loss ($10,000 - $50,000)	Off-site release with minor detrimental effects.	Sustained adverse local and national media reference.
Major	Hospitalisation Permanently Disabling Injury.	Major financial loss ($50,000 - $250,000)	Off-site release with detrimental effects but no residual impact.	Forced shutdown Extended national adverse media coverage.
Catastrophic	Fatality	Huge financial loss (>$250,000)	Off-site release with detrimental effects and residual impact.	Business closure

Measure of Likelihood

Likelihood	Description	Quantification
Almost Certain	Is expected to occur in most circumstances	Once per month
Likely	Will probably occur in most circumstances	More than once per yea
Possible	Might occur at some time	At least once in 5 years
Unlikely	Could occur at some time	At least once in 10 years
Rare	May occur only in exceptional circumstances	Less than once in 20 years

Risk Rank

Likelihood	Consequences				
	Noticeable	Important	Moderate	Major	Catastrophic
Almost Certain	S (11)	S (16)	H (20)	H (23)	H (25)
Likely	M (7)	S (12)	S (17)	H (21)	H (24)
Possible	L (4)	M (8)	S (13)	H (18)	H (22)
Unlikely	L (2)	L (5)	M (9)	S (14)	H (19)
Rare	L (1)	L (3)	M (6)	S (10)	S (15)

Legend

Low	Low risk: managed by routine procedures
Moderate	Moderate risk: management responsibility must be specified
Serious	Serious risk: senior management attention required
High	Extreme risk: immediate action required by all concerned

Figure 15 Example of NWL Risk Assessment Matrix

4. **Risk evaluation.** All of our identified risks are evaluated against our likelihood and consequence risk score as illustrated in Figure 15 above. This assists us in our decision making to ascertain which risks need treatment and the priority for treatment implementation.
5. **Risk treatment.** We treat a risk depending on the risk score it has been allocated in the analysis and evaluation stage. Risk treatment involves selecting one or more options for modifying risks, and these can include the following:
    - Avoiding the risk by not commencing or continuing the activity;
    - Accepting or increasing risk in order to pursue an opportunity;
    - Removing the risk source;
    - Changing the likelihood;
    - Changing the consequences;
    - Sharing the risk with another party or parties (e.g. contracts and insurance); and
    - Retaining the risk by informed decision.
6. **Post treatment risk evaluation.** The risks are reassessed after the application of the treatment to verify that the post treatment level of risk is known and accepted by the company.
7. **Ongoing review of risks.** It is important that once a risk is recorded in the system it is regularly reviewed, as the likelihood and consequence can change.

4.3.4 Risk Management Plans

We currently employ joint safety assessments (JSA's) to apply a disciplined risk management approach to planning around the health and safety elements of a particular job. We will be leveraging off this work to develop complete Risk Management Plans for major projects, covering health and safety, financial, environmental and operating risks for a project. These plans will be developed and approved by the key stakeholders involved in the work in question, such as Engineers, managers, and contractors.

4.3.5 Risk Registers

Information from the risk management process is recorded, reported and monitored using our risk registers. There are multiple risk registers in service covering:

- Public Safety Management System
- Health and Safety risks
- Business planning risks
- Individual projects
- Physical risks for specific sites

As the use of the risk management system matures we are investigating the consolidation of these registers based on broad levels of access and focus. This will ensure that all site and project risks can be compared in one data source, while potentially sensitive information regarding business risk is maintained separately.

4.3.6 Risk reporting and monitoring

The monitoring of risks is generally carried out at the level of the risk register.

Risks related to Health and Safety are recorded in the Vault Safety Management System, which provides excellent reporting on the risks recorded in it. This includes such features as sending emails to staff who have been assigned to manage the risk, and tracking the progress of corrective actions, as well as providing reports summarising the risk items recorded. We have confidence that the monitoring and reporting processes in this area are robust and complete, with monthly reporting on risks in this area going to the board.

Other risks, such as project level performance and commercial risks are monitored by the staff managing the project itself, and would normally only be reported to management on an exception basis, if the risk became a real threat.

4.4 Public Safety Management System (PSMS)

As an infrastructure company, we strive to manage our assets in a way that residual risk is reduced to as low as reasonably practical. Our accredited PSMS documents all known hazards and risks to the public or their property, caused by the operation of our business. It records the actions to be taken or that have been taken to resolve of those risks. Our risks are identified through operational processes such as documentation by field staff, and team and project meetings. Our PSMS is an accredited system to NZS7901 and is audited annually by an external auditor (Telarc).

In February 2016 we received confirmation that our registration with Telarc would continue, following the latest audit.

4.5 High Impact, Low Probability Events (HILP)

We are subject to the risk of a number of potential HILP events, which could give rise to a major unplanned service outage for an extended period of time. Our exposure to such events is workshopped every few years to maintain currency of the planning, or whenever it is identified that there is a new or changed HILP risk. An example of this would be an assessment of Tsunami risks to our business that was carried out after the Fukushima earthquake in Japan.

HILP events can have a widespread impact, but would be incredibly expensive to avoid, if at all. Accordingly, we have a responsibility to plan and manage for HILP events as best we economically and practically are able to. Within this context, our policy is to ensure:

- a safe environment for staff, contractors and the wider community;
- the timely restoration of power supply as far as practicable;
- effective communication; and
- efficient provision of information tools for critical business activities.

Our critical business activities relate primarily to keeping our staff safe, protecting the public from harm to do with our assets, power security and reliability, consumer service, and quality of supply.

Events that could interrupt our critical business functions include natural disasters such as a large earthquake on the alpine fault, a tsunami, storm events (snow, wind, and floods), a dam failure at one of the dams on the Waitaki River, major critical asset failure; communications failure; and loss of supply from Transpower.

4.6 Emergency Response Policies and Contingency Plans

As an essential service provider, we have a responsibility to plan and prepare for HILP events. We have a suite of risk management and response documents and policies in place to ensure that power supply is restored in as minimum time as possible.

4.6.1 Lifeline Utility and Engineering Lifeline Groups

The Civil Defence and Emergency Management (CDEM) Act 2002 stipulates the responsibilities and roles of key organisations that provide an essential service within New Zealand. Our core business as an EDB is an essential service and under the CDEM Act we have been classified as a "Lifeline Utility." As such, we must:

- Ensure that we are able to function to the fullest possible extent, even though this may be at a reduced level, during and after an emergency;
- Have a plan for functioning during and after an emergency;
- Participate in CDEM strategic planning; and
- Provide technical advice on CDEM when required.

4.6.2 Civil Defence Plan

Under the CDEM Act 2002, Regional Councils are required to establish CDEM Groups. As a Lifeline Utility, we are required to establish planning and operational relationships with our local CDEM Group, which is the Otago Civil Defence Emergency Management Group (Otago CDEM Group). We participate in the development of their plans and provide technical advice as requested. We participate in regular role play scenarios and other exercises organized by Otago CDEM Group.

We have a company Emergency Preparedness Plan in place which details how we respond to a Civil Defence Emergency. In addition, we have developed emergency response plans for dealing with widespread abnormal situations created by either equipment failure, natural causes, or certain man made scenarios such as fire or bomb threat.

4.6.3 Information System Security Breaches or Losses

Our Information Technology (IT) systems are an important part of our business and operational systems. Our ITT department manage the threat from external sources via industry standard approaches, including antivirus software, restricted Administrator access, and firewall technology.

Our ITT infrastructure has been designed to be robust, and includes a standby generator and UPS support for our server room.

All data is backed up to tape daily, with the tapes being stored offsite to provide protection in case of site damage.

4.7 Asset Management Maturity

We have applied the Commerce Commission's Asset Management Maturity Assessment Tool (AMMAT) to review the maturity of our asset management practices. This assessment tool is a series of questions based around the principles of PAS-55. The outcomes are also useful to identify gaps in our asset management systems. We are not currently seeking PAS55 or ISO55000 accreditation, but

we will be looking at incorporating the principles of those standards into our asset management systems and process as we move forward.

4.7.1 Summary of AMMAT Assessment

Our asset management practices are generally mature with scores being 3 out of 4.

Generally speaking our systems and processes are functional, but are often not particularly efficient. We are still very reliant on paper forms being manually entered by personnel. Integration and coordination of data across multiple systems can also require considerable human intervention, as can analysis of that data to generate useful information.

From this original assessment point we have been working towards identifying and improving our processes where we think we can, in ways that align with the scale of our business.

4.7.2 Gap Analysis and Remedial Actions

Three elements scored less than 3 and are the focus of our improvement efforts. They are shown in the following Table 20, along with an explanation of the actions that we are taking to improve our scores against the areas of interest.

Low Scoring AMMAT KPI	Proposed Remedial Action
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?	We have worked on our GIS, ICP, Works and asset systems to ensure that they support accurate data capture, although there is still some way to go to confirm that asset data itself is accurate and consistent. We have developed methods and tools for comparing information between systems to confirm accuracy and improve consistency. The rollout of our new integrated information system, Technology One's OneEnergy will help with this issue. We will continue to dedicate time to check and cleanse asset data as part of the implementation of OneEnergy. **Our goal is to have a high level of confidence in all of our asset information, in any of our operational systems**
What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))?	We do not yet have a complete asset management system audit process in place to covers all our systems. Audit processes are being used for separate systems, such as the Safety Management System and GIS data system, and this experience is helping with the development of a more comprehensive process. **Our goal is to develop an audit process that covers all critical asset information sources**

How does the organisation seek and acquire knowledge about new asset management related technology and practices, and evaluate their potential benefit to the organisation?	We are actively seeking out best practice within the industry, and from other industries. If the benefit to our business is obvious, then these are applied where required after consideration from stakeholders within the company, such as finance, engineering and contracting. If the benefit is less clear, then we may trial new technology or practices. **Our goal is to ensure that we are utilising up to date technology and practices to manage our assets**

Table 20 AMMAT Areas with Low Scores

4.8 Improvement Initiatives / Continuous Improvement

One of the key improvement initiatives that we are involved with is the installation of a new enterprise wide asset management system, OneEnergy supplied by Technology One.

This system features the following Asset Management functions in a tightly integrated system:

- Financial management;
- Payroll management;
- Fleet management;
- Asset registers, operational, financial and regulatory;
- Works planning;
- Maintenance scheduling;
- Condition monitoring and analysis; and
- Stores and procurement.

This system allows us to record and maintain our assets, and to track the work involving them.

The base system is in place and operational. All work orders that are issued to internal or external contractors, and all procurement activities take place within the system. Financial transactions are linked directly to projects at the work order level, which provides both Project Managers and our internal contractors excellent visibility of the progress of individual jobs.

We are about to enter a second phase of development where the system will be further enhanced to provide the following functions:

- Integration with GIS;
- Contracting quotation preparation;
- Documentation and attachment management;
- Support for mobile operation from the field; and
- Automated maintenance scheduling.

5. Renewals and Maintenance

This chapter describes how we maintain our network. It covers how we plan this work, our general approach to inspection and monitoring as well as more specific information about our different groups of assets and how they are maintained. This chapter is structured as follows:

- **Approach to Renewals and Maintenance:** gives an overview of how we determine what work needs to be carried out on our assets.
- **Asset Categories:** Outlines how we apply inspection regimes by asset function and criticality.
- **Asset Quantity Summary:** This is a brief summary showing the breakdown of our asset base by various categories.
- **Asset Category details:** in these sections we detail the maintenance and renewal approach for each of the different categories of our assets. We show the asset population data, population risks, any specific inspection and maintenance practices, or renewal programmes, and a summary of forecast renewal and maintenance expenditure. Forecasts are nominal and have not been adjusted for the effects of inflation.

5.1 Approach to Renewals and Maintenance

We currently operate a time based inspection regime to develop our renewals and maintenance programme. All assets are regularly inspected to identify any defects. Other information to trigger renewals or maintenance can come from analysis of fault reports, or from the experience of our staff or the wider industry with a particular asset population.

The results of the routine inspections and outcomes from defect reports are used to trigger specific maintenance or refurbishment activities. Major defects which have a high risk of causing serious harm to members of the public, employees, or property; or which could have a large impact on the reliability of the network are logged in the Defect Equipment Database. These defects are treated with high priority and must be resolved within three months.

All other condition based defects are logged on a paper based system. This system is in the process of being replaced with our OneEnergy Asset Management System. When all inspection and defect information is located in OneEnergy it will enable better analysis of asset condition trends across both individual assets and classes of assets.

Our objective is to detect incipient failures in our critical assets and replace them before supply disruption occurs. The impact of the failure of less critical assets, such as service fuses, may be minor compared to the expenditure and operational impact (such as regular outages) required to inspect and test them at regular intervals, so they may be left to fail while in service if this is the most economic course of action.

NWL field staff carry out the inspection of all lines, distribution assets, and the general inspection of zone substations. Specialist contractors are used to undertake specialist assessments such as

Dissolved Gas Analysis (DGA) and partial discharge (PD) analysis) of key assets such as substation transformers, ground mount switch gear, and cable terminations.

5.1.1 Maintenance Planning

In order to justify any maintenance expenditure, the maintenance proposals are assessed for each asset on the basis of:

- Safety;
- Severity of the defect;
- Criticality of the particular asset;
- Serviceability and performance of the asset;
- Economic consequences of failure; and
- Environmental consequences of failure.

Maintenance falls into two main categories:

- Corrective maintenance, where the work is to remove the cause of a problem on the asset, e.g. a component that is broken or out of tolerance; and
- Preventive maintenance, where the work is to remove the cause of a potential problem on the asset, e.g. replacing dirty oil, tightening bolts before a failure occurs.

5.1.2 Refurbishment Planning

Planned refurbishments are undertaken to ensure network safety and reliability. The methods for justification of a planned refurbishment programme are the same as for maintenance, listed above.

The difference between refurbishment and maintenance actions are often around the scale of the work to be carried out on an asset. Common drivers in the refurbishment programme are age and general condition of a group of assets.

Refurbishment may also be carried out to ensure that an asset or system will meet its performance requirements, such as capacity or speed of operation.

Economic analysis is also completed to decide whether an asset is refurbished or replaced.

5.2 Asset Categories

The different asset classes that we use for the planning of maintenance and renewals and the frequency of inspections are summarised in the following table.

Asset Class	Inspection Regime	Frequency
33 kV Subtransmission Lines (including pole mounted switchgear) Section 5.5	Ground Patrols Climbing Patrols Vegetation Patrols	Yearly 3 Yearly Yearly

Asset Class	Inspection Regime	Frequency
Zone Substations Building, Grounds, Fittings	General Inspection of Buildings, Grounds, and Indoor Equipment such as batteries	Quarterly
SubstationTransformers	Dissolved Gas Analysis	Yearly
	OLTC Overhaul	1 to 2 per year
	Oil Processing	1 per year
Switchboards	Partial Discharge Testing	Yearly
Section 5.6	Trip Testing on older equipment (>25 years old)	Yearly
Distribution Network	Ground Patrols	5 Yearly
Section 5.7	Vegetation Patrols	5 Yearly
LV Network	Ground Patrols	5 Yearly
Section 5.8	Vegetation Patrols	5 Yearly
Distribution Substations and Transformers	Ground Patrols	5 Yearly
	MDI Readings	Yearly
Section 5.9	Earth Testing	5 Yearly
Distribution Switchgear	Ground mount: Partial Discharge Testing	3 Yearly
Section 5.10	Pole mount: Ground Patrols	5 Yearly
Other System Fixed Assets Voltage Regulators	Ground Patrols	5 Yearly
SCADA/Communications	Inspection and Testing	Yearly
Ripple Control Transmitters	Manufacturer's inspection	2 Yearly
Section 5.11		
Other Systems	Ad Hoc	As required

Table 21 - Overview of Inspection regimes by Asset Class

5.3 Asset Quantity Summary

A summary of our network assets is included in Table 22.

Asset Category	Unit	Amount
Concrete poles / steel structure	No.	8812
Wood poles	No.	13424
Other pole types	No.	21
Subtransmission OH up to 66kV conductor	km	162
Subtransmission UG up to 66kV (XLPE)	km	4.6
110kV CB (Outdoor)	No.	1
33kV Switch (Pole Mounted)	No.	108
33kV CB (Indoor)	No.	11
33kV CB (Outdoor)	No.	21
11kV CB (ground mounted)	No.	65
11kV CB (pole mounted)	No.	3
Zone Substation Transformers	No.	22
Distribution OH Open Wire Conductor	km	1358
Distribution UG XLPE or PVC	km	42.6
Distribution UG PILC	km	25.5
11kV CB (pole mounted) - reclosers and sectionalisers	No.	38
11kV Switches and fuses (pole mounted)	No.	3196
11kV RMU	No.	38
Pole Mounted Transformer	No.	2367
Ground Mounted Transformer	No.	384
Voltage regulators	No.	15
LV OH Conductor	km	248
LV UG Cable	km	87.3

Table 22 Summary of Network Assets by Category

5.4 GXP equipment

We are connected to the Transpower network at four Grid Exit Points (GXPs). The characteristics of these are listed in Table 23.

Supply point	Voltage	Firm capacity	Max demand 2015/16	Energy throughput 2014/15	Zone Substations supplied
Oamaru GXP	110/33kV	40 MVA	43.0 MW	230.4 GWh	9
Black Point GXP	110/11kV	25 MVA*	10.9 MW	31.5 GWh	1
Waitaki GXP	11/33kV	24 MVA	10.5 MW	15.8 GWh	3
Twizel GXP	220/33kV	20 MVA	3.2 MW	12.65 GWh	3†

* - Upgraded from 5.5MVA in 2015. Energy throughput figures are from the pre-upgrade configuration.

† - Includes Ruataniwha, which is a large customer substation feeding directly from the subtransmission system at 33kV.

Table 23 Characteristics of NWL Grid Exit Points

5.5 Subtransmission

5.5.1 Quantity and Life Expectancy of Subtransmission Lines

Our subtransmission network operating at 33kV connects the grid exit points to the zone substations. These supplies are arranged as shown in Figure 16.

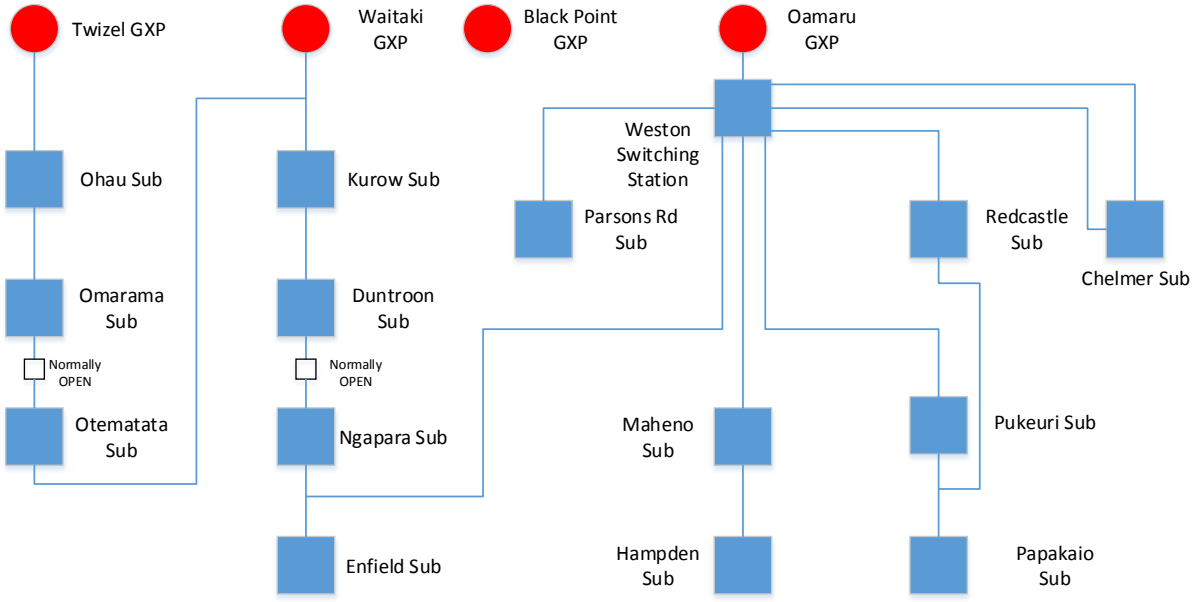


Figure 16 Subtransmission System Configuration

Generally speaking, the rated capacity of the subtransmission network is suitable to supply the attached loads as required. There is a voltage support issue with feeding 33kV supplies from Oamaru to beyond Duntroon, but this has been mitigated by the upgrade to Waitaki GXP, which moved the Duntroon supply away from Oamaru.

There are 209 km of subtransmission network, including 5km of 33kV cables. Our subtransmission lines are mounted on approximately 2334 poles, which are a mixture of mainly hardwoods and reinforced concrete types.

Subtransmission Pole Material	Number in Service
Hardwood	1572
Concrete	241
Softwood	520
Unknown	1

Table 24 Subtransmission Pole Population by Material

The life expectancy we apply to our subtransmission assets is shown in Table 25.

Asset Description	Standard life expectancy (years)
Concrete Pole	60
Wooden Pole	45
Cross Arm	20
Overhead conductor	55
XLPE cables installed <1985	45
XLPE cables installed >1985	55
PILC cables	70
Air Break Switches	35

Table 25 - Life Expectancy of Subtransmission Assets

5.5.2 Management Approach

The subtransmission assets are critical assets as a component failure on this network can have a significant impact on system reliability, as large numbers of consumers will be affected. Hence these assets are subject to more frequent inspections than the lower voltage distribution assets.

We have also stopped the installation of softwood poles on the subtransmission network. We currently install pre-stressed concrete poles, or select grade Hardwood poles where required for particular performance,. When used, new hardwood poles are carefully inspected during purchase to reject poles that do not meet specification.

5.5.3 Age profiles

33 kV Subtransmission Circuits:

The 33kV sub-transmission network is predominantly overhead construction, apart from some short lengths of cable, generally between the feeder CB's and line terminations, and on the Redcastle to Pukeuri line. The age profile of these assets is shown in Figure 17 and Figure 18 below.

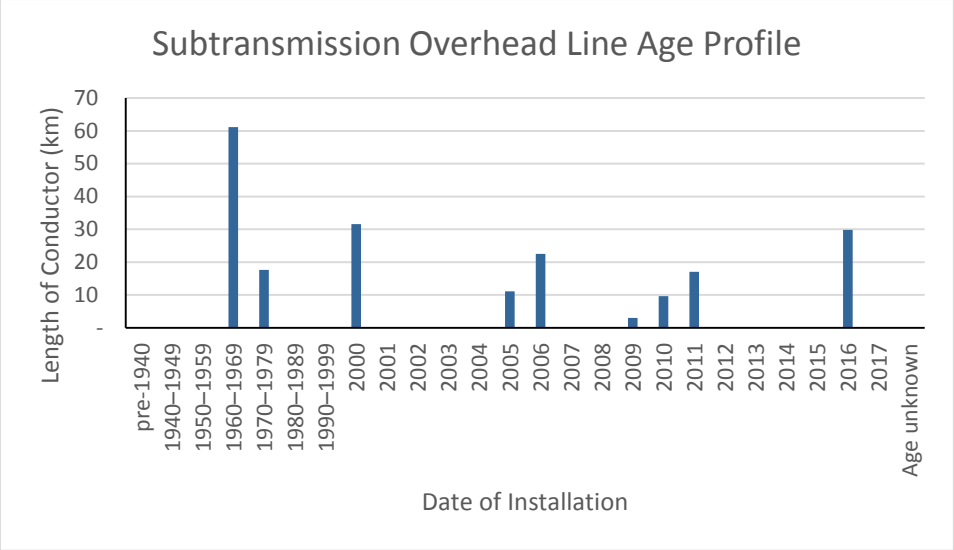


Figure 17 Age Profile of Subtransmission Overhead Lines

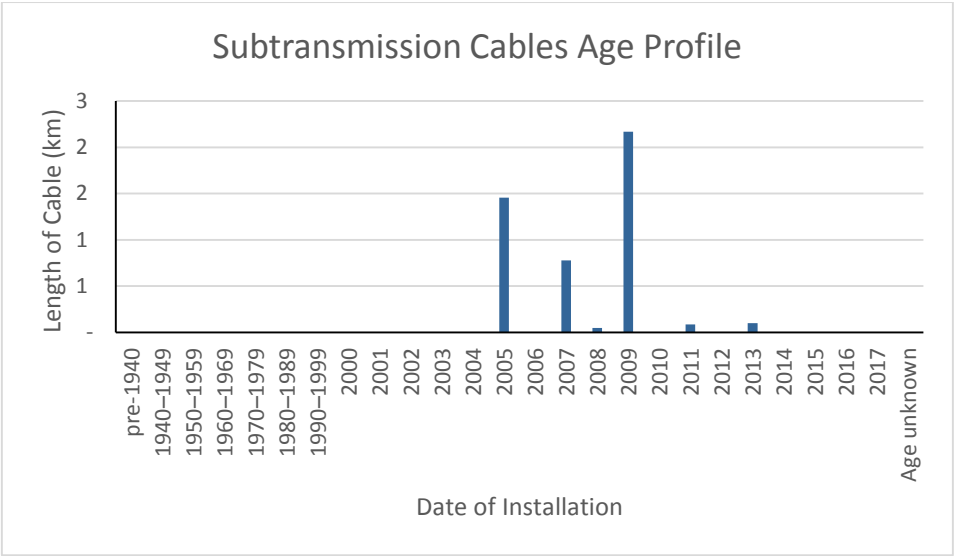


Figure 18 Age Profile of Subtransmission Cables

5.5.4 Asset risk

We prioritise maintenance of our subtransmission and zone substation assets above our other asset categories, as a failure of these assets can result in a major impact on our consumers.

Due to the high frequency of inspections and the high priority of defect correction, the subtransmission population is considered to be at low risk of failure.

The major risks to the Subtransmission network include:

- Road Traffic – much of the network is built on road reserve;
- Weather events such as high winds or heavy snow; and
- External equipment – pivot irrigators moving into, spraying, or being blown into lines.

5.5.5 Inspection and Maintenance Practices

A pole by pole visual inspection from ground level is made of all 33kV lines each year. Pole top inspections are performed on a three year cycle. This is either via remote camera (GoPro camera) or by accessing the pole from a ladder or bucket truck, and includes an assessment of the pole setting in the ground. The use of the GoPro camera for inspection is a fairly new initiative and has proved to be an excellent tool, increasing the effectiveness of ground (non-climbing) patrols.

If the cause of a 33 kV line fault is not identified during the fault restoration process, we will patrol the affected line segment as soon as possible after the fault.

We have recently trialled using a wood pole scanner and an acoustic sensor as part of our below ground inspection regime. These methods have proven useful and will be incorporated into all future pole inspections

Vegetation growth is carefully managed around the subtransmission lines. We attempt to clear corridors of trees during the installation of new lines, but during the lifecycle of the lines regrowth is common. Any vegetation is managed in accordance with the Electricity (Hazards from Trees) Regulations 2003.

5.5.6 Renewal Programme

There are no specific major Renewal programmes for our Subtransmission assets within the planning period. Renewal expenditure has been set according to estimates for ongoing condition based pole replacements.

5.5.7 Expenditure Forecast

The expected Renewals and Maintenance forecast for the first 10 years of the planning period is shown in Table 26.

Subtransmission Forecast	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Routine and Corrective Maintenance	42,500	42,925	43,354	43,788	44,226	44,668	45,115	45,566	46,021	46,482
Asset Renewal Maintenance	125,000	125,650	126,307	126,970	127,639	128,316	128,999	129,689	130,386	131,090

Table 26 Forecast of Maintenance and Renewal Expenditure for Subtransmission Assets

5.6 Zone Substations

5.6.1 Quantity and Life Expectancy of Zone Substations

Our Zone Substations are summarised in the following table (note that Ruataniwha substation is a customer substation and not treated as a Zone Substation for Asset Management purposes):

Zone Substation	GXP Supply	Capacity (MVA)	Security	2015/16 Actual Maximum Demand (MVA)	Date of Construction
Ohau	Twizel	3	N	1.25	2006
Omarama	Twizel	3	N	1.5	1984
Ruataniwha	Twizel	2	N	0.5	2015
Otematata	Waitaki	3	N	0.6	1973
Kurow	Waitaki	12	N-1	5.0	1991
Duntroon	Waitaki	7	N	5.2	2010
Black Point	Black Point	25	N	10.9	2005
Ngapara	Oamaru	7	N	4.8	1970
Papakaio	Oamaru	7	N	5.4	2006
Enfield	Oamaru	7	N	2.6	2006
Parsons Road	Oamaru	10	N	4.23	1970
Pukeuri	Oamaru	10	N	8.0	1971
Chelmer Street	Oamaru	28	N-1	15.0	1967
Redcastle	Oamaru	12	N-1	5.7	1967
Maheno	Oamaru	5	N	3.25	1967
Hampden	Oamaru	7	N	1.4	2010

Table 27 Summary of NWL Zone Substations

The life expectancy we apply to our zone substation assets is shown in Table 28.

Asset Description	Standard life expectancy (years)
Site Development/buildings	70
Transformers	45
Indoor switchgear	45
Outdoor switchgear	40
Protection relays	40
DC Supplies/Batteries/Inverters	20

Table 28 Life expectancy of Zone Substation Assets

5.6.2 Management Approach

Our zone substation assets are critical assets as a component failure can have a significant impact on system reliability with a large number of consumers affected. Hence these assets are inspected every 3 months.

We prefer to use vacuum switchgear with air insulated busbars, rather than the cheaper option of SF_6 insulated switchgear. This decision was based on environmental considerations and future maintenance and compliance costs associated with SF_6.

All of our substation equipment is purchased with a focus on the lowest ongoing preventative maintenance requirements.

5.6.3 Age profiles

5.6.3.1 110 kV Switchgear

We own one 110 kV air break switch and one 110 kV circuit at the Black Point GXP. This GXP is dedicated to the supply of one consumer, NOIC. This equipment was purchased and installed in 2006.

5.6.3.2 Zone Substation Transformers

The age profile shown in the following graph is based on the date of manufacture of the transformers.

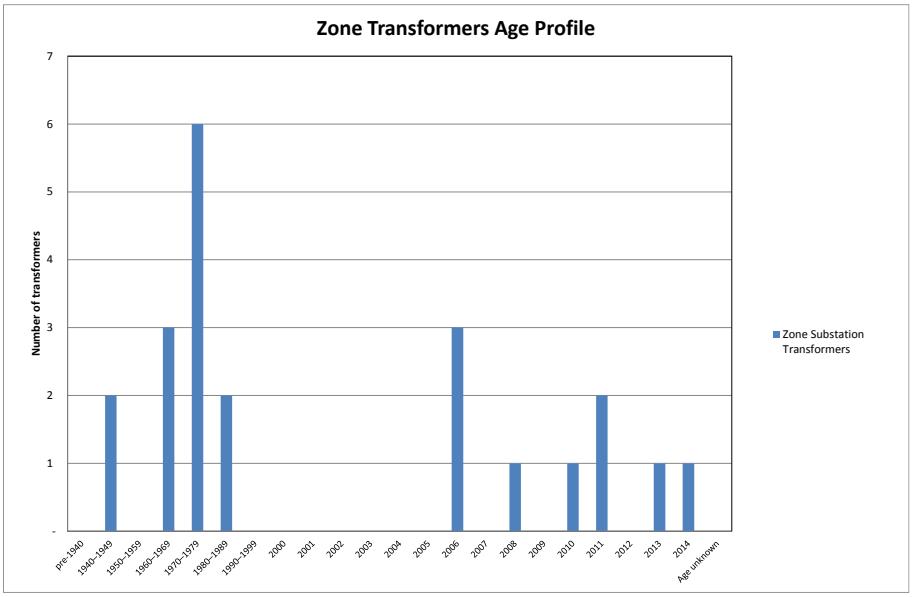


Figure 19 Zone Transformers Age profile

5.6.3.3 33 kV and 11 kV Switchgear

We own and operate the 33kV Indoor switchboard associated with the Oamaru GXP. This 33kV board is air insulated with vacuum CBs.

The majority of 11kV circuit breakers are of the bulk oil type, and were installed during the late 1960's when the sub-transmission lines and zone substations were being installed. Consequently the age profile shows high installation rates over short periods and correlate exactly with the ages of the zone substations.

The oldest 11kV CBs are listed as being installed in 1968. The newest CB's are those associated with the 11kV switchboards in the Chelmer and Redcastle substations installed in 2009, and the 11kV CBs at Enfield and Papakaio installed in 2006.

While the average age of the population is 20 years, 37% (23) are over 35 years old and some will reach the end of their 45 year standard life before the end of the planning period covered by this

AMP. This equipment is in good condition and we expect that these CBs will be capable of operating safely and reliably beyond their life expectancy of 45 years.

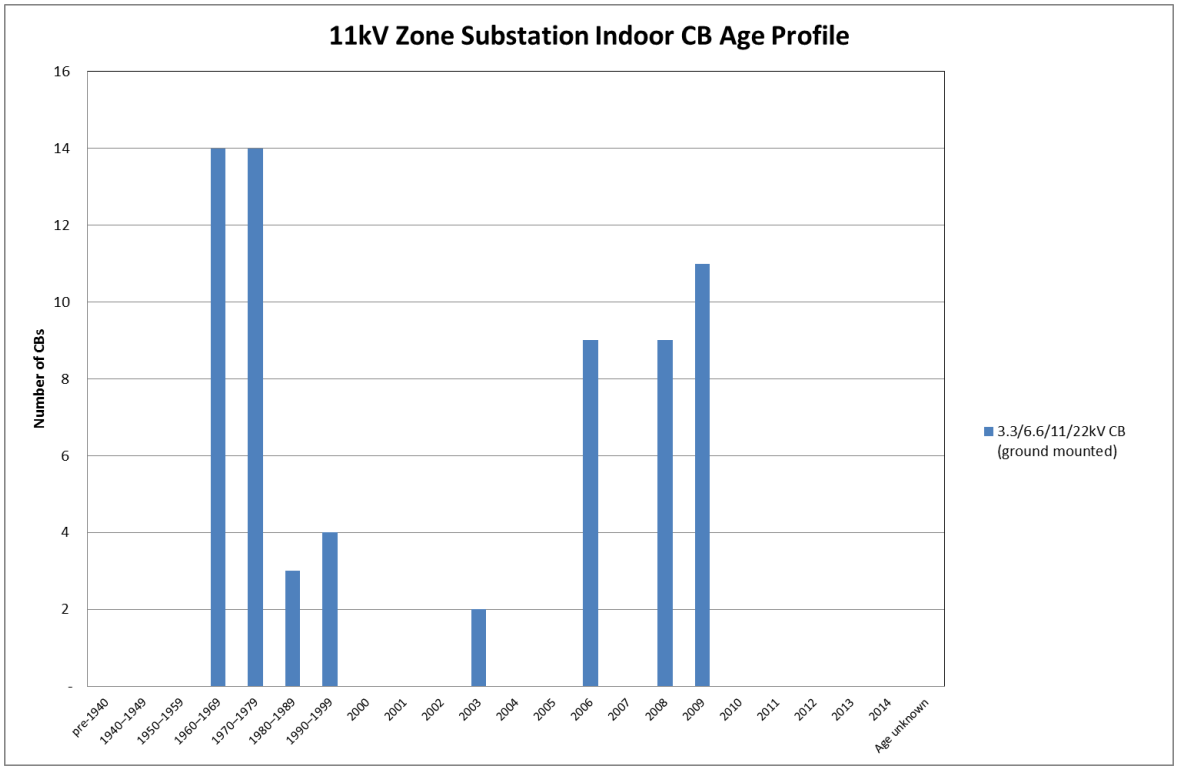


Figure 20 11kV Indoor CBs Age Profile

The 33kV CBs at zone substations are a combination of vacuum, vacuum/oil, and oil type units. The majority of these CBs are less than 20 years old, and are all working well within their load and fault ratings.

An additional two 33kV CBs have been added to both Redcastle and Pukeuri to allow the 33kV tie circuit to operate as a closed ring in ***N-1*** mode.

The two oldest 33kV CB's have been replaced with new outdoor CB's as part of the transformer upgrade at Chelmer substation.

33kV reclosers and sectionalisers installed in the Waitaki – Twizel 33kV sub-transmission line at each connected zone substation provide automatic sectionalising of the line in the event of a fault. All 33kV and 11kV CBs are connected to the SCADA system and can be switched remotely.

5.6.4 Asset risk

The criticality of our zone substations is high, so inspections and maintenance on these assets is a high priority, and is given equal priority with subtransmission work.

Due to the high frequency of inspections and the high priority of defect correction, the subtransmission population is considered to be at low risk of failure.

The major risks to our substations include:

- Animals;
- Human intruders – theft or vandalism; and
- External objects being blown into open air switchyards.

5.6.5 Inspection and Maintenance Practices

5.6.5.1 Zone Substation Transformers

Inspections on zone substation transformers centre on annual DGA sampling. This provides a non-invasive test which is effective at indicating the health of the transformer.

The need for maintenance on zone substation transformers and their tap changers is determined by trend monitoring of DGA results.

On Load Tap Changers on our zone substation transformers are overhauled or replaced at a rate of two per year, or once every ten years per transformer. The scheduling of this is dependent on the DGA results, or any particular information regarding one brand of OLTC. During this work the transformer is usually given an overhaul – the extent of this servicing is decided based on a detailed condition assessment of the transformer in question.

As an example, we are part way through a project to replace tap changers and radiators on four of our IMP 33/11kV transformers. This was driven by the results of inspections that found excessive corrosion of the contacts of the OLTCs and excessive corrosion on the radiators.

5.6.5.2 Indoor Substation Switchboards

Partial Discharge Testing is employed on an annual basis to determine the need for CB maintenance. The frequency of testing is increased as deterioration is detected.

Bulk oil CB's also receive an oil change and contact dressing following a number of major fault trippings, depending on the levels of the faults. This is unplanned reactive maintenance.

5.6.6 Renewal Programme

Specific renewal projects in the 2016/17 works programme include:

- Replacement of OLTC in 2 x IMP transformer;
- Replacement of radiators in 2 x IMP transformers;
- 1 x OLTC overhaul;
- Painting of 1 x Zone Substation Transformer;
- Replacing outdoor Oil filled fuse switches with modern vacuum CB switches at Ohau substation; and
- Fit reinforced cubicle doors to indoor switchboards to improve arc flash protection at Chelmer St substation.

5.6.7 Expenditure Forecast

The expected Renewals and Maintenance forecast for zone substations and equipment for the planning period is shown in Table 29.

Substation Forecast	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Routine and Corrective Maintenance	230,000	232,300	234,623	236,969	239,339	241,732	244,150	246,591	249,057	251,548
Asset Renewal Maintenance	244,000	90,500	30,603	30,909	31,218	31,530	31,846	32,164	32,486	32,811

Table 29 Zone Substation and equipment Forecast Expenditure

5.7 Distribution Network

5.7.1 Quantity and Life Expectancy of Distribution Network

There are a total of fifty one 11kV distribution feeder lines emanating from the fourteen 33/11kV zone substations. As the zone substations are radially connected to their GXP, supply restoration is therefore dependent on 11kV interconnection between substations. To further assist in a speedier supply restoration, we have embarked on a programme of having automated opening points on 11kV interconnection between substations. The only zone substations with ***N-1*** security are the two urban substations, Chelmer and Redcastle which supply approximately half of our total consumer base.

Our distribution network operates at 11kV, and connects zone substations to the consumers.

There are 1354km of overhead lines and 71km of 11kV cables on our distribution network. We have 16661 poles that are supporting HV distribution lines – this does not include those poles that carry both distribution and subtransmission circuits, as they are treated in the subtransmission system.

This asset population can be further broken down by the pole material:

Distribution Pole Material	Number in Service
Hardwood	6930
Concrete	6983
Softwood	2710
Unknown	38

Table 30 Distribution Poles by Material

The life expectancy we apply to our distribution assets is shown in Table 31.

Asset Description	Standard life expectancy (years)
Concrete Pole	60
Wooden Pole	45
Cross Arm	20
Overhead conductor	55
XLPE cables installed <1985	45
XLPE cables installed >1985	55
PILC cables	70
Air Break Switches	35

Table 31 - Life Expectancy of Distribution Assets

Where 11kV feeders interconnect, they are normally configured as open points. NWL's loadings are such that security provisions are generally focused on switching to restore supply quickly rather than targeting nil interruptions.

Approximately one third of the 11kV network is two wire single phase and features a large amount of spur configuration, which limits interconnection. This reflects the geographic remoteness of much of the network and the historical predominance of low energy intensity sheep farming.

5.7.2 Management Approach

We maintain our distribution network with the aim of keeping it safe for the public, and minimising outages. Our approach is predominately driven from defects found during regular inspection cycles, or generated from other work such as consumer connections, or attendance at faults. When a part of the network is particularly affected by a major event (e.g. a snow storm) we will instigate a special line patrol post event.

This approach, backed by a fairly well interconnected distribution network means that outage figures are kept below our targets without over investment on the distribution network.

5.7.3 Age profiles

The bulk of the 11 kV network was installed between 1960 and 1987 at a relatively consistent rate of 41 km p.a. This represents the period of rural electrification.

Approximately 25% of the population has survived past 45 years (the wooden pole ODV Standard Life). Maintenance does not appear to significantly extend the life of a line but sustains the line in service until the end of its economic life. The normal limit on economic life on NWL's distribution lines tends to be conductor capacity (voltage constraint) due to load growth, which for more critical main line situations tends to happen well before 45 years.

The age profile of these assets is shown in the following two charts.

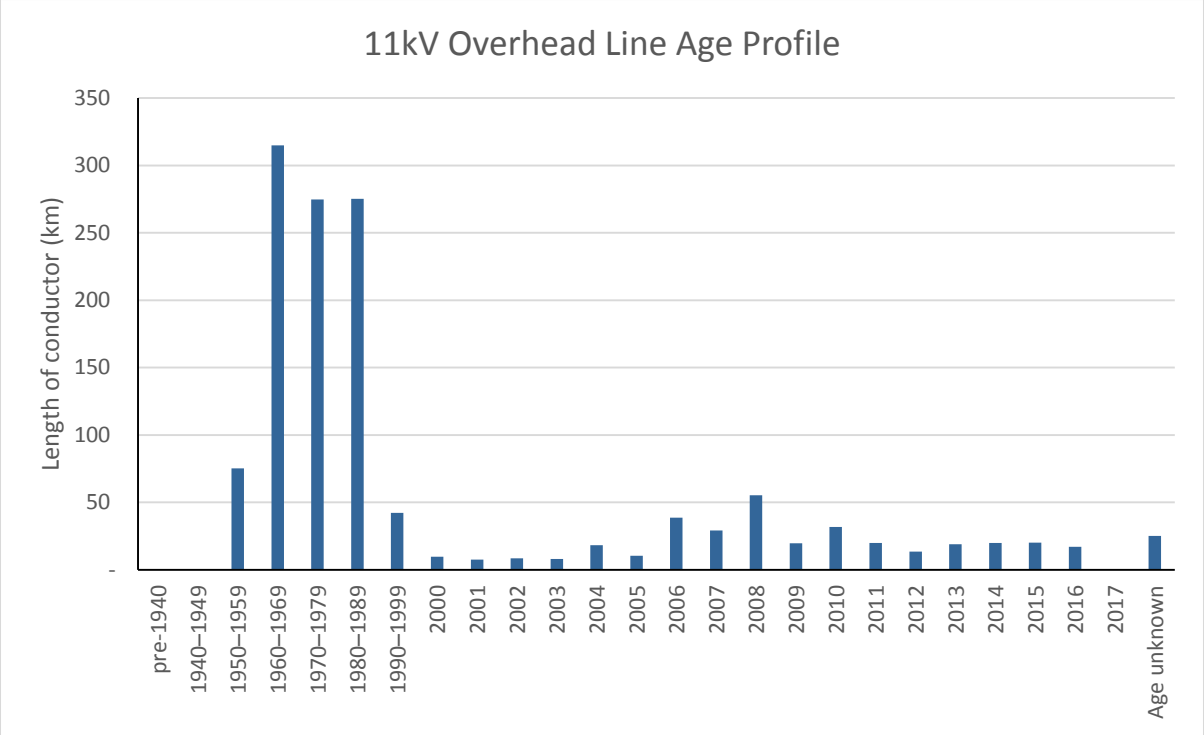


Figure 21 Age Profile of 11kV Overhead Lines

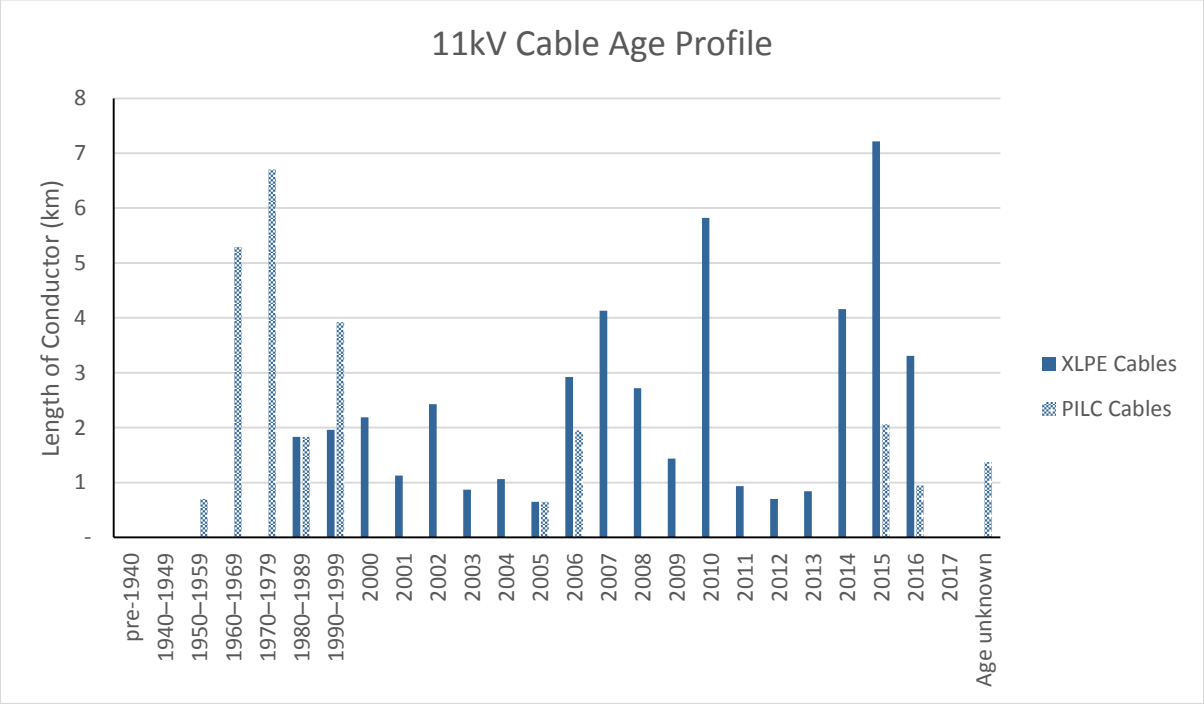


Figure 22 Age Profile of Distribution Cables

5.7.4 Asset risk

The overhead Distribution network is subject to a number of risks, mainly due to the extensive nature of the network. These risks include:

- Road Traffic – much of the network is built in road reserve

- Weather events such as high winds or heavy snow
- External equipment – pivot irrigators moving into, spraying, or being blown into lines

5.7.5 Inspection and Maintenance Practices

All of our 11kV distribution lines are inspected on a 5 year cycle. Any poles which are considered to be suspect are subject to further inspection and testing.

The policy of patrolling after faults when no cause has been identified is also applied to 11kV lines. Climbing patrols are only undertaken for pole top defects identified by ground patrols.

Line are retightened 2 years after the line is built.

Tree maintenance is significant ongoing part of the maintenance of our distribution lines.

5.7.6 Renewal Programme

Major named projects in the Renewal Programme for the coming year are:

- Ohau Feeder rebuild – this will remove issues of access and design and construction weaknesses that cause this line to perform poorly during heavy snow;

5.7.7 Expenditure Forecast

The forecast expenditure for the Distribution Network for the planning period is shown in Table 32.

Distribution Forecast	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Routine and Corrective Maintenance	105,847	106,905	107,974	109,054	110,145	111,246	112,359	113,482	114,617	115,763
Asset Renewal Maintenance	1,070,327	1,073,530	1,076,765	1,080,033	1,083,333	1,086,666	1,090,033	1,093,433	1,096,868	1,100,336

Table 32 Expenditure Forecast for Distribution Network

5.8 Low Voltage Network

5.8.1 Quantity and Life Expectancy of Distribution and LV Cables

LV overhead lines amount to 232km of our network, with LV reticulation being largely restricted to Oamaru and rural townships. Rural network design does not include LV interconnection between distribution transformers due to distance limitations on LV capacity.

Overhead reticulation within residential areas is no longer permitted under the Waitaki District Council “District Plan”. Therefore, any extension or upgrade work tends to result in conversion to underground. We have 88km of LV cable network. There are no other undergrounding programmes in progress as the community has not expressed a desire for this in community planning processes (Long Term Council Community Plan and District Plan). Asset management drivers, including cost and outage minimisation, favour the retention of overhead assets.

We have 3262 poles that carry LV only. Subtransmission or Distribution Poles that also carry LV are treated in that asset category. In overhead reticulated areas road crossing may be via Chorus poles

where they exist and are in an acceptable condition. The management of these poles is the responsibility of Chorus.

This asset population can be further broken down by the pole material:

LV Pole Material	Number in Service
Hardwood	1591
Concrete	1274
Softwood	360
Unknown	33

Table 33 Low Voltage Poles by Material

The life expectancy we apply to our distribution assets is shown in Table 34.

Asset Description	Standard life expectancy (years)
Concrete Pole	60
Wooden Pole	45
Cross Arm	20
Overhead conductor	55
XLPE cables installed <1985	45
XLPE cables installed >1985	55
PILC cables	70
Link Pillars and fuses	45

Table 34- Life Expectancy of Distribution Assets

5.8.2 Management Approach

LV faults generally only affect a few consumers and therefore do not impact overall performance so heavily.

Voltage complaints are not displaying upwards trend and tend to be related to HV capacity and tap setting rather than being an LV issue. Capacity is primarily addressed by transformer upgrades or installing intermediary transformers.

Our management approach to the LV network is to focus preventative maintenance on safety issues.

5.8.3 Age profiles

Our LV overhead lines show a similar age profile to the HV overhead lines, and are predominantly located in urban residential areas. Their age reflects the urban development cycles

Pole management is incorporated into HV pole inspection programmes with approximately 15 poles being replaced annually. This replacement rate is higher than for HV poles, which is an outcome of more conservative pole management due to their higher risk profile in urban locations.

The age profile of the LV lines is shown in the following charts.

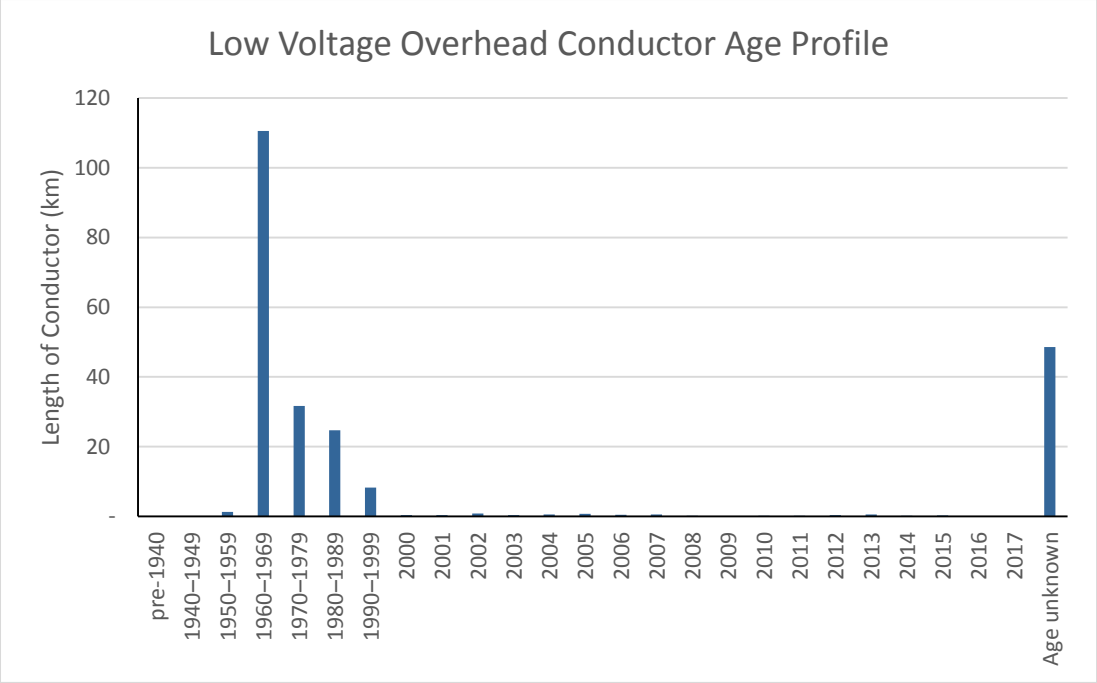


Figure 23 Age Profile of LV Network

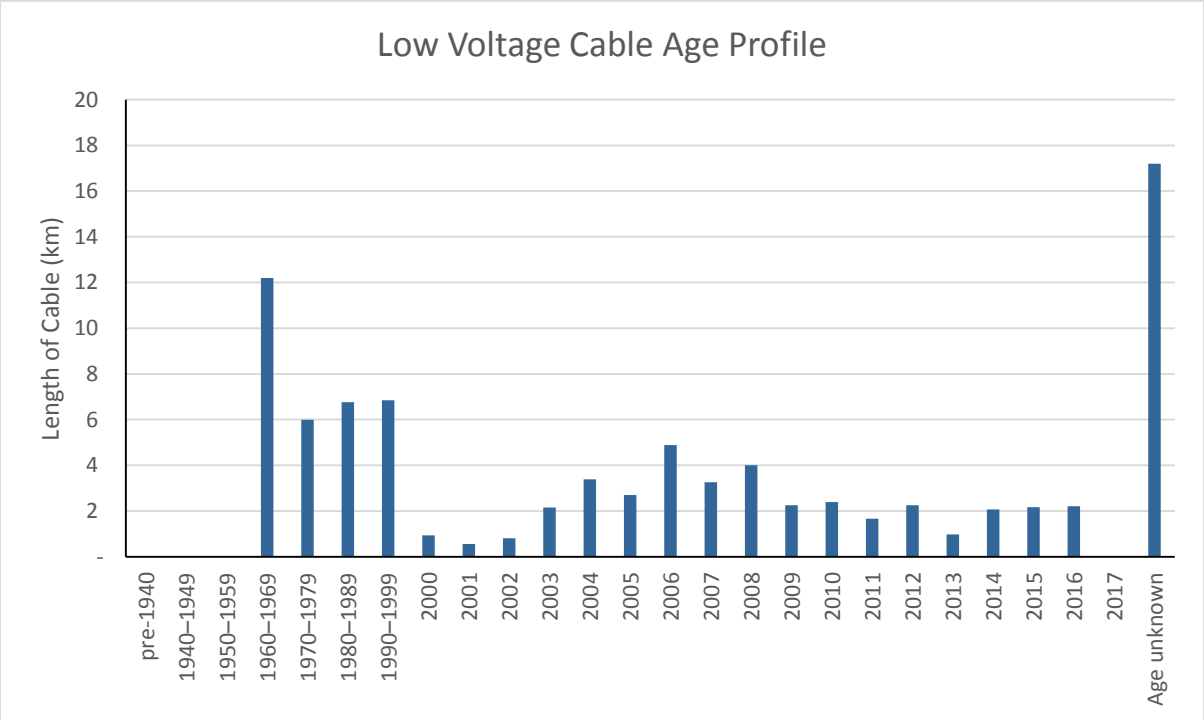


Figure 24 Age Profile of LV Cables

5.8.4 Asset risk

The LV network is subject to a number of risks, especially because it is predominantly located within urban areas. These risks include:

- Road Traffic – much of the network is built in road reserve, near driveways etc;
- External equipment – foreign objects being blown into lines; and
- Human interaction – vandalism, contact with wires while painting house, etc.

The focus of risk management on the LV network is public safety.

5.8.5 Inspection and Maintenance Practices

Dedicated LV distribution poles are inspected on the same 5 year cycle as for 11kV distribution poles with the same process being applied to poles that are deemed to be suspect.

Cable maintenance is limited to termination thermal scanning and distribution link box maintenance as identified from cyclic visual inspection.

Low voltage switchgear that is housed in metal clad cabinets that are not attached to a distribution transformer, are subject to the same 5 year earth test regime as 11kV equipment.

5.8.6 Renewal Programme

There are no specific named renewal projects planned for LV Network assets for the 2016/17 year.

5.8.7 Expenditure Forecast

The forecast expenditure for the planning period in the area of Low Voltage assets is shown in Table 35.

Low Voltage Forecast	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Routine and Corrective Maintenance	106,847	107,915	93,392	91,175	92,087	93,008	93,938	94,878	95,826	96,785
Asset Renewal Maintenance	265,000	266,400	267,814	269,242	270,685	272,141	273,613	275,099	276,600	278,116

Table 35 Forecast Expenditure for Low Voltage Network

5.9 Distribution Transformers

5.9.1 Quantity and Life Expectancy of Distribution Transformers

The 11kV distribution network supplies 2,769 distribution transformers, of which approximately 600 have a capacity in excess of 100kVA. All new transformers, 200kVA or over, are ground mount “mini-sub” configured, irrespective of whether they are installed in an underground or overhead reticulated area. LV reticulation in urban areas is typically supplied by 200-500kVA distribution substations which are located to accommodate four LV feeders. Transformer capacity is normally based on an average After Diversity Maximum Demand (ADMD) of approximately 5.6kW for a domestic consumer.

An LV switchboard is normally housed in the transformer cabinet with each LV feeder being independently fused. The LV switchboard is mounted independently of the transformer cabinet and is fitted with an incomer switch to facilitate isolation and removal of the transformer independent of the LV board. In overhead reticulated areas transformers are protected by pole mounted expulsion fuses and in underground reticulated areas with ground mounted fused oil switches. In urban areas the LV system is run in open rings with tie points brought into ground mounted distribution boxes or

jumper cuts in the overhead reticulated system. Ground mounted transformers earths in urban areas incorporate an equipotential earth loop to control step and touch voltages.

Transformers are arranged in a mesh layout such that neighbouring units can support an outage via LV interconnection. Both transformers and cables are designed with sufficient spare capacity for this purpose. Maximum Demand Indicators (MDI's) are fitted to determine the need for capacity upgrade and phase balancing. Larger supplies may have dedicated LV cables back to the LV distribution frame and/or a dedicated transformer on their own site. Rural supplies tend to have smaller dedicated transformers which are pole mounted.

Voltage Regulators are a special type of transformer installed on the distribution network to ensure good voltage regulation at the far end of feeders, especially where there is load growth due to dairy conversions and irrigation. They are often used as an interim measure until the load growth warrants reinforcement of the supply. We have 15 installations of voltage regulators in service

The life expectancy that we apply to distribution transformers is shown in Table 36

Asset Description	Standard life expectancy (years)
Pole Mounted Transformer	45
Ground Mounted Transformer	45
Voltage Regulators	55

Table 36 Life Expectancy for Distribution Transformers and Substations

5.9.2 Management Approach

The transformer fleet is generally reliable and robust. We aim to maximise the utilisation of our transformers without overloading them during normal operation, although we will apply a managed approach to short term overloading in the event of a fault.

MDI readings are utilised to monitor the loading on large transformers. It is possible that with the rollout of the smart meter systems these overloads will be visible at the time they occur, which will help with identifying problem spots.

5.9.3 Age profiles

For our transformers, the age profile has a large peak in installation numbers during the early to mid-1980's, generally associated with the first uptakes of irrigation. For the past 9 years there has been a second and more sustained wave of development resulting from both dairy conversion and irrigation.

The latest development period is showing a tendency towards larger-sized transformers than the earlier period. The age profile of our ground and pole mount transformers is shown in Figure 25.

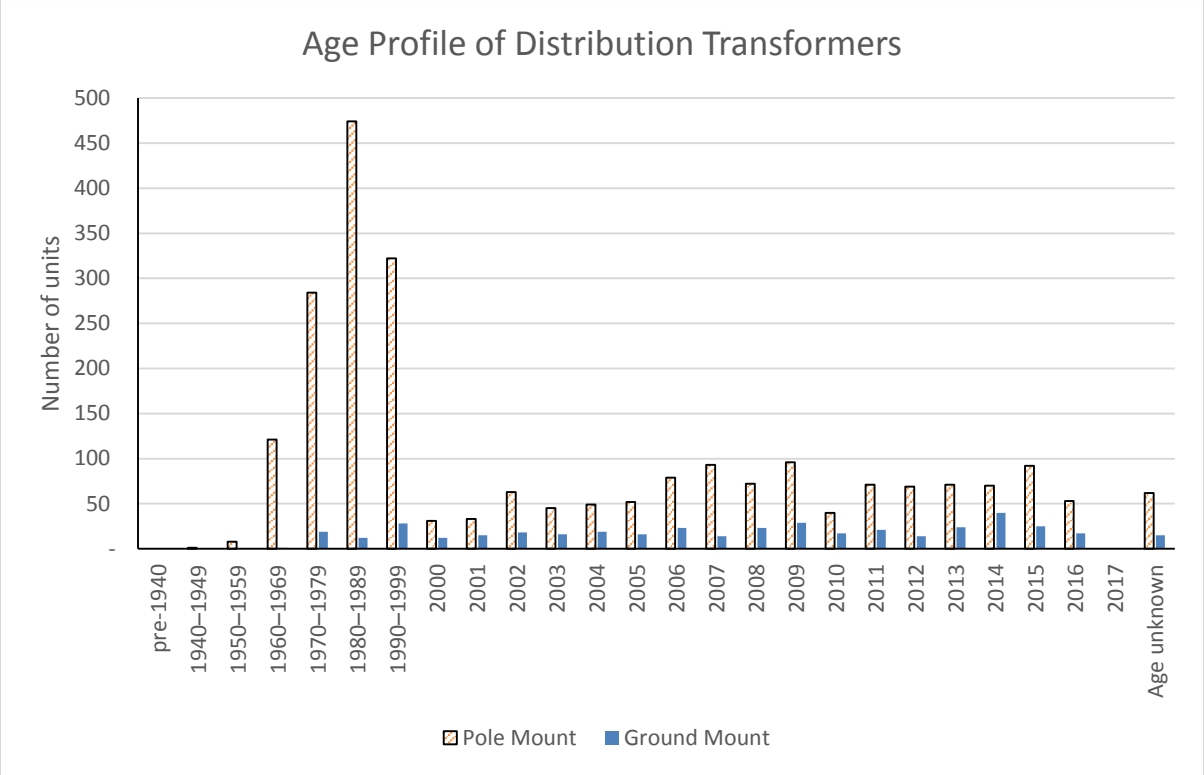


Figure 25 Age Profile of Distribution Transformers

5.9.4 Asset risk

Both Pole and Ground mount transformers have proven to be reliable and robust in service, with few equipment failures in general.

The main risks to this equipment class include:

- Lightning – although surge arresters are widely used, a direct strike to a transformer is destructive
- For pole mount transformers – Animal contacts, such as possums and rats.
- For ground mount transformers – Vehicle incidents, as many are located in the road reserve

5.9.5 Inspection and Maintenance Practices

NWL manages the other assets associated with distribution substations as an integral part of the transformer installation.

Pole mount transformers are inspected at the same intervals as the distribution lines on a five year cycle.

Maintenance actions for ground mount transformers includes:

- Annual Max Demand Indicator reading to confirm the transformer is not overloaded.
- General maintenance such as fixing leaks, treating rust, addressing vandalism, etc.
- Earth Testing on a five year cycle (for regulatory compliance purposes).

5.9.6 Renewal Programme

We plan to replace at least 1 ground mount transformer enclosure per year for the next 5 years. This work is concentrating on a type of concrete block enclosure that has some safety issues when reading MDI's and accessing LV fuses.

We will also run a trial to install remotely read MDI's on some urban transformers.

5.9.7 Expenditure Forecast

Table 37 summarises the forecast expenditure for our distribution transformer fleet.

Distribution Transformer Forecast	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Routine and Corrective Maintenance	60,000	60,600	61,206	61,818	62,436	63,061	63,691	64,328	64,971	65,621
Asset Renewal Maintenance	185,000	175,250	175,503	175,758	176,015	146,275	146,538	146,803	147,071	147,342

Table 37 Forecast Expenditure for Distribution Transformers

5.10 Distribution Switchgear

5.10.1 Quantity and Life Expectancy of Distribution Switchgear

We use 11kV reclosers and sectionalisers extensively in rural areas to automatically clear transient faults, and to minimise the areas affected by fault outages. The majority of these devices are linked to the SCADA system and can be remotely operated. We have 59 of these units in service.

11 kV oil filled ground mount switchgear (individual fused switches and ring main units) has been installed from 1990, as part of the major urban undergrounding programmes that commenced then, and the more recent network reinforcement programs. There are 38 RMUs or Fused switches in service, with most located outside, although a few are in covered in buildings.

Distribution spurs and individual 11kV service lines are often connected to the main feeder via drop out type fuses, or manually operated air break switches. These provide a control point for disconnecting the spur during a fault or planned outage, and are provide a level of discrimination for faults on the fringes of our network.

Life expectancy for this class of asset are shown in Table 38

Asset Description	Standard life expectancy (years)
Air break switch (ABS)	35
Ring Main Unit (RMU)	40
Fused Oil switch	40
Drop out fuse	35

Table 38 Life Expectancy for Distribution Switchgear

5.10.2 Management Approach

We manage distribution switchgear based on its criticality in the network. A sectionaliser or recloser has a bigger impact on our ability to reduce SAIDI and SAIFI figures than an ABS on a spur line, so work is prioritised based on this.

We will often manage distribution switchgear based on the design or age of the equipment, as common failure points become obvious in a particular design.

5.10.3 Age profiles

The age profiles of 11kV distribution switchgear are shown in the following figures:

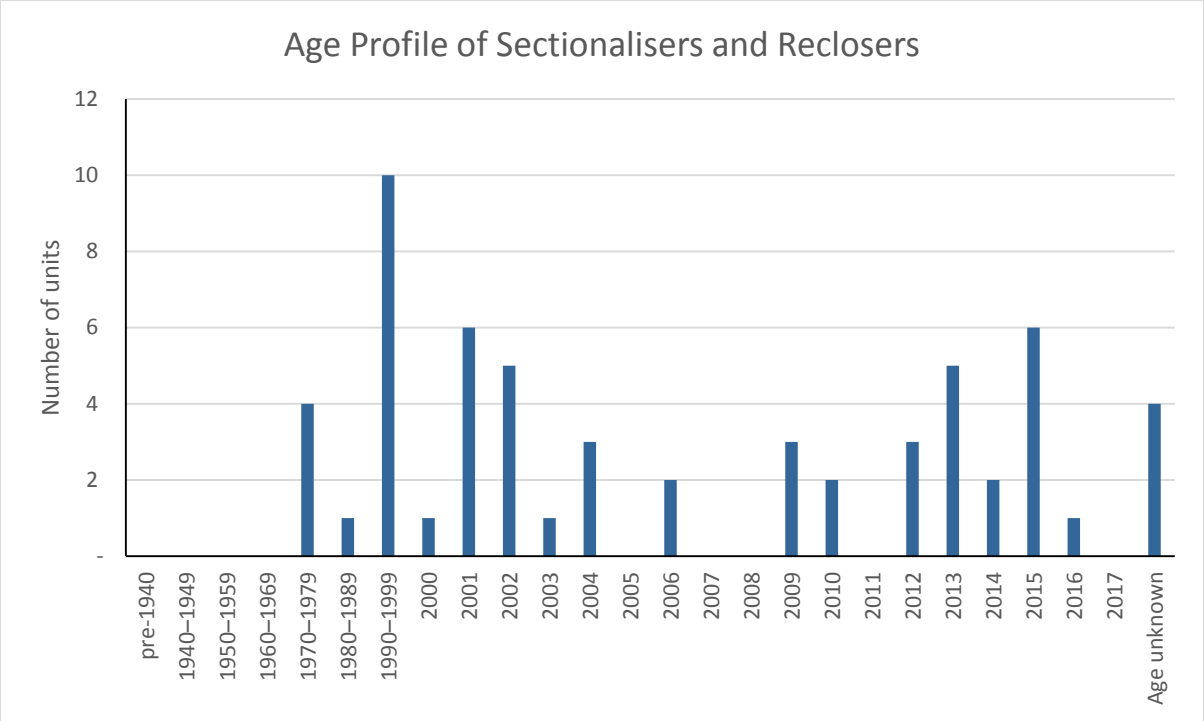


Figure 26 Age Profile of Distribution Sectionalisers and Reclosers

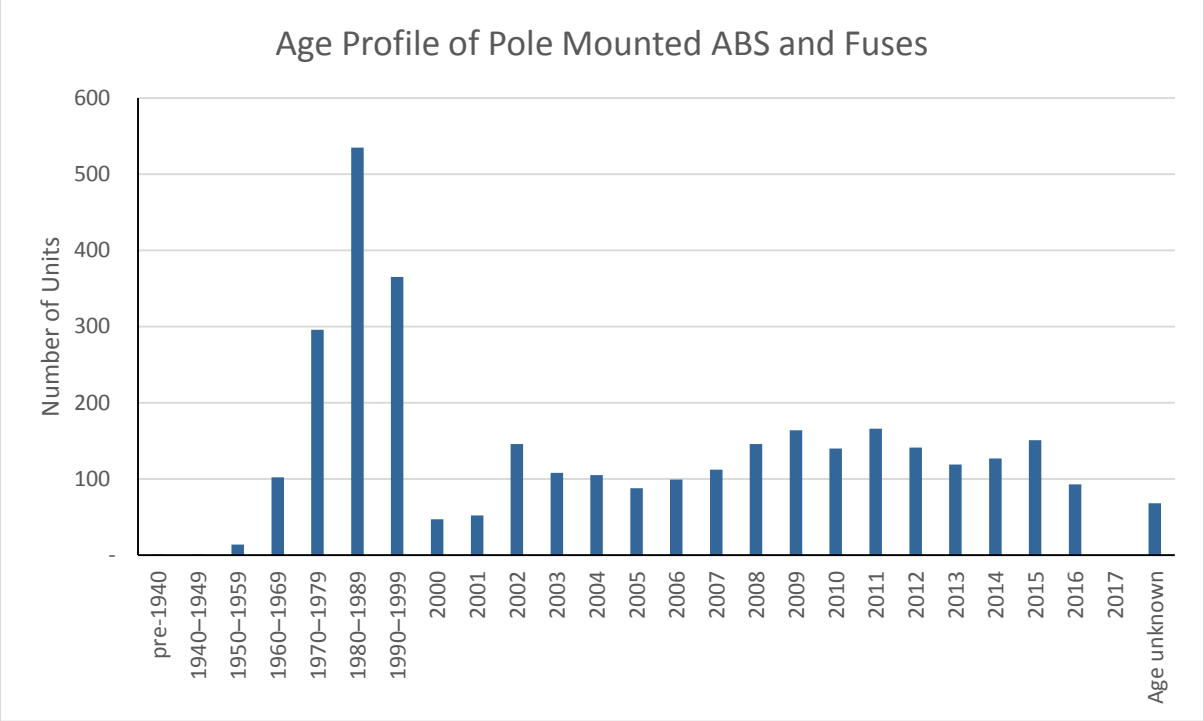


Figure 27 Age Profile of Pole Mounted ABS and Fuses

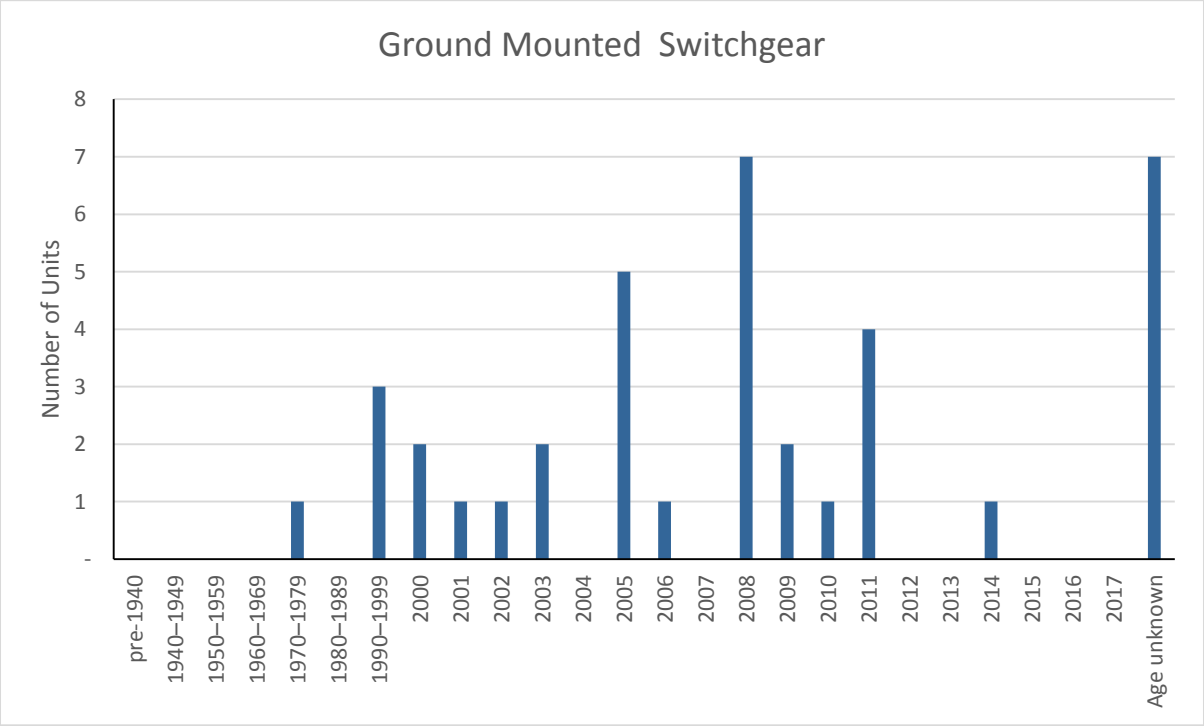


Figure 28 Age Profile of Ground Mounted Distribution Switchgear

5.10.4 Asset risk

The operational risk associated with the failure of distribution switchgear is dependent on the location and use. In service failure of a sectionaliser or recloser on a major feeder could either lead to loss of more consumers than necessary during a fault (because upstream protection must clear the fault) or prevent a planned backfeed being used to restore lost load during an outage. By comparison with this, an ABS or fuse on a spur line has low operational risk.

Safety related risks are generally low for pole mounted equipment but can be more important for ground mounted equipment, where operators are standing in close proximity during switching.

Major risks for the asset class include:

Pole Mounted ABS's, Reclosers, Sectionalisers

- Lightning – although surge arresters are widely used, a direct strike is destructive
- Animal contacts, such as possums and rats.
- Failure of porcelain insulators during operation

Ground mounted switchgear

- Vehicle incidents, as many are located in the road reserve
- Failure due to dirty insulating oil
- Failure of cable terminations on the unit
- Failure of mechanism during switching

5.10.5 Inspection and Maintenance Practices

Pole mount switchgear is inspected at the same intervals as the distribution lines on a five year cycle.

The ground mount distribution switchgear is inspected on a three year cycle. This includes partial discharge testing and visual checks for rust, vandalism, and obvious signs of damage.

Following an incident on another EDB's network in 2012, and subsequent discussions with the manufacturer, we have a programme to test and maintain all of our ground mount switchgear greater than five years old, including:

- test and replace the oil;
- clean out any contaminants and sludge in the tank;
- check the operating mechanism; and
- test the resistance of the contacts and fuses.

If this maintenance has not been completed, we will not operate the ground mount switch while it is live.

5.10.6 Renewal Programme

The renewal programme for distribution switchgear in the 2016/17 year includes the following specific projects:

- Replace 2 Oil filled RMU's
- Install 2 sectionalisers in rural feeders
- Install 4 new ABS's in rural feeders to improve the ability to sectionalise during outages

5.10.7 Expenditure Forecast

The forecast expenditure for our distribution switchgear is shown in Table 39.

Distribution Switchgear Forecast	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Routine and Corrective Maintenance	45,000	45,450	45,905	46,364	46,827	47,295	47,768	48,246	48,729	49,216
Asset Renewal Maintenance	40,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000

Table 39 Forecast Expenditure for Distribution Switchgear

5.11 Other System Fixed Assets

5.11.1 Quantity and Life Expectancy of Other System Fixed Assets

NWL owns and operates Enermet solid state 33kV Ripple Injection Plants at both the Oamaru and Twizel GXP's. An indoor Enermet solid state 11kV injection unit is installed at the Kurow Zone Substation and services the load connected to the Waitaki GXP. We own the ripple control relays installed at consumer's premises.

We operate an Abbey Systems Powerlink SCADA system. The SCADA system is connected to all of our zone substations via Abbey Systems RTUs and provides remote control, indication, logging and alarm status information for key operating assets. In addition, the majority of reclosers and sectionalisers are also connected to the SCADA system and can be remotely controlled.

The SCADA system uses UHF radio data communications provided by our licensed radio network. Radio repeaters are sited at Cape Wanbrow, Station Peak and Cloud Hill. They are shared by the VHF Radio Telephone system NWL uses for operational voice communications between the Control Room and field operators.

The life expectancy of this equipment is shown in the following table:

Asset Description	Standard life expectancy (years)
Ripple Control Transmitter	20
SCADA System	15
Radios	15

Table 40 Life Expectancy of Other Fixed Network Assets

5.11.2 Management Approach

These systems are managed with the active assistance of manufacturers and suppliers, as we do not have the expertise in house to carry out the higher level maintenance functions for this equipment.

5.11.3 Age profiles

The age profile in this category is shown in Figure 29

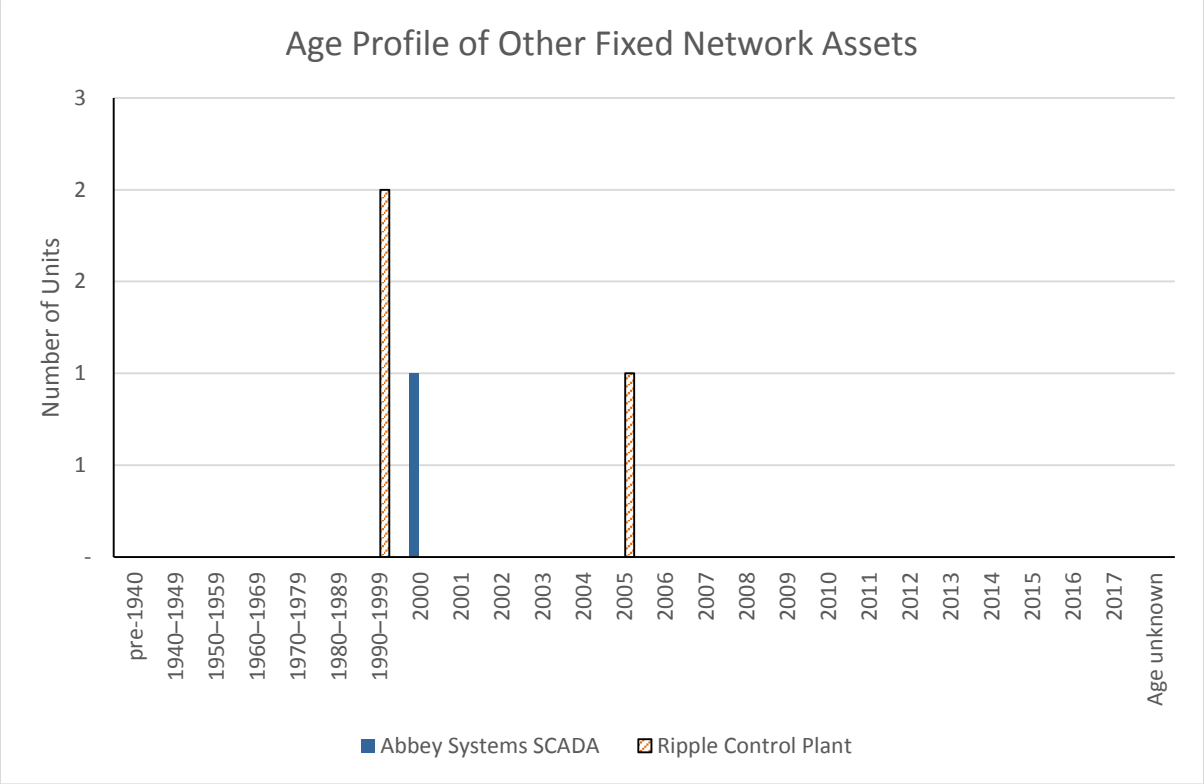


Figure 29 Age Profile of Other Fixed Network Assets

5.11.4 Asset risk

Failure of our ripple control plants would have a fairly large impact on our network, as we would lose the ability to reduce load in a non-invasive manner during a constraint.

Failure of the SCADA and/or radio communications system would render the control room inoperative, although some level of network operation could continue in the field using other means of communication.

The major risks to the Ripple control plants are component failure or that an animal accesses the coupling cells and causes damage.

The major risks to the radio network are the remote locations of our repeater sites – during extended outages due to snow they have failed in the past.

The major risk to our SCADA system is hardware failure, as they operate on specialised PC's. This is to some extent mitigated by having a master and a backup computer.

5.11.5 Inspection and Maintenance Practices

Maintenance of the SCADA and Communications Systems involves an annual radio equipment site check and a support contract with the SCADA system provider.

Maintenance of the load control plant involves a two yearly site check by the New Zealand agent for the ripple plant.

5.11.6 Renewal Programme

We are planning to upgrade the Birchwood repeater in 2016/17.There are no planned renewal projects for the Ripple Plants or the SCADA system.

5.11.7 Expenditure Forecast

The forecast expenditure for this class of assets is shown in Table 41.

Other Fixed Assets Forecast	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26
Routine and Corrective Maintenance	37,000	37,370	37,744	38,121	38,502	38,887	39,276	39,669	40,066	40,466
Asset Renewal Maintenance	0	0	0	0	0	0	0	0	0	0

Table 41 Forecast Expenditure for Other Fixed Network Assets

5.12 Other Assets

We own three 635kVA diesel generator sets, two of which are connected onto the 11kV bus at Enfield and Otematata Substations respectively. These generators are normally used for providing support generation in the event of a constraint due to a planned or unplanned outage, or a similar event. A third generator is now permanently deployed to the Waitaki District Council's main water reservoir for Oamaru to ensure continuity of water supply during any large scale power outages.

These units are maintained by outside service providers according to the manufacturer's instructions.

6. Network Development Plan (NDP)

This section describes our approach to network development and sets out our NDP for the planning period. Over the last year we have reviewed our NDP and are comfortable that it is still relevant. Accordingly, the development plans described here are an evolution of what we included in the 2015 AMP update.

This section covers:

- **Planning approach** which explains the approach, process and assumptions we use for planning the development of our network.
- **Planning criteria** which explains our security, capacity, supply, and reliability criteria. It also outlines the design standards that we have adopted.
- **Demand forecast** which explains how we forecast the amount of energy required for different parts of the region we supply; and
- **Network development plan** which explains the constraints within our network and plans to develop our network to relieve those constraints.

6.1 Planning Approach

Our planning approach is centred on achieving our mission of "owning and operating a safe, reliable and efficient distribution system that meets the evolving needs of our consumers." Therefore, our NDP is focused on safety, retaining and maintaining current service levels to our consumers and providing an economic connection for new consumers. The process we use to plan and implement development projects consists of:

- A development driver is triggered;
- Potential options are analysed and costed out. The best option(s) are developed further;
- Each development project is prioritised;
- Approval is obtained via a sanction for expenditure (SFE) from our Board;
- The project is scheduled on the Works Programme and issued to contractors for construction and commissioning.

6.2 Development Drivers

The main drivers for network development projects are:

- The provision of sufficient capacity to meet load growth from new connections and from changes in usage patterns;
- Maintaining the reliability and quality of supply especially during periods of high growth, and
- Ensuring compliance with Regulatory requirements and ensuring public safety.

Over recent years significant load growth has driven the need for additional investment within our area, in particular conversion of dry land sheep farming to dairying resulting in an increased use of irrigation. There are a number of large development projects currently in the planning or consent stage that will significantly increase demand in our area in total, or increase demand in an area of

the network where this will affect performance. Therefore, development of our network to meet consumer demand growth continues to be a significant component of our total investment.

Our NDP is based on growth trends in our network area and known potential developments. Typically, we perform a full reassessment of the NDP on a three yearly basis, with annual adjustments following the annual update of the demand forecast, or as development drivers are triggered by external actions, such as the expansion of the NOIC irrigation scheme.

NWL has identified the following planning assumptions that may impact on its business:

Parameter	Assumption	Basis for the Assumption	Potential Impact of Uncertainty
Consumer Connections	The Holcim cement plant development has been further delayed. Holcim is now building a cement import facility at the Port of Timaru	While mindful of the prospect of a major cement plant being established in the area along with all of the associated construction and support industries. It is no longer factored into the connection growth projections.	System growth projections, and the effect of a very large load which would probably require investment at a GXP level.
System Growth	That the growth in demand will continue at the rates that have been experience during the last 5 years for the first part of the planning period.	Discussions with farming and irrigation industry representatives.	The main impact around the certainty of this growth is the timing required for upgrade of subtransmission assets and the construction of new zone substations
Reliability, Safety, and Environment	That consumer feedback will continue to support the present level of reliability and quality of supply.	Successive consumer surveys have confirmed that consumers are happy with the security and reliability of the service that they receive and would not be prepared to pay extra for a higher level of security.	Network configurations are optimised for the level of security and types of operational activity carried out. A change in these requirements may require reinvestment

Table 42 Assumptions for the Network Development Plan

6.2.1 Planning Criteria

We have developed our planning criteria so that the network will meet the service level targets described in Section 3. Our planning criteria considers:

- Network Security;
- Network Capacity;
- Quality of Supply; and
- Network Reliability.

Each of these are addressed in turn below.

6.2.2 Network Security Criteria

Network security refers to the ability of the network to supply the load following the failure of one or more pieces of equipment. The deterministic security criteria we use is detailed in the following table. Security is defined for various classes of supply based on load size and consumer type.

Three security levels are defined:

- First outage: The required security following the outage of the first item of equipment (from the normal system configuration of the network)
- Second outage: The required security following the outage of two items of equipment (from the normal system configuration of the network)
- Bus Fault or switchgear failure: The required security following a busbar fault or the failure of an item of zone substation switchgear. These events are less likely and will have higher consequences than other outages.

Repair time is defined as the time taken to sufficiently repair faulted assets to where they can be livened and will support the required load. It excludes the response time taken to locate and isolate the fault as we prioritise restoration of supply to the maximum number of consumers ahead of individual security issues.

Table 43 lists our security criteria with classes of supply based on load size and consumer type.

NWL Security Standard					
Class	Description	Load Size (MVA)	First Outage (Cable, Line or Transformer)	Second Outage (Cable, Line or Transformer)	Bus Fault or Switchgear Failure
GXPs					
A1	Urban GXPs	Any	No interruption	Restore 50% in switching time 100% in repair time	No interruption for 50% Restore rest within 2hrs

NWL Security Standard					
Class	Description	Load Size (MVA)	First Outage (Cable, Line or Transformer)	Second Outage (Cable, Line or Transformer)	Bus Fault or Switchgear Failure
A2	Rural GXPs	>15	Restore 75% in switching time Restore 90% within 12 hrs.	Restore in repair time	Restore in repair time
A3	Rural GXPs	<15	Restore 50% in switching time Restore 90% within 8 hrs.	Restore in repair time	Restore in repair time
Sub-transmission Feeders and Zone Substations					
B1	CBD zone substation	Any	No interruption	Restore in repair time	No interruption for 50% Restore rest within 2hrs
B2	Urban zone substation	Any	No interruption	Restore in repair time	Restore in repair time
B3	Rural zone substation	>12	No interruption for 50% 100% in switching time	Restore in repair time	No interruption for 50% 100% in switching time
B4	Rural zone substation	2-12	Restore in switching time	Restore in repair time	Restore in repair time
B5	Rural zone substation	<2	Restore 50% in switching time 100% in repair time	Restore in repair time	Restore in repair time
B6	Sub-transmission feeder	>15	No Interruption	Restore in repair time	Restore in repair time

NWL Security Standard					
Class	Description	Load Size (MVA)	First Outage (Cable, Line or Transformer)	Second Outage (Cable, Line or Transformer)	Bus Fault or Switchgear Failure
B7	Sub-transmission feeder	<15	Restore in repair time	Restore in repair time	Restore in repair time
Distribution Feeders and Substations					
C1	Urban 11kV feeders and CBD LV reticulation	1-4MVA	Restore in switching time	Restore in repair time	Restore in repair time
C2	Urban 11kV spurs and LV reticulation	<1.5MVA	Restore 50% in switching time 100% in repair time	Restore in repair time	Restore in repair time
C3	Rural 11kV feeders	1-4MVA	Restore 50% in switching time 100% in repair time	Restore in repair time	Restore in repair time
C4	Rural 11kV spurs and LV reticulation	<1.5MVA	Restore in repair time	Restore in repair time	Restore in repair time

Notes:

1. Repair time is defined as the time taken to sufficiently repair faulted assets to where they can be livened and will support the required load. It excludes the response time taken to locate and isolate the fault as we prioritise restoration of supply to the maximum number of consumers, ahead of individual security issues.
2. Network assets dedicated to a special industrial load will have a security level determined by consumer requirements.
3. This security criteria assumes we can interrupt irrigation load for up to 48 hours.
4. Individual protection for each transformer and the 11KV bus tie run open normally or on transformer trip

Table 43: Network Waitaki Ltd security standard

Our target Repair Times for different asset classes are:

- Overhead lines 4 hours
- Underground cables 6 hours
- Distribution equipment 8 hours
- Sub-transmission equipment 12 hours

- Transpower connection assets 16 hours

6.2.3 Network Standardisation Criteria

Network capacity refers to the ability of the network, or the assets that make up the network to deliver the required amount of electricity to consumers. We design our network to have sufficient capacity to deliver electricity during normal conditions and meet our security criteria (See Section 6.2.2) during contingent events, when one or more assets are unavailable.

Table 44 below defines the capacity standards for the different asset classes.

Asset Class Criteria	Basis for Rating	Standardisation
33/66 kV Overhead Conductor	We size new conductor for the expected loading at the end of the planning period based on common industry sizes, and sizes common in our network We select the conductor size for both electrical load and mechanical strength.	Typical conductors we use are Dog and Jaguar, and Neon close to the coast.
33 kV Cables	We size new cables for the expected loading at the end of the planning period based on common industry sizes. Select the conductor and screen size for both load and fault current carrying capability. We ensure terminations have high impulse withstand voltage rating and be of a design that minimises the risk of discharge between cores in the termination area. We protect all 33 kV cables with suitably rated surge arrestors. This criteria also helps to meet network quality targets by reducing surge voltages on the subtransmission network.	
Zone Substation Transformers	We choose Zone Substation Transformers to meet the security criteria for the planning period. This means supplying the existing load and providing contingent capacity for neighbouring substations. For rural areas we normally use our standard transformer for rural zone substations, which is 5/7 MVA Dy11.	Rural zone transformers are typically 5/7 MVA, Dy11.
Distribution Feeder Loading Criteria	We adopt a feeder loading criterion to maintain distribution network transfer capacity between zone substations and provide backup to feeders within zone substations. Where possible, we maintain maximum routine feeder loads within 67% of the rating of the feeder. This will allow the	Maximum feeder loads are maintained within 67% of the rating of the

Asset Class Criteria	Basis for Rating	Standardisation
	load to be spread around neighbouring feeders if one feeder fails.	feeder.
11 kV Overhead Conductor	We size new conductor for the expected loading at the end of the planning period based on common industry sizes. Select the conductor size for both electrical load and mechanical strength. Within 1 km of the coast use all aluminium conductors. For everywhere else, use ACSR conductors.	Typical conductors we use are Mink and Dog.
11 kV Backbone Cables	We use 185mm2 Al XLPE insulated cable for all new 11 kV cable for feeder backbones.	185mm2 Al XLPE.
11kV Spur Cables	We size new 11 kV spur cables for the expected loading at the end of the planning period based on common industry sizes. We select conductor and screen size for both load and fault current carrying capability.	
LV Overhead Conductor	We size new conductor for the expected loading at the end of the planning period based on common industry sizes. We select the conductor size for both electrical load and mechanical strength.	Typical conductors we use are AAC Weke and Kutu.
LV Cables	We use 120mm2 or 185mm2 Al XLPE insulated cables for all new LV cables depending on local LV distribution load characteristics for a given transformer area and assessed voltage regulation under peak loading conditions.	120mm2 or 185mm2 AL XLPE.
Distribution Transformers	We select distribution transformers to ensure their capacity exceeds the assessed long term after diversity maximum demand of the current and potential load.	15, 30, 50, 100, 200, 300, 500 kVA
Switchgear	We select switchgear to: • meet the expecting loading at the end of the planning period; • have a maintenance requirement that is equivalent to or less than current plant; and • be able to be maintained using skills available locally. We have a policy of avoiding SF6 gas wherever possible, due	

Asset Class Criteria	Basis for Rating	Standardisation
	to the known environmental impact of the gas.	
Poles	We use poles of adequate strength to comply with design to AS/NZS7000 and be capable of withstanding snow and ice loading experienced with the region. We use the Catan line design software package to analyse forces and loadings to ensure we select correct pole and stay options.	

Table 44: Network Waitaki Ltd capacity criteria

6.2.4 Quality of Supply Criteria

Voltage drop is a problem on our network as we have a low density network with long rural feeders. On long rural feeders low voltage is generally the first sign of an emerging network capacity issue so it is one of the most common drivers for network augmentation projects.

We design our network to the following voltage limits:

- 33 kV Sub-Transmission: ±5% of nominal voltage
- 11 kV Distribution: ±5% of nominal voltage
- 400 V LV network: ±6% of nominal voltage up to the legal point of supply
- The maximum voltage drop along 33 kV lines in normal configuration shall be no more than 2.5%
- The maximum voltage drop along 11 kV feeders in normal configuration shall be no more than 5.0%
- The maximum voltage drop along LV feeders in normal configuration shall be no more than 10.0%

Projects that improve the voltage levels or voltage control on our network provide the following benefits:

- The ability to meet statutory voltage limit requirements
- Improvement in distribution circuit capacity
- Improvement in back feed ability to other distribution circuits in a contingency condition
- Reduction of power losses

6.2.5 Design Standards

We have adopted design guidelines for planning our network in rural areas. Building to these guidelines has enabled us to meet our security and capacity criteria in a productive and efficient manner.

Our Planning Guidelines for the Rural Network include:

- limiting 11kV feeders to 4 MVA distributed over 15 km – assuming 2 MVA of feeder load and 2 MVA of tie capacity;
- limiting 33kV sub-transmission lines to 20 MVA distributed over a maximum distance of 35 km – assuming 7 MVA off-takes at approximately 10 km intervals;
- no more than three 7 MVA substations per 33 kV line;
- ensuring Zone Substations configured for ***N*** security must have a minimum contingent capacity of 20% and preferably 50% of the maximum demand of their largest neighbouring substation; and
- utilising 33/11 kV, 5/7 MVA transformers for rural substations and upgrading to dual transformer sites when the load exceeds 5MVA

We achieve cost efficiencies by utilising standard designs for lines and substations. We review these designs periodically and update them where we identify opportunities to improve them efficiently, or we identify new techniques or products that provide a better outcome.

6.2.6 Distributed Generation

Distributed generation (DG) is classed as any form of generation that produces electricity for use at the point of connection or supplies electricity to other consumers through the local lines distribution network at distribution voltages. It does not supply electricity to consumers via the transmission grid.

DG is typically small scale generation (typically less than 5MW) that is embedded into the distribution network or consumers' premises. Our approach to DG is based on the following key principles:

- Distributed generation will be able to connect to our distribution network on fair and equitable terms which do not discriminate between different DG schemes;
- the terms under which DG can connect and operate will be as clear and straight forward as possible, within the limitations of the relevant legislation and our mission to operate a safe, reliable, and efficient distribution system; and
- We will work with the industry to investigate issues around widespread DG and work to incorporate mitigations into our network development and operation.

There are 38 DG schemes totally approximately 200kW of generation connected on our network. These range from two mini hydro schemes of 30 kW and 20 kW capacity to 3-5 kW schemes using roof top photovoltaic (PV) systems. We are committed to enabling the establishment of consumer owned DG within our network.

NWL has the following policy documents for the connection of Distributed Generation:

- NI05/35 Regulated terms for connection of distributed generation
- NI05/36 Connection and operation of distributed generation with a capacity 10kW or less
- NI05/37 Connection and operation of distributed generation with a capacity greater than 10kW

These policy documents are freely available to consumers from our website, www.networkwaitaki.co.nz. NWL also uses the EEA produced 'Technical Guidelines on Connection of Generation'.

The basic conditions for connection of DG to the network are that:

- it must automatically disconnect and lock out from the distribution network if there is a loss of mains power, and
- it must not impact adversely on the quality of supply in the area it is connected.

In the past we have investigated the feasibility of installing and running DG systems ourselves, and will continue to consider them in the current planning period, if suitable opportunities arise. We currently have three grid connected diesel generators that are used for load support when required, usually because of outage requirements.

6.2.6.1 The Effect of DG on Network Development Planning

We consider the impact of distributed generation in two ways as part of the network development planning process. Firstly, DG is considered from how its likely uptake will impact on the demand forecasts developed as part of the network development planning process. We expect that within the planning period of this AMP research into the effects of widespread DG within a network will help our planning. Secondly, DG is considered as an alternative to conventional network solutions for each project in the network development plan.

6.2.7 Demand Reduction

We use our load management system to control water heating and other loads at consumers' installations. Load management is presently used to reduce network demand co-incident with regional peaks, and thereby reduce transmission charges.

Load management is also used to shift demand from peak load times into off peak times to manage the transmission constraint into the Oamaru GXP. We have installed ripple relays on irrigation loads greater than 30 kVA to enable this load to be managed both pre and post contingency to manage this transmission constraint.

Consumers are encouraged to take advantage of the load control options available to them, and NWL charges are structured to encourage the use of off peak energy. Controllable load is comprised mainly of storage water heating, with a diminishing quantity of night storage and under floor heating. However, the availability of controllable load has diminished in recent years due to the replacement of off peak night storage heating with heat pumps that have traditionally been unsuitable for load control due to the low thermal mass of air. Within this planning period we will be investigating the state of the art in the area of load control using heat pumps, as the penetration of these devices increases.

We are also considering modifying our price structures to incentivise more off peak energy use. As the deployment of smart meters in our area of supply increases there may be some more opportunity to increase demand side management

6.2.8 Energy Efficiency

NWL has participated in previous energy efficiency initiatives including the retrofitting of water heating cylinder insulation and the eco light bulb campaign. Another initiative has been to provide funding for the Centre of Advanced Engineering to prepare an Energy Sustainability Plan, in

conjunction with local authorities and economic development agencies. In the past NWL has contributed to co-funding an Irrigation Energy Efficiency Programme initiative done by Irrigation New Zealand and the Energy Efficiency and Conservation Authority (EECA).

We will continue to investigate options to improve the energy efficiency of our consumers, key stakeholders and the local community.

6.3 Demand Forecast

Over the past decade a significant portion of network investment has been driven by load growth. The growth has primary arisen from the change in land use demographics i.e. the conversion of dry land sheep farming to dairying and the associated rise of irrigation, which is also making inroads into crop farming.

A benefit of this demand driven investment is that it has driven the upgrade of parts of the network prior to condition based investment triggers.

As well as increasing the demand on the network assets, the move to irrigation has also affected the demand profile of our network. Where we were a winter peaking network, our current peaks occur in January or February.

We are aware of a number of very large development projects that are in the planning or consent stage and may appear during the planning period. There are no doubt other projects being considered that we are unaware of at this point. Accordingly, the development of a robust demand forecast is essential to achieving our corporate Mission.

We have applied certain assumptions to our demand forecasts to assist us with modelling the future requirements of the network. They are shown in Table 45

Parameter	Assumption	Basis for the Assumption	Potential Impact of Uncertainty
Consumer Connections	That the demand for new and upgraded connections, in the dairy and irrigation sector, will continue. Environmental requirements are placing demands on irrigators to be more efficient. This pressure is expected to see the increased use of spray irrigation, which will require increased investment in the electricity network	NWL has been experiencing strong growth in the dairy conversion and irrigation sector due to the availability of irrigation water from the Waitaki river. The on-going expansion of the NOIC irrigation scheme into areas that were previously constrained to dry land farming is providing further opportunities for changes in land usage.	System growth projections, planning, and capital funding projections, and contractor workload
System Growth	That the growth in demand will at least continue at the rates that have been experienced during the last 5 years	Discussions with farming and irrigation industry representatives, along with media reports of Government promoting irrigation. Analysis of applications for new supplies – total capacity purchased is increasing annually.	The main impact around the certainty of this growth is the timing required for major upgrades in transmission and subtransmission upgrades.
Reliability, Safety, and Environment	That consumers remain satisfied with the planned levels of reliability and quality of supply.	Successive consumer surveys have confirmed that consumers are happy with the security and reliability of the service that they receive and would not be prepared to pay extra for a higher level of security. .	To increase the reliability and quality of supply from current levels may require duplication of assets, and a change to the topology of our network to incorporate closed rings to guarantee supply.

Parameter	Assumption	Basis for the Assumption	Potential Impact of Uncertainty
System Growth	That "disruptive technologies" such as DG do not dominate the distribution network before their impact is understood	Many of these technologies (PV systems, electric cars) are not well suited to use in a reasonably small rural community as far south as Oamaru. This is likely to keep initial penetration at a low level and allow time for analysis of the potential effects	The large scale installation of effective DG within a particular area could potentially strand major assets by reducing demand. Conversely, the large scale installation of Electric vehicle chargers in a particular area could stress some network assets

Table 45 Demand Forecast Assumptions

6.3.1 Methodology

The development of a robust demand forecast is complex and requires a number of inputs and assumptions. For the purposes of planning network development we establish a reasonable baseline forecast which is then continually tested against actual demand outcomes as the years progress, i.e. we test the accuracy of our model by looking at what is actually happening in the network.

When applying load increases to the model we use a linear kW value rather than applying a percentage load growth factor as we believe the compounding effect of the percentage load growth would over-estimate the demand in the latter part of the planning period.

The process to establish a baseline demand forecast for our network is as follows:

- Historical demand records are split at the 11kV feeder level into several load categories, including irrigation, dairy farming, large industrial, large commercial and residential load;
- The historical demands in each of these categories are extrapolated using different calculated trends. Forecast of irrigation and dairy load is based on actual demand increases in the last 2 to 3 years plus discussions with major stakeholders in the dairy and irrigation industries. Demand forecasts for major industrial loads are based on any known step changes in this type of load gleaned from discussions with major consumers and from media sources.
- Greater weighting is placed on dry years (when irrigation is being used to a greater extent)
- Historical diversity factors are then used to combine the forecasts at the feeder level to derive forecasts at the Zone Substation level. This process is repeated at the subtransmission level to provide GXP forecasts.
- Step loads due to known developments such as major irrigation schemes, large industrial installations and any large subdivisions are added into the forecast at the relevant level (distribution, subtransmission or GXP)

- For large irrigation schemes, we estimate additional on farm irrigation load based on applying historic kW/hectare ratios to the amount of land being irrigated.

Diversity factors are updated periodically as they change over time as new loads are added, or as existing load profiles change (for example irrigation use is changing as farmers seek to use it more efficiently).

6.3.1.1 The Impact of Demand Side Management on the Demand Forecast

We make extensive use of our ripple control load management system to control water heating and other suitable loads at consumers' installations. We use load management to reduce network demand coincident with the Transpower Lower South Island regional peaks, which is typically during the winter period. While this is not coincident with the peak loading on the network, we do this primarily to reduce transmission charges for our consumers.

There are also situations where we use demand side management to limit the loading on our network assets to ensure that they can provide the level of reliability expected by our consumers. This is primarily during drought periods in the summer to manage the transmission constraint into the Oamaru GXP. Typically, the impact of load management in the summer is small and for these reasons we have not included the effect of demand side management in the demand forecasts.

6.3.1.2 The Impact of Distributed Generation and Embedded Generation on the Demand Forecast

To date there has only been a small amount of distributed generation installed within our area of supply. This is intrinsically included in our demand forecast by its impact on the historic measured feeder peak demand and it is assumed that this existing generation will continue to be used at the same level into the future.

For these reasons we have not made any allowance for Distributed Generation in our demand forecast, but we will continue to watch the developments in this area with interest.

6.3.1.3 Key Developments Included in Forecasts

The following key developments within the region are included in the current demand forecast

- NOIC is committed to an expansion that will add approximately 10MW to the demand at Black Point. This expansion will extend their piped irrigation network to new areas of the region, primarily the Kakanui River Valley, which will result in additional on farm pumping load, and potentially some Dairy conversions in that area.

6.3.2 The Demand Forecast

The demand forecast is presented below at two levels, GXP and Zone substation. Each are presented below.

6.3.2.1 GXP Demand Forecasts

In 2012 NWL revised its previous demand forecast, with special attention focused on the irrigation and dairy sector. This forecast started from the previous work done for the 2011 AMP and the work

done by Covec (independent consultant) in 2009. The forecast completed in 2012 included historic increases in irrigation in the last few years. Discussions were also held with key players in the local irrigation schemes and farming groups to gauge the amount of new land that is likely to be spray irrigated and the amount of existing border dyke based irrigation that is likely to be converted to spray.

The work on demand forecast was refined again in 2014. The latest forecast shown in Figure 30 includes two new scenarios for Oamaru GXP, a high growth scenario (multiple dry years) and a low growth scenario (multiple wet years), as these represent the range of demand that could be seen in any year.

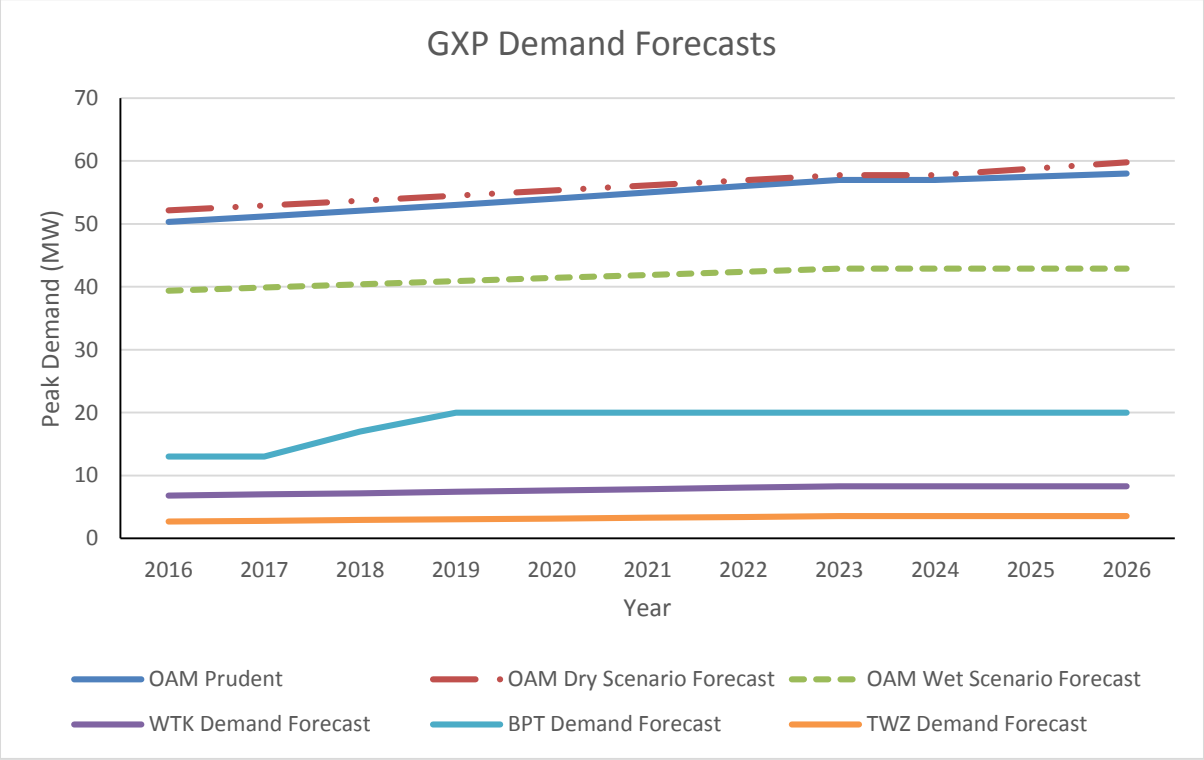


Figure 30 GXP Demand Forecasts

6.3.2.2 Zone Substation Demand Forecasts

Table 46 shows the 10 year Zone Sub demand forecasts. The primary drivers for the load forecast are:

- Irrigation load is expected to continue to drive high growth especially in the Kakanui River Valley, with the extension of the NOIC scheme. .
- Continued steady growth in demand due to irrigation in the Western part of the network beyond Kurow.

These drivers are described in more detail in Table 46 below.

Maximum Demand (MW)	2015/16 Actuals		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Ohau	1.25		1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3
Omarama	1.5		1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.4	1.4
Otematata	0.6		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Kurow	5.0		3.0	3.1	3.2	3.0	3.1	3.2	3.5	3.7	3.7	3.7
Otekaieke						3.0	3.0	3.0	3.0	3.0	3.0	3.0
Duntroon	5.2		5.4	5.4	4.5	3.5	3.6	3.6	3.6	3.6	3.6	3.6
Awamoko					4.0	3.1	3.1	3.1	3.1	3.1	3.1	3.1
Ngapara	4.8		4.5	4.5	4.0	4.1	4.2	4.2	4.3	4.4	4.5	4.5
Papakaio	5.4		5.5	5.5	3.5	3.6	3.6	3.7	3.7	3.7	3.7	3.7
Enfield	2.6		2.6	2.6	2.7	2.7	2.8	2.8	2.8	2.9	2.9	2.9
Parsons Road	4.23		3.0	3.0	3.1	3.1	3.2	3.2	3.2	3.3	3.3	3.3
Pukeuri	8.0		9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Chelmer Street	15.0		10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.3	10.3
Redcastle	5.7		5.8	5.9	6.0	6.1	6.2	6.3	6.4	6.4	6.4	6.4
Five Forks				1.9	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1
Maheno	3.25		3.3	3.4	3.4	3.5	3.5	3.6	3.6	3.7	3.7	3.7
Hampden	1.4		1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2

Table 46 - Zone Substation Maximum Demand Forecast

6.4 Development Programme

The development requirements for each of the GXPs, subtransmission and zone substations is described below. A summary of the resulting capital expenditure is provided at the end of the chapter.

Our development strategy for the planning period remains unchanged from the 2015 AMP, with the overall objective of:

- implementing a staged migration to subtransmission at 66KV as demand grows across the region;
- Shift existing load and future growth away from the Oamaru GXP which is constrained by Transpower's 110kV transmission system.

We consider this overall strategy the most economic means of continuing to meet the increasing demand from our consumers. At a distribution level the growth in load has resulted in the need to reinforce feeders to maintain the level of security, and therefore reliability, to our consumers.

We are not planning to reticulate new areas or to remove reticulation from less economic areas. Our aim is to retain and service our existing consumers, and connect new consumers as they become available, while maintaining the current levels of service provided.

The resulting investment programme includes the following investment areas:

- Transpower's 110kV development
- GXP development
- Subtransmission development
- Zone Substation and Distribution development

Each of these are discussed below.

6.4.1 Transpower's 110kV Transmission Development

The ***N-1*** capacity of the Transpower 110kV network supplying the North Otago region and the southern part of the South Canterbury region is constrained. These circuits will either require a significant upgrade within the next few years or some of the load supplied by these circuits will need to be supplied from another part of Transpower's transmission grid. The dual 110kV lines supply four GXP's, namely our Black Point and Oamaru GXP's, and Alpine Energy's Bells Pond and Studholme GXPs.

Load growth trends within these GXP areas have increased significantly in the last 5 years with the NOIC development at Black Point and new dairy factories at Studholme and Glenavy. A number of large irrigation developments are also on the horizon.

In response, Transpower has investigated load growth projections and in consultation with NWL, Alpine Energy and major stakeholders has developed a number of transmission upgrade options that will form the basis of the Waitaki Valley Transmission Development Plan.

Unfortunately, the planning horizon for these upgrade options will not meet the requirements of the demand growth on our network. Transpower are investigating alternative systems to allow the better use of existing assets, such as a special protection scheme between Waitaki GXP and Black Point which will allow NOIC's 10MW expansion to go ahead in the next few years.

We have begun to investigate multiple options to remove or reduce the constraint that we are subject to due to Transpower's operational policies on their 110kV equipment.

6.4.2 GXP Development

6.4.2.1 Oamaru GXP

The Oamaru GXP is a 40MVA N-1 substation currently supplying a peak load of 40MVA during dry summers.

The 110kV Transpower supply to the Oamaru GXP has a dynamic voltage constraint due to constraints on the Transpower equipment supplying it. There is also an operational loading constraint on the 110kV lines between Waitaki and Oamaru GXP's that limits the *N-1* capacity at this Oamaru GXP to approximately 40 MW depending on transmission system conditions. Operation to 40MVA is only possible because of an approval for reduced voltage levels.

During the dry summers (with high irrigation loads) of 2009/10 and again in 2015, the load at the substation was held just below this level by the use of load control, with Transpower declaring a grid emergency in 2015.

During these times we have employed additional load control measures, and additional local generation to help mitigate this transmission constraint.

It is our expectation that without additional investment to keep moving load away from Oamaru GXP the load will exceed the transmission capacity supplying the GXP by between 7 MW to 11 MW at the end of the planning period.

Development options that are available to us and were considered to overcome the 110kV system constraints include:

- Building a 220kV GXP at the Livingstone substation thereby bypassing the constraints on the 110kV system. This option would effectively enable any new load between Kurow and Oamaru to be supplied from this GXP;
- Thermally upgrade the conductors on the two single circuit lines supplying Oamaru;
- Build a new substation at Glenavy to provide a bus tie and allow better use of existing 110kV assets;
- Install a 30MVAr capacitor bank at Oamaru to help reduce the voltage constraint;
- Build a new 110kV/33kV GXP at the existing Black Point site; or
- Install a special protection scheme that will automatically disconnect irrigation load following the forced outage of one the circuits supplying Oamaru to bring the load below the ***N-1*** constraint.
- Upgrade the capacity of the existing Lake Waitaki GXP and extend the subtransmission network to move substations from Oamaru onto Waitaki;

As a result of this investigation it was determined that the best long term option was to increase the capacity of the Waitaki GXP and construct a new 66kV line subtransmission line (initially operated at 33kV) to Duntroon Zone substation.

This development was completed in time for the summer irrigation season of 2015, and successfully moved approximately 3MW was moved off the Oamaru GXP. Peak demand on Oamaru in the 2015/16 summer period since the Waitaki GXP upgrade has been recorded as 38.9 MVA

6.4.2.2 Waitaki GXP

The Waitaki GXP was an ***N*** security GXP with one 5 MVA transformer, supplied from the Waitaki Power Station 11kV Generator bus. With continuing load growth in the region the capacity of the GXP was fully utilised in 2015. In order to remove this constraint the GXP was upgraded in 2015 with a new 20/24MVA transformer and associated controls and switchgear as Stage 1 of a two stage project. The substation now has a capacity at *N* security of 24MVA. The original 5MVA transformer is still on site and can be returned to service with some switching, but will not operate in parallel with the new transformer.

This upgrade has allowed the transfer of Duntroon substation from Oamaru GXP onto Waitaki GXP

Stage 2 of the project will involve the installation of another 24MVA transformer to increase the security of the GXP to *N-1* at 24MVA. This work is planned for 2018/19.

This upgrade will provide adequate capacity for this GXP through the planning period.

6.4.2.3 Twizel GXP

The Twizel GXP supplies both NWL and Alpine Energy networks from a split 33kV bus. Although this is a dual transformer installation it is operated as two ***N*** security GXPs with a 33kV backup supply available from the other transformer and bus. Options for upgrading the protection at this GXP to upgrade it to an ***N-1*** security supply have been investigated but cannot be justified on a cost per consumer basis.

The Twizel GXP has sufficient capacity to meet our load within the planning period. As part of Stage 2 of the Waitaki GXP upgrade we will be reviewing which substations are connected to the Twizel GXP and whether any should move to the Waitaki GXP, to ensure that we are making the most efficient use of our GXP connections.

Development at the Twizel GXP in 2016/17 will be limited to the addition of automated HV switching on the Ripple Control system operated there, to allow remote isolation of the coupling cell. This will reduce the time required to reconfigure the subtransmission network between Twizel GXP and Waitaki GXP, which currently required manual switching.

6.4.2.4 Black Point GXP

The Black Point GXP is dedicated to the NOIC Irrigation Scheme, which was commissioned in 2006.

NOIC is in the process of implementing an expansion which will raise their peak demand from 10.7MW to 19MW. The GXP is designed to meet a firm capacity of 25MVA, but operational issues on the Transpower 110kV system feeding it (the same issues affecting Oamaru GXP) have constrained the supply to Black Point.

In order to supply the 19MW demand, Transpower are installing a special protection scheme between Waitaki GXP and Black Point GXP. In the event of a contingent event during a constraint period the protection scheme will operate and remove some of the NOIC pumping load to bring the Black Point demand below the constraint.

This system was also discussed as an option to ease the constraint on Oamaru GXP, although it was not pursued, as the required security was difficult to guarantee with the complexity of the distributed load on Oamaru GXP compared to the centrally controlled pumping load at Black Point.

There are no other developments planned at Black Point for the Planning period.

6.4.3 Sub-transmission Development

There are three drivers for the subtransmission development:

- The transfer of load from Oamaru GXP to Waitaki GXP;
- Voltage constraints at Oamaru GXP; and
- Area specific upgrades for zone substations for load growth.

These are discussed below.

6.4.3.1 Transfer Load from Oamaru GXP to Waitaki GXP

As discussed above the presence of a constraint of 40MW on supply out of Oamaru GXP means that we need to transfer load away from Oamaru GXP to the Waitaki GXP to allow capacity for expected growth in the Oamaru area.

This requires the construction of a subtransmission line extension from the Waitaki GXP supply. The first stage of this new line has been constructed between Kurow and Duntroon Substations, and was commissioned in the summer of 2015. It is designed and constructed for 66kV operation, but will be operated at 33kV until at least 2021/22. This has allowed us to move up to 5MW of load from the Oamaru GXP onto the Waitaki GXP.

In the first few years of the current planning period, there is forecast to be irrigation driven load growth in the area between Kurow and Black Point, and in the lower Waitaki Plains area. Part of that growth will be driven by the on farm pumping associated with the expansion of the NOIC pumping scheme into the Kakanui River Valley area. This will drive the construction of new substations (discussed below) which may require more load shift from Oamaru GXP to Waitaki GXP.

6.4.3.2 Voltage constraints at Oamaru GXP

The 33kV sub-transmission network that emanates from the Weston Switching Station is fed by the Oamaru GXP, and is becoming voltage constrained. These constraints are most evident in the areas to the west of Oamaru remote from the GXP. This will become more pronounced as more irrigation and dairy development occurs west of Duntroon, and on the lower Waitaki plains.

A number of options for addressing these constraints have been investigated. These included:

- The establishment of an additional GXP.
- Upgrading the capacity and security of the Waitaki GXP.
- Extending and creating rings in the 33kV network.

- Establishing a higher voltage sub-transmission network, at 66kV or 110kV.

For the reasons described in the previous section the investment option selected to resolve this issue was the upgrade of the Waitaki GXP and the eventual use of 66kV in our subtransmission system. The areas of the network which are effected the worst by the voltage constraint at Oamaru/Weston will be moved across to Waitaki GXP as new substations are commissioned.

6.4.3.3 Pukeuri Substation: Upgrade to Dual Transformer

This substation falls within the class B4 of the security standard. There is limited ability to restore load should the single zone substation transformer fail.

Pukeuri Substation supplies our second largest consumer, Alliance Pukeuri Freezing Works, on one 33/11 kV 10/12 MVA transformer. The substation load is approximately 8MVA. The substation also provides backup at 11kV for the Papakaio substation, which is in an area of irrigation load growth.

There are two 33kV lines supplying this substation. An outage of any one 33kV line will not impact on supply. However, a failure of the zone substation transformer will have a major impact as there is not sufficient capacity on neighbouring substation feeders to restore the entire load. The upgrade involves installing another suitable transformer on site. We have a spare 10MVA transformer that came out of Redcastle Substation that can be used for this project.

This project is justified in terms of the improvement in security that it provides. Approval of the project is subject to expenditure approval from our Board, pending further modelling work proving the security benefits.

6.4.3.4 Kurow Substation

In the 2016/17 year we are planning to install a fibre optic communications cable from Waitaki GXP to Kurow, along with associated communications equipment.

The addition of the second transformer at Waitaki GXP in 2018/19 will correspond with the construction of a second subtransmission line from Waitaki to Kurow zone substation.

Within the planning period (currently forecast for 2021/22) we will install a 33/66kV autotransformer at Kurow to allow the subtransmission down towards Duntroon to operate at 66kV.

6.4.3.5 66/33 kV Autotransformers at Kurow, Duntroon, Awamoko, and Ngapara Substations

This project will enable the lines between Kurow, Duntroon, Awamoko and Ngapara Substations to operate at 66 kV. Ultimately this voltage change will be required to enable these substations to be supplied from the upgraded Waitaki GXP without voltage constraints. In turn this will enable the Oamaru GXP to sustain local growth within the present transmission constraints, which are expected to be present during the current planning period

This work will be coordinated to match in with the upgrade of the subtransmission line from Kurow to Duntroon planned to occur in 2021/22.

6.4.3.6 New Five Forks Substation and Subtransmission Supply

With extra irrigation load coming onto the Kakanui River Valley, a new zone substation will be required in the Five Forks area for the summer of 2016/17 to supply this new load.

The substation will be a standard single transformer rural type, with a single 11kV bus supplying three radial feeders. Early design work was completed in 2015/16, including the purchase of the substation land and geotechnical surveys.

The new Five Forks substation will be supplied by a new 66kV line from the existing Enfield Zone substation, which will initially be operated at 33kV. Line route options are being finalised at the moment and this line will be constructed in 2016/17.

6.4.3.7 New Awamoko Substation and Subtransmission Supply

The load on each of the Papakaio and Duntroon single transformer 7 MVA substations now exceeds 5 MW at peak times. This means that if either of these substation transformers were to fail it would be difficult to supply the peak load of these substations from neighbouring substations on the 11 kV network, which breaches our security requirements. We will build a new substation in the Awamoko – Peebles area. The substation will be based on our standard 7MVA single transformer single bus rural type with radial 11kV feeders.

A subtransmission supply will be constructed from the existing Ngapara substation. It will be built to 66kV standard but initially operating at 33 kV. The conversion to 66kV is not forecast in the current planning period.

This project is planned for the 2019/20 works programme. This substation will reduce the demand on the Papakaio and Duntroon Substations as well as provide contingent capacity for these two substations. The subtransmission line supplying it is also required before the end of the planning period to enable more load to be shifted off Oamaru and on to the Waitaki GXP. Hence, this line fulfils two needs.

6.4.3.8 66 kV Line Duntroon - Awamoko

This project will provide added security to Ngapara, Duntroon and Awamoko substations by providing a 33kV ring between them. This will help to provide a suitable service for the extra load growth expected in the Lower Waitaki plains area.

This work is planned for the 2020/21 works programme.

6.4.3.9 New Otekaieke Zone Substation

The distance between the Kurow and Duntroon substations is 30 km. The load between these substations is forecast to grow due to new irrigation developments and existing border dyke irrigation converting to spray. During the construction of the Kurow to Duntroon subtransmission line the increased loading in the area caused problems with feeder ties that were being used to maintain supply. The construction of a new zone substation in the Otekaieke area will resolve this issue.

We plan to construct a new substation in Otekaieke in the 2017/18 planning year. It will be based on our standard 7MVA single transformer single bus rural type with radial 11kV feeders. Supply to the substation will be via the new Kurow to Duntroon line, probably via a Tee connection. A 66/33kV

autotransformer will be installed in 2021/22 to match up with the conversion of the subtransmission supply from Kurow.

Final configuration of the subtransmission and substation design, will be carried out in the 2016/17 works plan.

6.4.3.10 Reinsulate the Ngapara – Duntroon Line for 66kV Operation

This project, in conjunction with 66/33 kV autotransformers at Kurow and Duntroon substations will enable Ngapara Substation to be supplied from the Waitaki GXP via the Duntroon 33kV bus. This will enable load growth in the region to be supplied from the Waitaki GXP and enable the Oamaru GXP to operate within the transmission constraints for many years.

This project is planned for the 2019/20 works programme.

6.5 Subtransmission Expenditure Summary

Table 47 lists the expected timing and costs of the major sub-transmission projects:

Project	Driver	Planning year	Budgeted Cost k$
33kV Line to Five Forks	System Growth	2016/17	2,250
Five Forks Zone Substation	System Growth	2016/17	1,800
Otekaieke Zone Substation	System Growth	207/18	1,200
66kV Line Ngapara - Awamoko	System Growth	2018/19	1,950
Awamoko Zone Substation	System Growth	2019/20	1,700
Reinsulate Ngapara – Duntroon Line for 66 kV operation	System Growth	2019/20	350
66kV Line Duntroon Awamoko	System Growth	2020/21	2,400
Upgrade Pukeuri Substation to Dual Transformers	Reliability, Safety, & Environment	2021	1,075
66/33 transformers at Kurow and Duntroon Substations	System Growth	2021/22	1,680
		Total	14,405

Table 47 Planned Sub-transmission Projects in the Planning Period

6.5.1 Distribution Development

Development of the distribution network has been driven by load growth and new connections in the past decade. NWL expects this trend to continue in the early part of the planning period. Later in the planning period as the load growth driven work decreases, there is expected to be an increase in life cycle condition based replacement work.

Due to the major work that is planned at the GXP, Subtransmission and Zone Substation level, our distribution network will not require much development in the short term.

Our planning for the distribution development traditionally has a very short planning horizon, of one or two years. We will be developing better capability in this area of our planning during 2016/17.

6.5.1.1 Upgrade McHenrys Road – Station Peak Feeder

This is Stage 2 of this project, and involves upgrading an 11kV feeder to ACSR Dog conductor so that it can be used as an alternative feeder into the Hakataramea Valley region, which has experienced significant irrigation growth in the last few years. This increases our options for supply to the area during planned and unplanned outages.

6.5.1.2 Upgrade the Five Forks Feeder

This project involves rebuilding 6.6 km of the Five Forks feeder down Kakanui Valley and Crown Hill Roads, using ACSR Dog conductor. This section is currently strung with low capacity conductor (such as Swan conductor) which does not meet NWL's standard of using Mink as the minimum capacity conductor. There are 45 distribution transformers connected on to this section and the area is also experiencing load growth.

This project will:

- Enable the Five Forks feeder to be interconnected to the Ngapara feeder by building 2.5 km of new line, which will increase security to both feeders.
- With construction of a new zone substation in the Five Forks area, the proposed tie to the Ngapara feeder will be used to provide contingent capacity for the outage of either the new zone substation or the existing Enfield Substation.

6.5.1.3 Upgrade and Extend the Windsor Feeder to Peaks Road

This project involves upgrading the Windsor Feeder (supplied from Ngapara Substation) down Conlan Road and extending it to Peaks Road. The primary driver for this project is to meet the expected increase in irrigation and dairy load in the Paradise Gully Road area. Extending the feeder to Peaks Road will enable it to connect up to the Five Forks and Ngapara feeders once the projects to upgrade and extend these feeders are completed. Together these projects will provide increased reliability and security to the feeders and between the existing Ngapara and Enfield substations, plus the new Five Forks substation when it is built in 2016.

6.5.1.4 Voltage Regulator Projects

In the first five years of the planning period we are budgeting to install at least one set of 3 phase 150A voltage regulators on the distribution network. The most suitable location for each will be determined as part of the project.

These regulators will generally be used to provide voltage support for when the distribution network is in an abnormal configuration, e.g. during a feeder tie situation while restoring power after a fault. The ongoing growth in the "far ends" of our distribution feeders has eroded the ability of feeder ties that have been traditionally used to maintain supply. The regulators will improve this situation.

6.5.1.5 Dunrobin Rd to new NOIC site

As part of the expansion of their network NOIC are installing a new pump site that requires the upgrade of the feeder that it will be supplied from in the 2016/17 year.

6.5.1.6 Install Distribution Transformers – Load Growth

The majority of load growth in our network is new irrigation projects, which typically have dedicated transformer assets. However, we are forecasting a moderate number of transformers will need to be installed to deal with load growth. These will most likely be in the township areas, and may be triggered by calculation of ADMD loads, or consistent high readings on maximum demand indicators (MDIs) of existing transformers.

Table 48 lists the major planned distribution development projects:

Project	Driver	Planning Year	Budgeted Cost k$
Upgrade McHenrys Road lines	Reliability, Safety, and Environment	2016/17	300
Upgrade Five Forks Feeder along Kakanui Valley Road	System Growth	2016/17	300
Upgrade and extend Windsor Feeder to Peaks Rd	System Growth	2016/17	260
Install 3 Phase 150A Voltage Regulator	System Growth	2016/17	120
Dunrobin Rd upgrade, new NOIC site	System Growth	2016/17	100
Install Distribution Transformers – load growth	System Growth	2016/17	80
		Total	1,160

Table 48 Distribution Network Development items

6.5.2 LV development plan

Our LV development plan is based around response to consumer load growth. We have no network development programme items for this asset class apart from this new load. Due to the variable nature of new connections in our network we have elected not to forecast the nature of this growth to any detail.

6.5.3 Developments on other system Assets

We have no current development plans on system assets not mentioned so far.

6.5.4 Network Development Capital Expenditure Summary

Capital expenditure forecasts for the planning period can be found in Table 49.

Category	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Consumer connection	505	516	526	537	549	449	346	272	278	283
System growth	5,520	1,521	2,710	2,927	2,825	1,953	1,371	1,399	1,429	1,459
Asset replacement and renewal	1,159	1,241	1,267	1,293	1,320	1,348	1,376	1,405	1,435	1,465
Asset relocations	0	0	0	0	0	0	0	0	0	0
Reliability, safety and environment: Quality of supply	1,409	2,570	1,036	327	247	679	807	939	959	979
Reliability, safety and environment: Legislative and regulatory	50	51	52	53	54	55	57	58	59	60
Other reliability, safety and environment	0	0	0	0	0	0	0	0	0	0
Total	**8,643**	**5,898**	**5,592**	**5,138**	**4,995**	**4,485**	**3,956**	**4,074**	**4,159**	**4,246**

Table 49 Summary of forecast for Capital Development

7. Non-network Investment Plan

7.1 Fibre Optic Communications Rollout to Zone Substations

We own a fibre optic network that runs past or near many of our zone substations. We are in the process of connecting these substations to one another to create a high bandwidth communications network between them. This project will enable:

- A communications path for engineering access to interrogate equipment at the sites remotely.
- An alternative communications path for substation SCADA systems. The analogue radio system has little spare capacity (bandwidth) left on it. The freed up bandwidth can then be used for the new rural intelligent switches (reclosers and sectionalisers) that are being installed away from the fibre network.
- High speed protection signalling between sites, which will provide better protection co-ordination for line faults.
- A communications path for future intelligent devices that may be installed in substations.

In 2016/17 we will be extending the fibre network to connect Pukeuri substation to the network.

7.2 IT systems

Our IT systems for Asset Management are based around 3 key platforms:

7.2.1 TechnologyOne OneEnergy

This is an integrated software platform that is used for all asset management, works management and financial reporting (which includes standard modules for payroll, stores, accounts etc).

Phase one of the installation was completed in 2015/16, and the system is now being used for all financial management and most works management functions.

Phase two of the rollout will be implemented in 2016/17, and will include a customer quotation function for our contracting business, budgeting features, and integration with our GIS

7.2.2 Intergraph G Technology GIS

Our GIS system is Intergraph G Technology product. It is used as the primary data repository for geographic electricity distribution asset data.

The performance of the system and the accuracy of our GIS data is a high priority, especially since the GIS is the primary data source for services such as Before U Dig where providing the wrong data can have safety implications. Our team has developed many in house extensions to the base system to better utilise the features of the GIS system.

7.2.3 ICP Database

Our ICP and Consumer records are maintained in a custom built Microsoft CRM database. This database is used for managing our obligations to the National registry, tracking retailer billing, and recording ICP details for connections, and other necessary information.

7.2.4 Radio System Upgrade

We currently operate an analogue VHF voice radio system and a UHF data system for SCADA communications. The use of the existing system is being reviewed, and proposals for the development of the systems are being considered in the coming financial year.

8. Summary of Expenditure Forecasts

The summary of our forecast expenditure for the planning period is shown in Table 50.

These estimates are considered to be fairly accurate for the first 5 years of the planning period, with the figures being indicative only beyond that point. Many of our investment, maintenance and renewal decisions will be very dependent the outcomes of inspections in the first 5 years, consumer growth, and other issues that are currently out of our control.

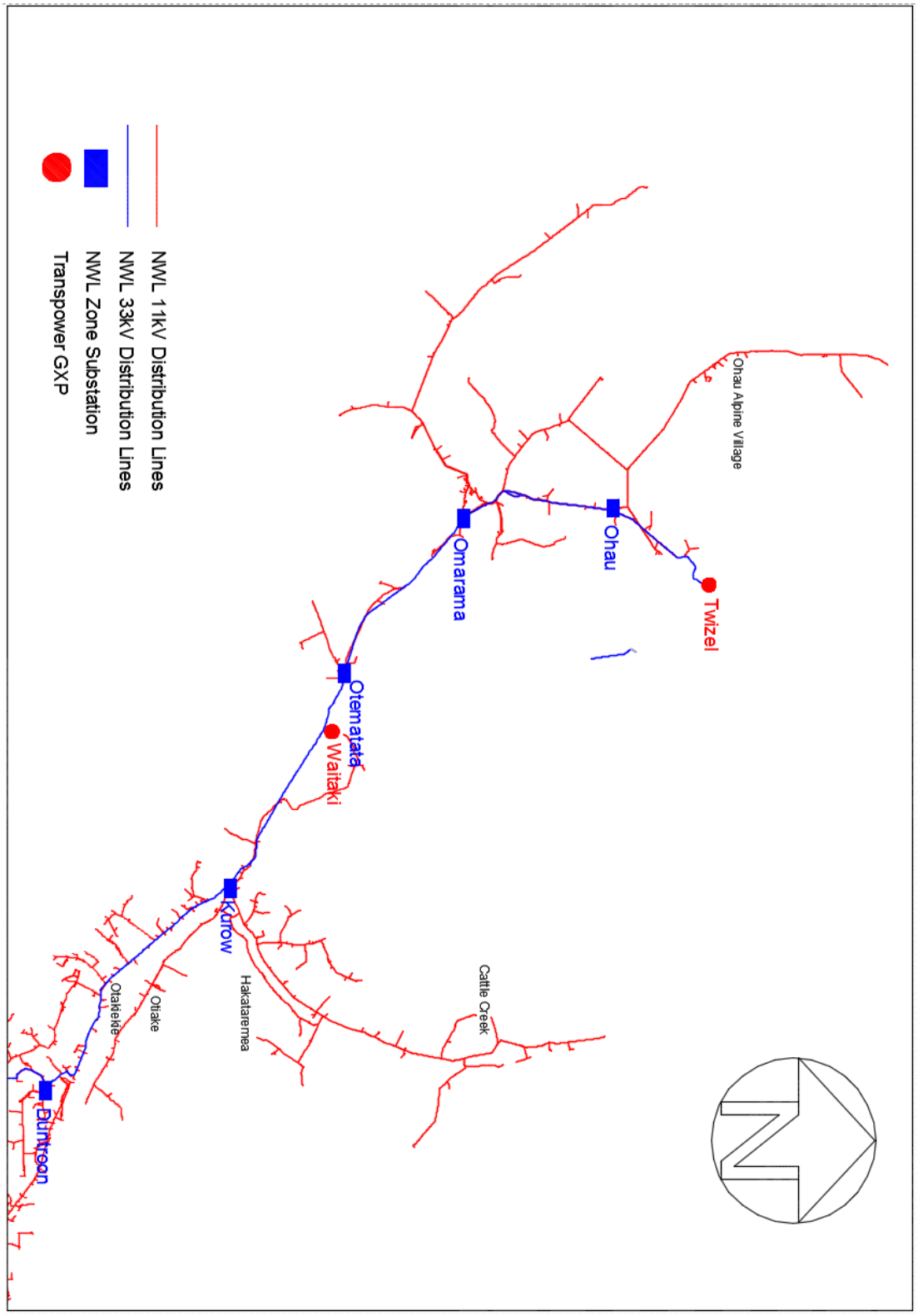
Forecast Expenditure ($k)										
Expenditure Type	**2016/17**	**2017/18**	**2018/19**	**2019/20**	**2020/21**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**
Consumer connection	505	516	526	537	549	449	346	272	278	283
System growth	5,520	1,521	2,710	2,927	2,825	1,953	1,371	1,399	1,429	1,459
Asset replacement & renewal	1,159	1,241	1,267	1,293	1,320	1,348	1,376	1,405	1,435	1,465
Asset relocations	0	0	0	0	0	0	0	0	0	0
Reliability, safety & environment: Quality of supply	1,409	2,570	1,036	327	247	679	807	939	959	979
Reliability, safety & environment: Legislative & regulatory	50	51	52	53	54	55	57	58	59	60
Other reliability, safety & environment	0	0	0	0	0	0	0	0	0	0
Subtotal Capital Expenditure:	**8,643**	**5,898**	**5,592**	**5,138**	**4,995**	**4,485**	**3,956**	**4,074**	**4,159**	**4,246**
Service interruptions & emergencies	273	279	285	291	297	303	309	316	322	329
Vegetation management	300	306	313	319	326	333	340	347	354	362
Routine & corrective maintenance & inspection	582	594	607	619	632	646	659	673	687	702
Asset replacement & renewal	770	786	803	820	837	854	872	891	909	928
Subtotal Operational Expenditure:	**1,925**	**1,965**	**2,007**	**2,049**	**2,092**	**2,136**	**2,181**	**2,226**	**2,273**	**2,321**
Total Expenditure	**10,568**	**7,864**	**7,598**	**7,186**	**7,087**	**6,620**	**6,136**	**6,300**	**6,432**	**6,567**

Table 50 Summary of Expenditure Forecasts

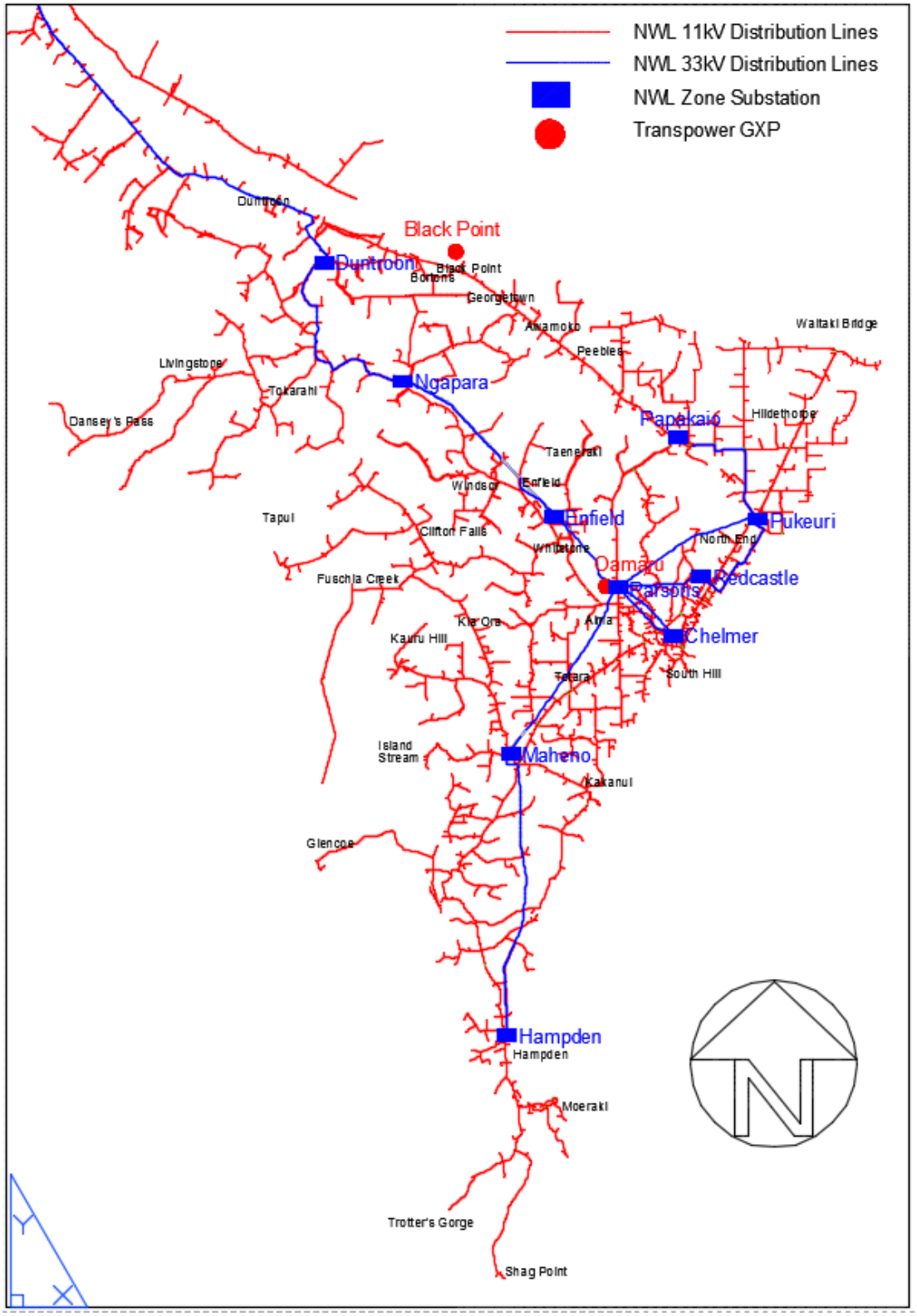
Appendices

Appendix A

Area of Supply – Western (Inland) Area



Area of Supply – Eastern (Coastal) Area



Appendix B – EDB Information Disclosure Requirements Schedules 11 - 13

Schedule 11

Company Name	**Network Waitaki Ltd**
AMP Planning Period	**1 April 2016 – 31 March 2026**

SCHEDULE 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.

sch ref													
7			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
8		for year ended	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**
9	**11a(i): Expenditure on Assets Forecast**		**$000 (in nominal dollars)**										
10		Consumer connection	2,000	505	516	526	537	549	449	346	272	278	283
11		System growth	5,268	5,520	1,521	2,710	2,927	2,825	1,953	1,371	1,399	1,429	1,459
12		Asset replacement and renewal	589	1,159	1,241	1,267	1,293	1,320	1,348	1,376	1,405	1,435	1,465
13		Asset relocations	-	-	-	-	-	-	-	-	-	-	-
14		Reliability, safety and environment:											
15		Quality of supply	223	1,409	2,570	1,036	327	247	679	807	939	959	979
16		Legislative and regulatory	30	50	51	52	53	54	55	57	58	59	60
17		Other reliability, safety and environment	-	-									
18		**Total reliability, safety and environment**	253	1,459	2,621	1,088	380	301	734	863	997	1,018	1,039
19		**Expenditure on network assets**	8,110	8,643	5,898	5,592	5,138	4,995	4,485	3,956	4,074	4,159	4,246
20		Expenditure on non-network assets											
21		**Expenditure on assets**	8,110	8,643	5,898	5,592	5,138	4,995	4,485	3,956	4,074	4,159	4,246
22													
23	*plus*	Cost of financing	584	622	425	403	370	360	323	285	293	299	306
24	*less*	Value of capital contributions	1,281	1,448	1,353	1,381	1,410	1,440	1,470	1,697	2,000	2,406	2,956
25	*plus*	Value of vested assets	-	-	-	-	-	-	-	-	-	-	-
26													
27		**Capital expenditure forecast**	7,412	7,817	4,970	4,613	4,098	3,916	3,338	2,544	2,367	2,052	1,596
28													
29		Assets commissioned	1,100	6,500	4,133	3,836	3,407	3,256	2,775	2,115	1,968	1,707	1,327
30			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
31		for year ended	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**
32			**$000 (in constant prices)**										
33		Consumer connection	2,000	505	505	505	505	505	405	305	235	235	235
34		System growth	5,268	5,520	1,490	2,600	2,750	2,600	1,760	1,210	1,210	1,210	1,210
35		Asset replacement and renewal	589	1,159	1,215	1,215	1,215	1,215	1,215	1,215	1,215	1,215	1,215
36		Asset relocations	-	-	-	-	-	-	-	-	-	-	-
37		Reliability, safety and environment:											
38		Quality of supply	223	1,409	2,517	994	307	227	612	712	812	812	812
39		Legislative and regulatory	30	50	50	50	50	50	50	50	50	50	50
40		Other reliability, safety and environment	-	-	-	-	-	-	-	-	-	-	-
41		**Total reliability, safety and environment**	253	1,459	2,567	1,044	357	277	662	762	862	862	862
42		**Expenditure on network assets**	8,110	8,643	5,777	5,364	4,827	4,597	4,042	3,492	3,522	3,522	3,522
43		Expenditure on non-network assets	1,871	1,686	1,097	1,176	1,182	1,097	1,000	1,000	1,000	1,000	1,000
44		**Expenditure on assets**	9,981	10,329	6,874	6,540	6,009	5,694	5,042	4,492	4,522	4,522	4,522
45													
46		**Subcomponents of expenditure on assets (where known)**											
47		Energy efficiency and demand side management, reduction of energy losses	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
48		Overhead to underground conversion	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
49		Research and development	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

	Current Year CY	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 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26
Difference between nominal and constant price forecasts	$000										
Consumer connection	-	-	11	21	32	44	44	41	37	43	48
System growth	-	-	31	110	177	225	193	161	189	219	249
Asset replacement and renewal	-	-	26	52	78	105	133	161	190	220	250
Asset relocations	-	-	-	-	-	-	-	-	-	-	-
Reliability, safety and environment:											
Quality of supply	-	-	53	42	20	20	67	95	127	147	167
Legislative and regulatory	-	-	1	2	3	4	5	7	8	9	10
Other reliability, safety and environment	-	-	-	-	-	-	-	-	-	-	-
Total reliability, safety and environment	-	-	54	44	23	24	72	101	135	156	177
Expenditure on network assets	-	-	121	228	311	398	443	464	552	637	724
Expenditure on non-network assets	(1,871)	(1,686)	(1,097)	(1,176)	(1,182)	(1,097)	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)
Expenditure on assets	(1,871)	(1,686)	(976)	(948)	(871)	(699)	(557)	(536)	(448)	(363)	(276)

	Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
for year ended	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21
11a(ii): Consumer Connection						
*Consumer types defined by EDB**	$000 (in constant prices)					
Small: residential and commercial to 15kVA	500	85	85	85	85	85
Medium: residential and commercial 16kVA to 50kVA	900	100	100	100	100	100
Large: commercial and industrial 51kVA and above	600	320	320	320	320	320
[EDB consumer type]						
[EDB consumer type]						
*include additional rows if needed						
Consumer connection expenditure	2,000	505	505	505	505	505
less Capital contributions funding consumer connection						
Consumer connection less capital contributions	2,000	505	505	505	505	505
11a(iii): System Growth						
Subtransmission	2,774	2,550	30	2,400	350	2,400
Zone substations	1,836	1,800	1,200	-	2,200	-
Distribution and LV lines	20	1,090	180	120	120	120
Distribution and LV cables	309	-	-	-	-	-
Distribution substations and transformers	330	80	80	80	80	80
Distribution switchgear	-	-	-	-	-	-
Other network assets	-	-	-	-	-	-
System growth expenditure	5,268	5,520	1,490	2,600	2,750	2,600
less Capital contributions funding system growth						
System growth less capital contributions	5,268	5,520	1,490	2,600	2,750	2,600

11a(iv): Asset Replacement and Renewal

	Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
for year ended	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21
$000 (in constant prices)						
Subtransmission	160	60	60	60	60	60
Zone substations	24	24	-	-	-	-
Distribution and LV lines	165	800	800	800	800	800
Distribution and LV cables	-	-	-	-	-	-
Distribution substations and transformers	100	160	150	150	150	150
Distribution switchgear	140	115	205	205	205	205
Other network assets	-	-	-	-	-	-
Asset replacement and renewal expenditure	589	1,159	1,215	1,215	1,215	1,215
less Capital contributions funding asset replacement and renewal						
Asset replacement and renewal less capital contributions	589	1,159	1,215	1,215	1,215	1,215

11a(v):Asset Relocations

	Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
for year ended	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21
*Project or programme**	$000 (in constant prices)					
[Description of material project or programme]						
[Description of material project or programme]						
[Description of material project or programme]						
[Description of material project or programme]						
[Description of material project or programme]						
include additional rows if needed						
All other project or programmes - asset relocations						
Asset relocations expenditure	-	-	-	-	-	-
less Capital contributions funding asset relocations						
Asset relocations less capital contributions	-	-	-	-	-	-

11a(vi):Quality of Supply

	Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
for year ended	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21
*Project or programme**	$000 (in constant prices)					
New Recloser on Solway Feeder			25			
Fibre for Hampden (to fix radio comms issue here)	35					
Fibre for Pukeuri	2		85			
Fibre (Waitaki - Kurow)		25				
Fibre from Weston - Ngapara			40			
Fibre from Ngapara - Duntroon				30		
Fibre from Duntroon - Kurow					80	
Replace Ohau 11kV oil switches with Halo RMU		65				
Retrofit RPS Switchgear covers for safer racking in/out	13	15				
TWZ/Kurow/Parsons Ripple isolation Project	25	45				
Replace 1 X 551 relay and unsafe protection panel	21	30	28	28	28	28
THOR Hammer		10				
Ohau Feeder Re-build (subject to SFE)		600				
Rural switch gear, install fault indicators, and other minor rural protection changes	5	30	30	30	30	30
Purchase and Install Reclosers/Sectionalisers/Tie Switches	45	35	35	35	35	35
UG Ducting HV LV Fibre (General)		25	25	25	25	25
Ferry Road Feeder - Upgrade from Mink to Dog	9	200				
Upgrade Pukeuri to Dual Transformer config - Stage 1 (Subject to SFE)	20		1,200			
Differential Zone Transformer Protection		20				

		Develop 2 new feeders out of Pukeuri	18					
		Arc Flash Protection (Weston 33, Chelmer, Redcastle)		40	40	40	60	60
		PV Trial	30	50				
		Duplicate 33kV DC-DC Power Supply		20	20			
		Replace 1 x rural 2 pole Transformer Structures		25	25	25	25	25
		Reconductor 1.7km - Waiareka Valley Road			65			
		Omarama - Replace 11kV Oil switches with CBs			140			
		Omarama - Second 33 kV CB (1 for each Tx)			280			
		Install 4 x ABS		24	24	24	24	24
		Line differential Protection Weston - Chelmer		120				
		Radio Link Upgrade			455			
		Birchwood Repeater		30				
		11kV Feeder extension from Arundel St to Foyle St				300		
		New Line Peaks Road to Five Forks Feeder at Tunnel Road - 3.4km				187		
		Reconductor from ABS1034 to end of Peaks Rd - 7.7km				270		
128								
129		**include additional rows if needed*						
130		All other projects or programmes - quality of supply						
131		**Quality of supply expenditure**	223	1,409	2,517	994	307	227
132	*less*	Capital contributions funding quality of supply						
133		**Quality of supply less capital contributions**	223	1,409	2,517	994	307	227
134								

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
	for year ended	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21

11a(vii): Legislative and Regulatory

*Project or programme**	$000 (in constant prices)					
Distribution Box Replacement (incl. J boxes - BF)	30	50	50	50	50	50
[Description of material project or programme]						
[Description of material project or programme]						
*include additional rows if needed						
All other projects or programmes - legislative and regulatory						
Legislative and regulatory expenditure	30	50	50	50	50	50
less Capital contributions funding legislative and regulatory						
Legislative and regulatory less capital contributions	30	50	50	50	50	50

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
	for year ended	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21

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

*Project or programme**	$000 (in constant prices)					
[Description of material project or programme]						
[Description of material project or programme]						
[Description of material project or programme]						
[Description of material project or programme]						
[Description of material project or programme]						
*include additional rows if needed						
All other projects or programmes - other reliability, safety and environment						
Other reliability, safety and environment expenditure	-	-	-	-	-	-
less Capital contributions funding other reliability, safety and environment						
Other reliability, safety and environment less capital contributions	-	-	-	-	-	-

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
	for year ended	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21

11a(ix): Non-Network Assets

Routine expenditure

*Project or programme**	$000 (in constant prices)					
Meters & Relays	21	20	20	20	20	20
Other non-network	700	849	700	879	985	900
Data Cabling and site communications	35	35	35	35	35	35
Server replacement	7	7	7	7	7	7
Desktop/Laptop replacement	6	30	30	30	30	30
Cellphones	2	5	5	5	5	5
Redevelop Operating base		500	200			
*include additional rows if needed						
All other projects or programmes - routine expenditure						
Routine expenditure	771	1,446	997	976	1,082	997

Atypical expenditure

*Project or programme**						
Asset & Works Management System (OneEnergy)	1,100	100	100	200	100	100
GIS upgrade		30				
Document management		100				
Data Storage		10				
[Description of material project or programme]						
*include additional rows if needed						
All other projects or programmes - atypical expenditure						
Atypical expenditure	1,100	240	100	200	100	100
Expenditure on non-network assets	1,871	1,686	1,097	1,176	1,182	1,097

Company Name	**Network Waitaki Ltd**
AMP Planning Period	**1 April 2016 – 31 March 2026**

SCHEDULE 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.

sch ref		Current Year CY	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 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26
	Operational Expenditure Forecast	**$000 (in nominal dollars)**										
	Service interruptions and emergencies	580	273	279	285	291	297	303	309	316	322	329
	Vegetation management	294	300	306	313	319	326	333	340	347	354	362
	Routine and corrective maintenance and inspection	423	582	594	607	619	632	646	659	673	687	702
	Asset replacement and renewal	750	770	786	803	820	837	854	872	891	909	928
	Network Opex	2,047	1,925	1,965	2,007	2,049	2,092	2,136	2,181	2,226	2,273	2,321
	System operations and network support	1,935	1,935	1,976	2,017	2,059	2,103	2,147	2,192	2,238	2,285	2,333
	Business support	935	935	955	975	995	1,016	1,037	1,059	1,081	1,104	1,127
	Non-network opex	2,870	2,870	2,930	2,992	3,055	3,119	3,184	3,251	3,319	3,389	3,460
	Operational expenditure	4,917	4,795	4,896	4,999	5,103	5,211	5,320	5,432	5,546	5,662	5,781

		Current Year CY	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 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26
		$000 (in constant prices)										
	Service interruptions and emergencies	580	273	273	273	273	273	273	273	273	273	273
	Vegetation management	294	300	300	300	300	300	300	300	300	300	300
	Routine and corrective maintenance and inspection	423	582	582	582	582	582	582	582	582	582	582
	Asset replacement and renewal	750	770	770	770	770	770	770	770	770	770	770
	Network Opex	2,047	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925	1,925
	System operations and network support	1,935	1,935	1,935	1,935	1,935	1,935	1,935	1,935	1,935	1,935	1,935
	Business support	935	935	935	935	935	935	935	935	935	935	935
	Non-network opex	2,870	2,870	2,870	2,870	2,870	2,870	2,870	2,870	2,870	2,870	2,870
	Operational expenditure	4,917	4,795	4,795	4,795	4,795	4,795	4,795	4,795	4,795	4,795	4,795
	Subcomponents of operational expenditure (where known)											
	Energy efficiency and demand side management, reduction of energy losses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Direct billing*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Research and Development	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Insurance	96	84	84	84	84	84	84	84	84	84	84

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

		Current Year CY	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 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26
	Difference between nominal and real forecasts	**$000**										
	Service interruptions and emergencies	-	-	6	12	18	24	30	36	43	49	56
	Vegetation management	-	-	6	13	19	26	33	40	47	54	62
	Routine and corrective maintenance and inspection	-	-	12	25	37	50	64	77	91	105	120
	Asset replacement and renewal	-	-	16	33	50	67	84	102	121	139	158
	Network Opex	-	-	40	82	124	167	211	256	301	348	396
	System operations and network support	-	-	41	82	124	168	212	257	303	350	398
	Business support	-	-	20	40	60	81	102	124	146	169	192
	Non-network opex	-	-	60	122	185	249	314	381	449	519	590
	Operational expenditure	-	-	101	204	308	416	525	637	751	867	986

Schedule 12

Company Name	**Network Waitaki Ltd**
AMP Planning Period	**1 April 2016 – 31 March 2026**

SCHEDULE 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.

sch ref					Asset condition at start of planning period (percentage of units by grade)						
	Voltage	**Asset category**	**Asset class**	**Units**	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**	**Grade unknown**	**Data accuracy (1–4)**	**% of asset forecast to be replaced in next 5 years**
10	All	Overhead Line	Concrete poles / steel structure	No.	0.50%	3.00%	96.50%			2	5.00%
11	All	Overhead Line	Wood poles	No.	0.50%	3.00%	96.50%			2	5.00%
12	All	Overhead Line	Other pole types	No.						N/A	
13	HV	Subtransmission Line	Subtransmission OH up to 66kV conductor	km			85.00%	15.00%		3	
14	HV	Subtransmission Line	Subtransmission OH 110kV+ conductor	km						N/A	
15	HV	Subtransmission Cable	Subtransmission UG up to 66kV (XLPE)	km			100.00%			3	
16	HV	Subtransmission Cable	Subtransmission UG up to 66kV (Oil pressurised)	km						N/A	
17	HV	Subtransmission Cable	Subtransmission UG up to 66kV (Gas pressurised)	km						N/A	
18	HV	Subtransmission Cable	Subtransmission UG up to 66kV (PILC)	km			100.00%			3	
19	HV	Subtransmission Cable	Subtransmission UG 110kV+ (XLPE)	km						N/A	
20	HV	Subtransmission Cable	Subtransmission UG 110kV+ (Oil pressurised)	km						N/A	
21	HV	Subtransmission Cable	Subtransmission UG 110kV+ (Gas Pressurised)	km						N/A	
22	HV	Subtransmission Cable	Subtransmission UG 110kV+ (PILC)	km						N/A	
23	HV	Subtransmission Cable	Subtransmission submarine cable	km						N/A	
24	HV	Zone substation Buildings	Zone substations up to 66kV	No.			94.00%	6.00%		3	
25	HV	Zone substation Buildings	Zone substations 110kV+	No.						N/A	
26	HV	Zone substation switchgear	22/33kV CB (Indoor)	No.				100.00%		3	
27	HV	Zone substation switchgear	22/33kV CB (Outdoor)	No.				100.00%		3	
28	HV	Zone substation switchgear	33kV Switch (Ground Mounted)	No.						N/A	
29	HV	Zone substation switchgear	33kV Switch (Pole Mounted)	No.			100.00%			3	
30	HV	Zone substation switchgear	33kV RMU	No.						N/A	
31	HV	Zone substation switchgear	50/66/110kV CB (Indoor)	No.						N/A	
32	HV	Zone substation switchgear	50/66/110kV CB (Outdoor)	No.			100.00%			3	
33	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (ground mounted)	No.			95.00%	5.00%		3	
34	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (pole mounted)	No.			100.00%			3	

					Asset condition at start of planning period (percentage of units by grade)						
	Voltage	Asset category	Asset class	Units	Grade 1	Grade 2	Grade 3	Grade 4	Grade unknown	Data accuracy (1–4)	% of asset forecast to be replaced in next 5 years
39	HV	Zone Substation Transformer	Zone Substation Transformers	No.			76.00%	24.00%		3	
40	HV	Distribution Line	Distribution OH Open Wire Conductor	km	5.00%		95.00%			3	5.00%
41	HV	Distribution Line	Distribution OH Aerial Cable Conductor	km						N/A	
42	HV	Distribution Line	SWER conductor	km						N/A	
43	HV	Distribution Cable	Distribution UG XLPE or PVC	km			97.00%	3.00%		3	
44	HV	Distribution Cable	Distribution UG PILC	km		1.00%	99.00%			3	1.00%
45	HV	Distribution Cable	Distribution Submarine Cable	km						N/A	
46	HV	Distribution switchgear	3.3/6.6/11/22kV CB (pole mounted) - reclosers and sectionalisers	No.		5.00%	95.00%			3	
47	HV	Distribution switchgear	3.3/6.6/11/22kV CB (Indoor)	No.						N/A	
48	HV	Distribution switchgear	3.3/6.6/11/22kV Switches and fuses (pole mounted)	No.	1.00%	4.00%	95.00%			3	5.00%
49	HV	Distribution switchgear	3.3/6.6/11/22kV Switch (ground mounted) - except RMU	No.						N/A	
50	HV	Distribution switchgear	3.3/6.6/11/22kV RMU	No.		5.00%	88.00%	7.00%		3	5.00%
51	HV	Distribution Transformer	Pole Mounted Transformer	No.	2.00%	3.00%	92.00%	3.00%		3	5.00%
52	HV	Distribution Transformer	Ground Mounted Transformer	No.	1.00%	1.00%	91.50%	6.50%		3	2.00%
53	HV	Distribution Transformer	Voltage regulators	No.			34.00%	66.00%		3	
54	HV	Distribution Substations	Ground Mounted Substation Housing	No.			100.00%			2	
55	LV	LV Line	LV OH Conductor	km		2.00%	98.00%			2	2.00%
56	LV	LV Cable	LV UG Cable	km			100.00%			3	
57	LV	LV Streetlighting	LV OH/UG Streetlight circuit	km		2.00%	98.00%			3	2.00%
58	LV	Connections	OH/UG consumer service connections	No.		2.00%	98.00%			3	2.00%
59	All	Protection	Protection relays (electromechanical, solid state and numeric)	No.			100.00%			3	
60	All	SCADA and communications	SCADA and communications equipment operating as a single system	Lot			100.00%			3	
61	All	Capacitor Banks	Capacitors including controls	No.				100.00%		3	
62	All	Load Control	Centralised plant	Lot			100.00%			3	
63	All	Load Control	Relays	No.		20.00%		80.00%		3	
64	All	Civils	Cable Tunnels	km						N/A	

Company Name	**Network Waitaki Ltd**
AMP Planning Period	**1 April 2016 – 31 March 2026**

SCHEDULE 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.

sch ref

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
9	Ohau	1	-	N	2	-	-	-	Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
10	Omarama	2	3	N-1	2	50%	3	50%	No constraint within +5 years	
11	Otematata	1	-	N	-	-	-	-	Transformer	Diesel generator on site can supply existing loads if transformer is out of service.
12	Kurow	5	12	N-1	7	42%	12	50%	No constraint within +5 years	
13	Duntroon	5	-	N	2	-	-		Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
14	Ngapara	5	7	N-1	2	69%	7	60%	No constraint within +5 years	
15	Enfield	3	-	N	4	-	-		Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
16	Parsons	4	-	N	6	-	-		Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
17	Papakaio	5	-	N	2	-	-		Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
18	Pukeuri	8	-	N	2	-	10	90%	No constraint within +5 years	
19	Redcastle	6	12	N-1	6	48%	12	50%	No constraint within +5 years	
20	Chelmer	15	28	N-1	13	54%	28	36%	No constraint within +5 years	
21	Maheno	3	-	N	2	-	-		Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
22	Hampden	1	-	N	6	-	-		Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
23						-			[Select one]	
24						-			[Select one]	
25						-			[Select one]	
26						-			[Select one]	
27						-			[Select one]	
28						-			[Select one]	

29 [1] *Extend forecast capacity table as necessary to disclose all capacity by each zone substation*

Company Name	**Network Waitaki Ltd**
AMP Planning Period	**1 April 2016 – 31 March 2026**

SCHEDULE 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.

sch ref

12c(i): Consumer Connections

Number of ICPs connected in year by consumer type

		Number of connections					
		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**
	*Consumer types defined by EDB**						
	Small: residential and commercial to 15kVA	10,600	10,630	10,660	10,690	10,720	10,750
	Medium: residential and commercial 16kVA to 50kVA	1,521	1,545	1,555	1,565	1,575	1,585
	Large: commercial and industrial 51kVA and above	525	540	550	560	570	580
	Indpendent Contract Consumers ("IND")	29	29	29	29	29	29
	[EDB consumer type]						
	Connections total	12,675	12,744	12,794	12,844	12,894	12,944
	**include additional rows if needed*						
	Distributed generation						
	Number of connections	26	45	65	100	140	200
	Capacity of distributed generation installed in year (MVA)	-	-	-	-	1	5

12c(ii) System Demand

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	Maximum coincident system demand (MW) for year ended	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**
	GXP demand	57	59	60	61	62	63
plus	Distributed generation output at HV and above	-	-	-	-	-	-
	Maximum coincident system demand	57	59	60	61	62	63
less	Net transfers to (from) other EDBs at HV and above	-	-	-	-	-	-
	Demand on system for supply to consumers' connection points	57	59	60	61	62	63
	Electricity volumes carried (GWh)						
	Electricity supplied from GXPs	290	292	295	298	301	301
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	290	292	295	298	301	301
less	Total energy delivered to ICPs	272	274	277	280	282	282
	Losses	18	18	18	18	19	19
	Load factor	58%	56%	56%	56%	55%	55%
	Loss ratio	6.2%	6.2%	6.1%	6.0%	6.3%	6.3%

Company Name	**Network Waitaki Ltd**
AMP Planning Period	**1 April 2016 – 31 March 2026**
Network / Sub-network Name	

SCHEDULE 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.

sch ref		*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
8							
9	for year ended	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**
10	**SAIDI**						
11	Class B (planned interruptions on the network)	25.3	29.1	29.1	29.1	29.1	29.1
12	Class C (unplanned interruptions on the network)	79.4	87.4	87.4	87.4	87.4	87.4
13	**SAIFI**						
14	Class B (planned interruptions on the network)	0.10	0.15	0.15	0.15	0.15	0.15
15	Class C (unplanned interruptions on the network)	0.66	1.39	1.39	1.39	1.39	1.39

Schedule 13

Company Name	**Network Waitaki Ltd**
AMP Planning Period	**1 April 2016 – 31 March 2026**
Asset Management Standard Applied	**N/A**

SCHEDULE 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	User Guidance	Why	Who	Record/documented Information
3	Asset management policy	To what extent has an asset management policy been documented, authorised and communicated?	3	We have an Asset Management policy in place that is available for staff in the policy section of the document library, and available to the public on the company website along with the AMP under the information disclosure section.		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.
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?	3	Key items in the Asset Management drivers are closely linked to stakeholder direction, such as the consumer surveys, and in some cases (such as the AMP)are subject to signoff from our board of directors. There is regular reporting on our asset management performance to stakeholders such as the board and the Consumer Trust.		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 (eg, 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.
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?	3	There is a comprehensive range of planning, maintenance and inspection standards that reflect asset lives and characteristics. These are regularly updated according to the Document Control system	Inspect Maintenance Standards, review AMP. Discuss with staff.	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.
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?	3	The comprehensive array of plans and policies referred to above are initiated by the entry of new types of assets, based on industry practice and our specific circumstances. These plans reflect the expected lives, unique characteristics and recommended maintenance intervals for assets.	Inspect Maintenance Standards, review AMP. Discuss with staff.	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).

Company Name	**Network Waitaki Ltd**
AMP Planning Period	**1 April 2016 – 31 March 2026**
Asset Management Standard Applied	**N/A**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
3	Asset management policy	To what extent has an asset management policy been documented, authorised and communicated?	The organisation does not have a documented asset management policy.	The organisation has an asset management policy, but it has not been authorised by top management, or it is not influencing the management of the assets.	The organisation has an asset management policy, which has been authorised by top management, but it has had limited circulation. It may be in use to influence development of strategy and planning but its effect is limited.	The asset management policy is authorised by top management, is widely and effectively communicated to all relevant employees and stakeholders, and used to make these persons aware of their asset related obligations.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation has not considered the need to ensure that its asset management strategy is appropriately aligned with the organisation's other organisational policies and strategies or with stakeholder requirements. OR The organisation does not have an asset management strategy.	The need to align the asset management strategy with other organisational policies and strategies as well as stakeholder requirements is understood and work has started to identify the linkages or to incorporate them in the drafting of asset management strategy.	Some of the linkages between the long-term asset management strategy and other organisational policies, strategies and stakeholder requirements are defined but the work is fairly well advanced but still incomplete.	All linkages are in place and evidence is available to demonstrate that, where appropriate, the organisation's asset management strategy is consistent with its other organisational policies and strategies. The organisation has also identified and considered the requirements of relevant stakeholders.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation has not considered the need to ensure that its asset management strategy is produced with due regard to the lifecycle of the assets, asset types or asset systems that it manages. OR The organisation does not have an asset management strategy.	The need is understood, and the organisation is drafting its asset management strategy to address the lifecycle of its assets, asset types and asset systems.	The long-term asset management strategy takes account of the lifecycle of some, but not all, of its assets, asset types and asset systems.	The asset management strategy takes account of the lifecycle of all of its assets, asset types and asset systems.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation does not have an identifiable asset management plan(s) covering asset systems and critical assets.	The organisation has asset management plan(s) but they are not aligned with the asset management strategy and objectives and do not take into consideration the full asset life cycle (including asset creation, acquisition, enhancement, utilisation, maintenance decommissioning and disposal).	The organisation is in the process of putting in place comprehensive, documented asset management plan(s) that cover all life cycle activities, clearly aligned to asset management objectives and the asset management strategy.	Asset management plan(s) are established, documented, implemented and maintained for asset systems and critical assets to achieve the asset management strategy and asset management objectives across all life cycle phases.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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Asset Management Standard Applied	**N/A**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
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?	3	The AMP is available to the public, the wider staff, and the Consumer Trust on our website, or by calling into our offices. Many staff and key contractor personnel are involved in the preparation and review of the AMP. Our Board approves our budgets and signs off on the AMP.		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.
29	Asset management plan(s)	How are designated responsibilities for delivery of asset plan actions documented?	3	The AMP sets out the responsibilities of staff involved in asset management governance in section 2. Individual projects within the annual works programme are assigned to engineers at the beginning of the operating year, with any changes in staff resulting in a handover of projects. We have a regular reporting regime to the CEO and the Board regarding delivery of the asset management plan.		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.
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	We are well resourced for our current Asset Management regime. Specific detail design and construction expertise will be contracted in as required. We monitor our workforce to identify gaps in training and competencies. We have been employing new trainees to build up staff levels to account for staff who are nearing reitrement age.		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.
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	We have a comprehensive suite of Business Continuity Plans that cover asset failure, natural disasters and interruption to key processes. We review these plans at regular intervals, or when a specific event (such as the Christchurch earthquakes) causes concern. Our plans include working with external agencies such as the Police, Fire Service, and Civil Defence. Regular incidents such as cars hitting poles provide on-going training and opportunities to review plans. These plans have been developed as part of a wider risk management framework based on ISO 31000 that considers a range of mitigation measures.		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.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
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?	The organisation does not have plan(s) or their distribution is limited to the authors.	The plan(s) are communicated to some of those responsible for delivery of the plan(s). OR Communicated to those responsible for delivery is either irregular or ad-hoc.	The plan(s) are communicated to most of those responsible for delivery but there are weaknesses in identifying relevant parties resulting in incomplete or inappropriate communication. The organisation recognises improvement is needed as is working towards resolution.	The plan(s) are communicated to all relevant employees, stakeholders and contracted service providers to a level of detail appropriate to their participation or business interests in the delivery of the plan(s) and there is confirmation that they are being used effectively.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
29	Asset management plan(s)	How are designated responsibilities for delivery of asset plan actions documented?	The organisation has not documented responsibilities for delivery of asset plan actions.	Asset management plan(s) inconsistently document responsibilities for delivery of plan actions and activities and/or responsibilities and authorities for implementation inadequate and/or delegation level inadequate to ensure effective delivery and/or contain misalignments with organisational accountability.	Asset management plan(s) consistently document responsibilities for the delivery of actions but responsibility/authority levels are inappropriate/ inadequate, and/or there are misalignments within the organisation.	Asset management plan(s) consistently document responsibilities for the delivery actions and there is adequate detail to enable delivery of actions. Designated responsibility and authority for achievement of asset plan actions is appropriate.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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)	The organisation has not considered the arrangements needed for the effective implementation of plan(s).	The organisation recognises the need to ensure appropriate arrangements are in place for implementation of asset management plan(s) and is in the process of determining an appropriate approach for achieving this.	The organisation has arrangements in place for the implementation of asset management plan(s) but the arrangements are not yet adequately efficient and/or effective. The organisation is working to resolve existing weaknesses.	The organisation's arrangements fully cover all the requirements for the efficient and cost effective implementation of asset management plan(s) and realistically address the resources and timescales required, and any changes needed to functional policies, standards, processes and the asset management information system.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation has not considered the need to establish plan(s) and procedure(s) to identify and respond to incidents and emergency situations.	The organisation has some ad-hoc arrangements to deal with incidents and emergency situations, but these have been developed on a reactive basis in response to specific events that have occurred in the past.	Most credible incidents and emergency situations are identified. Either appropriate plan(s) and procedure(s) are incomplete for critical activities or they are inadequate. Training/ external alignment may be incomplete.	Appropriate emergency plan(s) and procedure(s) are in place to respond to credible incidents and manage continuity of critical asset management activities consistent with policies and asset management objectives. Training and external agency alignment is in place.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
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	Our management structure and company organisation are designed to remove silos and encourage cross talk between the different groups involved in the management of the network, from Engineering to Finance to Field services. The small size of the business and the culture of working together means that all members of the management team have involvement in asset management. Accountability for outcomes ranges from formal KPI's at an annual level, formal monthly management meetings after each Board meeting, to daily discussions of progress.	See AMP for Staff Structure, Delegated Financial Authorities, etc.	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 eg, 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.
40	Structure, authority and responsibilities	What evidence can the organisation's top management provide to demonstrate that sufficient resources are available for asset management?	3	We discuss the ongoing works programme with our field staff in order to predict resource levels required for delivery of the plan. If resources are not available for a particular reason we will decide between contracting in extra resources, or rescheduling the work to fit around our existing workforce. We are actively recruiting trainees to		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.
42	Structure, authority and responsibilities	To what degree does the organisation's top management communicate the importance of meeting its asset management requirements?	3	After each monthly Board meeting, our CEO presents the Board's feedback at a staff meeting. This meeting is supported by regular meetings amongst all staff to determine details of the works programs. Because we are a small company, communication is constant and managers work to remove any information barriers between staff.		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 (eg, 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.
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	We have a Contractor Approval Procedure, which allows to vet external contractors against our safety and skill requirements prior to them working on our assets. All external contractors are provided with all network Standards, Procedures etc, and their work is subject to inspections and completion audits.		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 (eg, 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.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
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)?	Top management has not considered the need to appoint a person or persons to ensure that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s).	Top management understands the need to appoint a person or persons to ensure that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s).	Top management has appointed an appropriate people to ensure the assets deliver the requirements of the asset management strategy, objectives and plan(s) but their areas of responsibility are not fully defined and/or they have insufficient delegated authority to fully execute their responsibilities.	The appointed person or persons have full responsibility for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s). They have been given the necessary authority to achieve this.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
40	Structure, authority and responsibilities	What evidence can the organisation's top management provide to demonstrate that sufficient resources are available for asset management?	The organisation's top management has not considered the resources required to deliver asset management.	The organisations top management understands the need for sufficient resources but there are no effective mechanisms in place to ensure this is the case.	A process exists for determining what resources are required for its asset management activities and in most cases these are available but in some instances resources remain insufficient.	An effective process exists for determining the resources needed for asset management and sufficient resources are available. It can be demonstrated that resources are matched to asset management requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
42	Structure, authority and responsibilities	To what degree does the organisation's top management communicate the importance of meeting its asset management requirements?	The organisation's top management has not considered the need to communicate the importance of meeting asset management requirements.	The organisations top management understands the need to communicate the importance of meeting its asset management requirements but does not do so.	Top management communicates the importance of meeting its asset management requirements but only to parts of the organisation.	Top management communicates the importance of meeting its asset management requirements to all relevant parts of the organisation.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation has not considered the need to put controls in place.	The organisation controls its outsourced activities on an ad-hoc basis, with little regard for ensuring for the compliant delivery of the organisational strategic plan and/or its asset management policy and strategy.	Controls systematically considered but currently only provide for the compliant delivery of some, but not all, aspects of the organisational strategic plan and/or its asset management policy and strategy. Gaps exist.	Evidence exists to demonstrate that outsourced activities are appropriately controlled to provide for the compliant delivery of the organisational strategic plan, asset management policy and strategy, and that these controls are integrated into the asset management system	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
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	We are a small company and we have sought out staff with Asset management experience, as training them in house is not efficient. Our organisation structure was changed in 2015 to align along asset management, engineering and field work streams, This will allow a more constant focus on further developing our Asset Management systems.	Organisation Structure Chart, Position Descriptions for key AM personnel.	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.
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	NWL competence framework is detailed in document NC2004. Induction, personal development/training and position descriptions are kept for all staff.	See NC2004, Position Descriptions	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. (eg, 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.
50	Training, awareness and competence	How does the organization 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	We are a small company and our managers and senior personnel monitor the skillsets of their workers to help identify any training needs. Internal auditors compare the training records of staff against our requirements to keep on top of maintaining adequate numbers of staff with certain compentencies, and keeping up with training requirements.	Organisation Structure Chart, Position Descriptions for key AM personnel.	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.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
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)?	The organisation has not recognised the need for assessing human resources requirements to develop and implement its asset management system.	The organisation has recognised the need to assess its human resources requirements and to develop a plan(s). There is limited recognition of the need to align these with the development and implementation of its asset management system.	The organisation has developed a strategic approach to aligning competencies and human resources to the asset management system including the asset management plan but the work is incomplete or has not been consistently implemented.	The organisation can demonstrate that plan(s) are in place and effective in matching competencies and capabilities to the asset management system including the plan for both internal and contracted activities. Plans are reviewed integral to asset management system process(es).	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation does not have any means in place to identify competency requirements.	The organisation has recognised the need to identify competency requirements and then plan, provide and record the training necessary to achieve the competencies.	The organisation is the process of identifying competency requirements aligned to the asset management plan(s) and then plan, provide and record appropriate training. It is incomplete or inconsistently applied.	Competency requirements are in place and aligned with asset management plan(s). Plans are in place and effective in providing the training necessary to achieve the competencies. A structured means of recording the competencies achieved is in place.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
50	Training, awareness and competence	How does the organization 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?	The organization has not recognised the need to assess the competence of person(s) undertaking asset management related activities.	Competency of staff undertaking asset management related activities is not managed or assessed in a structured way, other than formal requirements for legal compliance and safety management.	The organization is in the process of putting in place a means for assessing the competence of person(s) involved in asset management activities including contractors. There are gaps and inconsistencies.	Competency requirements are identified and assessed for all persons carrying out asset management related activities - internal and contracted. Requirements are reviewed and staff reassessed at appropriate intervals aligned to asset management requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
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?	3	We have put a lot of focus into providing work packs of a high standard to field services that are suitable for the safe and efficient delivery of our asset managemetn tasks. We have an open door policy, whereby contracting staff are encouraged to dicsuss assigne3d tasks with engineering staff. This encourages the free flow of information from the field to the planners.		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.
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?	3	NWL has a comprehensive range of policies, standards and procedures that address all Asset Management activities. NWL also has a Safety management System in place, which requires a high level of document control. These documents are regularly revised and amended.		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. (eg, 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.
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?	3	We have two main locations for asset information, our GIS and our works and asset management system, OnEnergy. The asset information that we capture into these systems is driven both by industry good practice (talking to peer EDBs, working from standards, using fit for purpose software platforms) and by local experience. Our asset management software systems are flexible enough that if we need to capture some new information we can configure the systems to do so. We are subject to external audits with both a financial and safety focus that also provide feedback on what we should be recording.		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.
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	Our on-going inspections and pre-work site preparation provide confirmation that asset data is accurate. At regular intervals the records team carry out audits on asset records against the real world.		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 (eg, 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.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
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?	The organisation has not recognised the need to formally communicate any asset management information.	There is evidence that the pertinent asset management information to be shared along with those to share it with is being determined.	The organisation has determined pertinent information and relevant parties. Some effective two way communication is in place but as yet not all relevant parties are clear on their roles and responsibilities with respect to asset management information.	Two way communication is in place between all relevant parties, ensuring that information is effectively communicated to match the requirements of asset management strategy, plan(s) and process(es). Pertinent asset information requirements are regularly reviewed.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation has not established documentation that describes the main elements of the asset management system.	The organisation is aware of the need to put documentation in place and is in the process of determining how to document the main elements of its asset management system.	The organisation in the process of documenting its asset management system and has documentation in place that describes some, but not all, of the main elements of its asset management system and their interaction.	The organisation has established documentation that comprehensively describes all the main elements of its asset management system and the interactions between them. The documentation is kept up to date.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation has not considered what asset management information is required.	The organisation is aware of the need to determine in a structured manner what its asset information system should contain in order to support its asset management system and is in the process of deciding how to do this.	The organisation has developed a structured process to determine what its asset information system should contain in order to support its asset management system and has commenced implementation of the process.	The organisation has determined what its asset information system should contain in order to support its asset management system. The requirements relate to the whole life cycle and cover information originating from both internal and external sources.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	There are no formal controls in place or controls are extremely limited in scope and/or effectiveness.	The organisation is aware of the need for effective controls and is in the process of developing an appropriate control process(es).	The organisation has developed a controls that will ensure the data held is of the requisite quality and accuracy and is consistent and is in the process of implementing them.	The organisation has effective controls in place that ensure the data held is of the requisite quality and accuracy and is consistent. The controls are regularly reviewed and improved where necessary.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
64	Information management	How has the organisation's ensured its asset management information system is relevant to its needs?	2	We have sized our asset management information systems to our foreseeable needs, based on industry good practice and by buying reputable products.		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.
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?	3	Our risk management process is clearly documented in the AMP, and is based on the principles of ISO 31000. Operational risks are regularly reviewed. Compliance to regulatory requirements is reported to the Board each quarter.		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 (eg, 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.
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?	3	Risk management is embedded in our day to day work , ranging from job safety assessments between stakeholders on a project to the "tail gates" and activities on site for a fault response. Feedback from these exercises can be directed either informally (via a conversation with an engineer) or formally (via meeting minutes, specific defects, or discussion at a management meeting).		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.
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	We reference ENA & EEA newsletters, and notifications from the Commission and Electricity Authority. Compliance assessments are reported to the Board quarterly. Each manager is formally made aware of their compliance obligations at monthly management meetings, with informal follow up. We have a culture of discussing potential non-compliances with the relevant authorities.		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 (eg, 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

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
64	Information management	How has the organisation's ensured its asset management information system is relevant to its needs?	The organisation has not considered the need to determine the relevance of its management information system. At present there are major gaps between what the information system provides and the organisations needs.	The organisation understands the need to ensure its asset management information system is relevant to its needs and is determining an appropriate means by which it will achieve this. At present there are significant gaps between what the information system provides and the organisations needs.	The organisation has developed and is implementing a process to ensure its asset management information system is relevant to its needs. Gaps between what the information system provides and the organisations needs have been identified and action is being taken to close them.	The organisation's asset management information system aligns with its asset management requirements. Users can confirm that it is relevant to their needs.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation has not considered the need to document process(es) and/or procedure(s) for the identification and assessment of asset and asset management related risks throughout the asset life cycle.	The organisation is aware of the need to document the management of asset related risk across the asset lifecycle. The organisation has plan(s) to formally document all relevant process(es) and procedure(s) or has already commenced this activity.	The organisation is in the process of documenting the identification and assessment of asset related risk across the asset lifecycle but it is incomplete or there are inconsistencies between approaches and a lack of integration.	Identification and assessment of asset related risk across the asset lifecycle is fully documented. The organisation can demonstrate that appropriate documented mechanisms are integrated across life cycle phases and are being consistently applied.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation has not considered the need to conduct risk assessments.	The organisation is aware of the need to consider the results of risk assessments and effects of risk control measures to provide input into reviews of resources, training and competency needs. Current input is typically ad-hoc and reactive.	The organisation is in the process ensuring that outputs of risk assessment are included in developing requirements for resources and training. The implementation is incomplete and there are gaps and inconsistencies.	Outputs from risk assessments are consistently and systematically used as inputs to develop resources, training and competency requirements. Examples and evidence is available.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation has not considered the need to identify its legal, regulatory, statutory and other asset management requirements.	The organisation identifies some its legal, regulatory, statutory and other asset management requirements, but this is done in an ad-hoc manner in the absence of a procedure.	The organisation has procedure(s) to identify its legal, regulatory, statutory and other asset management requirements, but the information is not kept up to date, inadequate or inconsistently managed.	Evidence exists to demonstrate that the organisation's legal, regulatory, statutory and other asset management requirements are identified and kept up to date. Systematic mechanisms for identifying relevant legal and statutory requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
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	We have a comprehensive range of Policies, Standards and Procedures that address the entire asset life cycle from planning, design, construction, commissioning, operation, maintenance, renewal and removal. These policies are strictly controlled by a document management system, and are regularly reviewed.		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 (eg, 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.
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?	3	We have a comprehensive range of Inspection and Maintenance Policies and Standards. Firstly those Standards embody design standards such as safety and service levels, with designs requiring peer review before progressing to construction. Secondly the materials and construction tasks are specified in detail based on our material and methods Standards. Thirdly, we carry out both informal and formal field audits of work to verify that performance in the field is to our standards. Fourthly, all major works and a sample of minor works are inspected at completion and require a Commissioning report and confirmation that it complies with the Electricity (Safety) Regulations 2010. Fourthly, assets are subject to on-going inspections at specified intervals and are maintained in		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 (eg, 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.
95	Performance and condition monitoring	How does the organisation measure the performance and condition of its assets?	3	We have clearly specified AM objectives, primarily Reliability and Safety, but also including other measures such as Works Programme progress and financial performance. These measures are continually assessed against targets by respective managers, with action taken to correct variances. These measures are informally reported to the CEO daily, and formally to the Board each month. We believe that our asset data is of sufficient accuracy and quality for all of our planning and disclosure tasks.		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).
99	Investigation of asset-related failures, incidents and nonconformities	How does the organisation ensure responsibility and the authority for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non conformances is clear, unambiguous, understood and communicated?	3	Any investigations into equipment failure are flagged to the CEO level, along with the names of responsible parties. We use the Incident Cause Analysis Method (ICAM) to investige incidents where the potential for hamr or major damage was high. Defects that are raised in our defect database are assigned an owner, who is responsible for managing the return of the asset to a compliant state.		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.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
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?	The organisation does not have process(es) in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning.	The organisation is aware of the need to have process(es) and procedure(s) in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning but currently do not have these in place (note: procedure(s) may exist but they are inconsistent/incomplete).	The organisation is in the process of putting in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning. Gaps and inconsistencies are being addressed.	Effective process(es) and procedure(s) are in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation does not have process(es)/procedure(s) in place to control or manage the implementation of asset management plan(s) during this life cycle phase.	The organisation is aware of the need to have process(es) and procedure(s) in place to manage and control the implementation of asset management plan(s) during this life cycle phase but currently do not have these in place and/or there is no mechanism for confirming they are effective and where needed modifying them.	The organisation is in the process of putting in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during this life cycle phase. They include a process for confirming the process(es)/procedure(s) are effective and if necessary carrying out modifications.	The organisation has in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during this life cycle phase. They include a process, which is itself regularly reviewed to ensure it is effective, for confirming the process(es)/ procedure(s) are effective and if necessary carrying out modifications.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
95	Performance and condition monitoring	How does the organisation measure the performance and condition of its assets?	The organisation has not considered how to monitor the performance and condition of its assets.	The organisation recognises the need for monitoring asset performance but has not developed a coherent approach. Measures are incomplete, predominantly reactive and lagging. There is no linkage to asset management objectives.	The organisation is developing coherent asset performance monitoring linked to asset management objectives. Reactive and proactive measures are in place. Use is being made of leading indicators and analysis. Gaps and inconsistencies remain.	Consistent asset performance monitoring linked to asset management objectives is in place and universally used including reactive and proactive measures. Data quality management and review process are appropriate. Evidence of leading indicators and analysis.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
99	Investigation of asset-related failures, incidents and nonconformities	How does the organisation ensure responsibility and the authority for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non conformances is clear, unambiguous, understood and communicated?	The organisation has not considered the need to define the appropriate responsibilities and the authorities.	The organisation understands the requirements and is in the process of determining how to define them.	The organisation are in the process of defining the responsibilities and authorities with evidence. Alternatively there are some gaps or inconsistencies in the identified responsibilities/authorities.	The organisation have defined the appropriate responsibilities and authorities and evidence is available to show that these are applied across the business and kept up to date.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
105	Audit	What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))?	2	We have a document management system in place that specifies regular review and amendment of specific Policies, Standards, Procedures etc. The audit requirements for the Safety Management System overlapped some of the AM procedures. We subscribe to the PowerCo standards system, which provides extra expertise in certain technical areas. There is still work to be done in this area.		This question seeks to explore what the organisation has done to comply with the standard practice AM audit requirements (eg, 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.
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	Asset failure, or incipient failure from and inspection is recorded and communicated via our defects database. Defects are assigned owners who are responsible to return the asset to compliant state.		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
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	In the broad area of cost (price) and supply quality, we survey our consumers to determine preference, i.e. whether consumers are happy with the performance for the price they are paying. NWL also adopts minimum safety requirements that meet good industry practice. Maintenance and Inspection standards are written to ensure that the risk of in-service asset failure is minimised. Our new asset management software system will be used to track costs against various categories of work to ensure that we are continually improving.		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.
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?	2	We activley monitor external sources of advice or comment such as the EEA and other EDB's. We encourage staff to talk with colleagues in other companies and industries, and invite vendors to demonstrate and discuss new techniques and 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 (eg, 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.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
105	Audit	What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))?	The organisation has not recognised the need to establish procedure(s) for the audit of its asset management system.	The organisation understands the need for audit procedure(s) and is determining the appropriate scope, frequency and methodology(s).	The organisation is establishing its audit procedure(s) but they do not yet cover all the appropriate asset-related activities.	The organisation can demonstrate that its audit procedure(s) cover all the appropriate asset-related activities and the associated reporting of audit results. Audits are to an appropriate level of detail and consistently managed.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation does not recognise the need to have systematic approaches to instigating corrective or preventive actions.	The organisation recognises the need to have systematic approaches to instigating corrective or preventive actions. There is ad-hoc implementation for corrective actions to address failures of assets but not the asset management system.	The need is recognized for systematic instigation of preventive and corrective actions to address root causes of non compliance or incidents identified by investigations, compliance evaluation or audit. It is only partially or inconsistently in place.	Mechanisms are consistently in place and effective for the systematic instigation of preventive and corrective actions to address root causes of non compliance or incidents identified by investigations, compliance evaluation or audit.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation does not consider continual improvement of these factors to be a requirement, or has not considered the issue.	A Continual Improvement ethos is recognised as beneficial, however it has just been started, and or covers partially the asset drivers.	Continuous improvement process(es) are set out and include consideration of cost risk, performance and condition for assets managed across the whole life cycle but it is not yet being systematically applied.	There is evidence to show that continuous improvement process(es) which include consideration of cost risk, performance and condition for assets managed across the whole life cycle are being systematically applied.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
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?	The organisation makes no attempt to seek knowledge about new asset management related technology or practices.	The organisation is inward looking, however it recognises that asset management is not sector specific and other sectors have developed good practice and new ideas that could apply. Ad-hoc approach.	The organisation has initiated asset management communication within sector to share and, or identify 'new' to sector asset management practices and seeks to evaluate them.	The organisation actively engages internally and externally with other asset management practitioners, professional bodies and relevant conferences. Actively investigates and evaluates new practices and evolves its asset management activities using appropriate developments.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

Appendix C: Board Certification of AMP

Network Waitaki Limited
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Oamaru

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Email service@networkwaitaki.co.nz
Web: www.networkwaitaki.co.nz

SCHEDULE 17

Certification for Year-beginning Disclosures

Clause 2.9.1 of section 2.9

We,

Clare Margaret Kearney
Anthony James Wood

Being directors of Network Waitaki Limited certify that, having made all reasonable enquiry, to the best of our knowledge-

a. The following attached information of Network Waitaki Limited prepared for the purposes of clause 2.6.1 and clause 2.6.6 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.

Clare Margaret Kearney

Anthony James Wood

DATED: 31 March 2016