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Asset Management Plan

1st April 2015 – 31st March 2025

Prepared by Network Waitaki Ltd

www.networkwaitaki.co.nz

March 2015

Contents

1 Summary

Welcome to Network Waitaki's (NWL) Asset Management Plan (AMP) for the planning period 1st April 2015 to 31st March 2025. This AMP describes the electricity distribution service outcomes that NWL expects to deliver to the communities within its area of supply over that period along with the work programs and budgets required to deliver those outcomes.

The purpose of this AMP is to provide a systematic framework for the governance and management of NWL's electricity distribution assets.

Preparation of the AMP promotes compliance with the Electricity Distribution Information Disclosure Determination 2012. As part of that compliance it is a requirement to include specific schedules of; the maturity of the company's asset management processes; and forecasts for expenditure, asset condition, substation capacity, demand, and reliability. Those schedules are included in Appendix H.

1.1 Background and Objectives

NWL is wholly owned by a Consumer Trust and is locally managed to meet the Trust requirements which are documented in the company's Mission Statement as follows:

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.

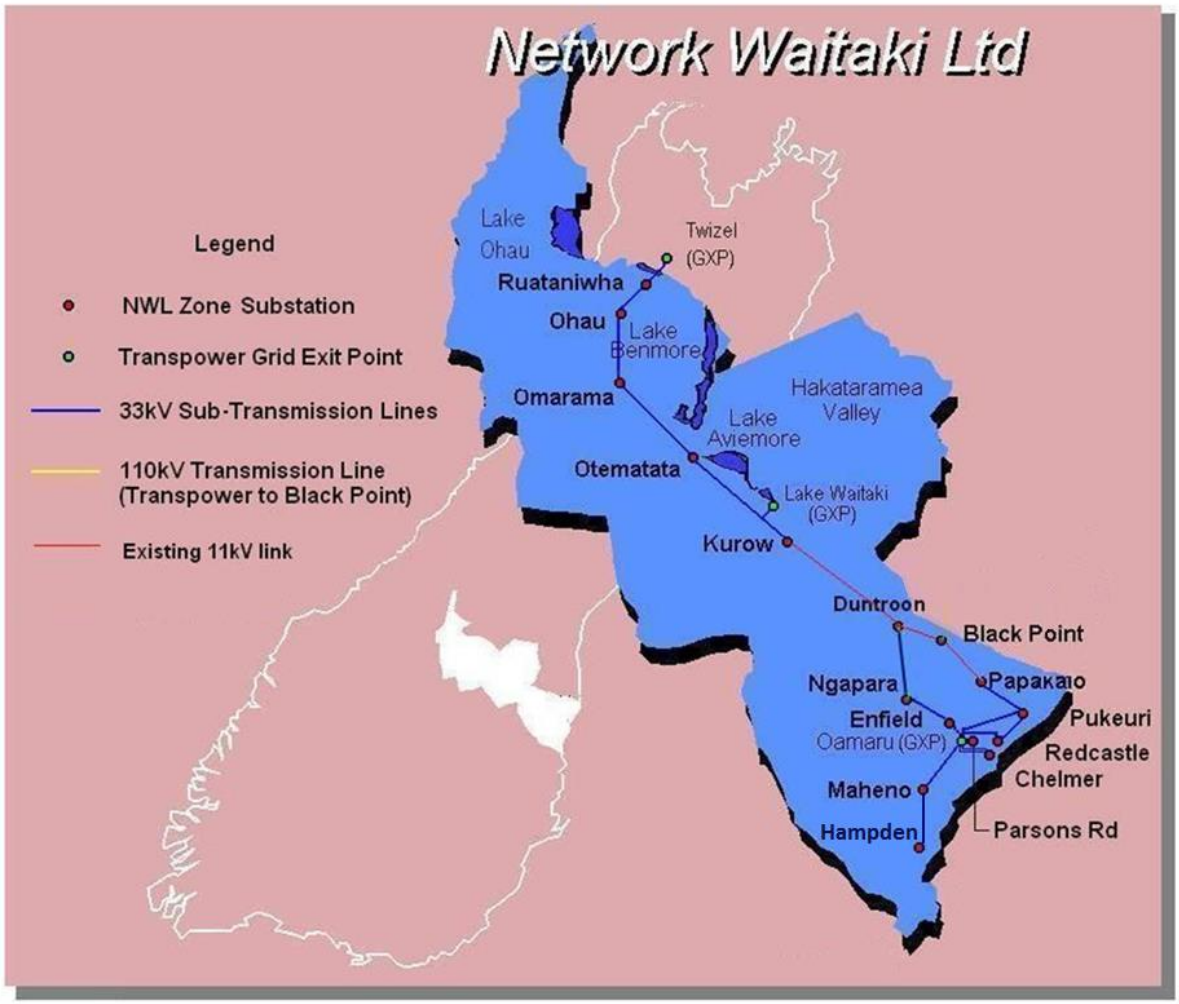
NWL's asset management overarching strategy is to ensure that its asset management practices continue to deliver agreed service levels as set out in this AMP at minimum long-term cost. In particular, the objectives of this AMP are to:

- 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. This promotes productive efficiency.
- Ensure that physical, commercial and regulatory risks are correctly managed throughout the assets lives.

1.2 Assets Covered

The NWL network is predominantly a rural network supplying the North Otago, Hakataramea, and Ahuriri regions. Key economic activities are dairy farming, sheep farming and rural servicing.

NWL's area of supply and subtransmission network is shown in the following diagram.



NWL takes bulk supply from the following points:

Supply point	Voltage	Firm capacity	Max demand 2013/14	Energy throughput 2013/14
Oamaru GXP	110/33kV	40 MVA	39.0 MW	180.4 GWh
Black Point GXP	110/11kV	25 MVA	10.7 MW	15.8 GWh
Waitaki	11/33kV	5.5 MVA	4.6 MW	17.8 GWh
Twizel GXP	220/33kV	20 MVA	3.0 MW	7.4 GWh

Key features of the network as at 31 March 2014 include:

Parameter	Value
Length of 33kV lines and cables	166 km
Length of 11kV lines and cables	1407 km
Length of LV lines and cables	333 km
Number of zone substations	14
Number of connected customers	12431
Coincident max demand	51 MW
GWh energy throughput	237 GWh
Percentage of customers in urban areas	54%

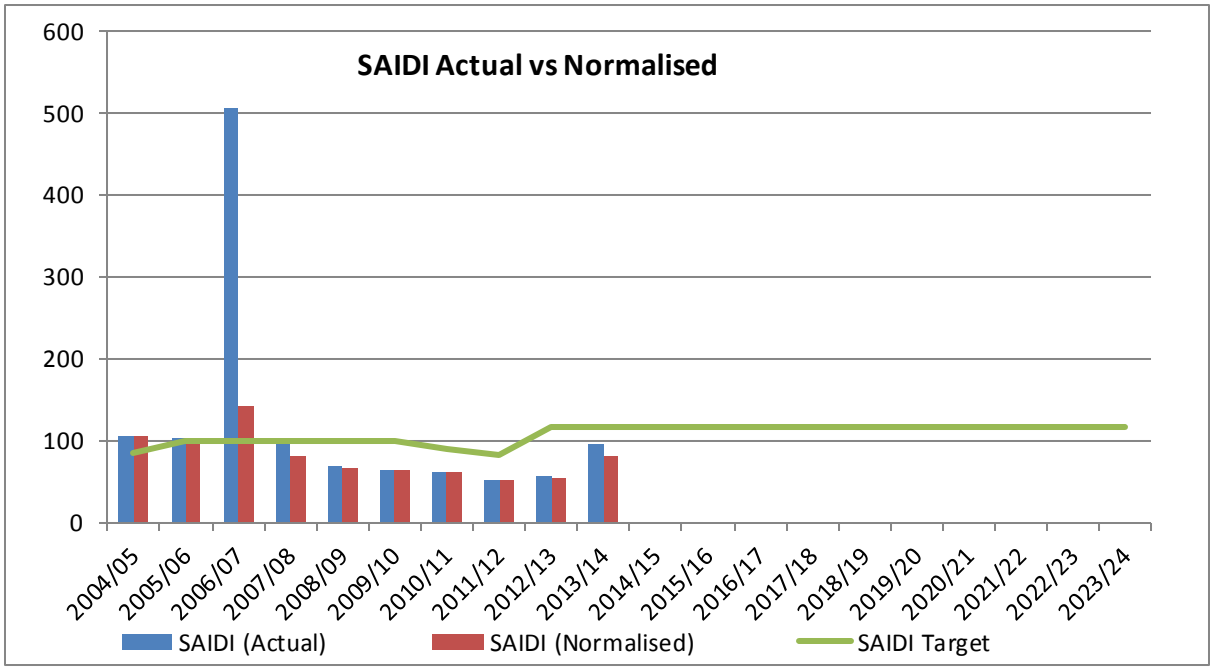
1.3 Service Levels

NWL's customer surveys have revealed that the service attributes most highly valued by customers are "keeping the power on" and "getting the power back on if it goes off". Hence the measures that NWL uses for the development of customer service targets are the industry performance measures used to monitor the reliability of the electrical network, SAIDI and SAIFI, as these are not discretionary and, in the view of NWL effectively measure the extent to which it is able to achieve its objective of supplying a safe, reliable, and efficient electricity supply to its customers.

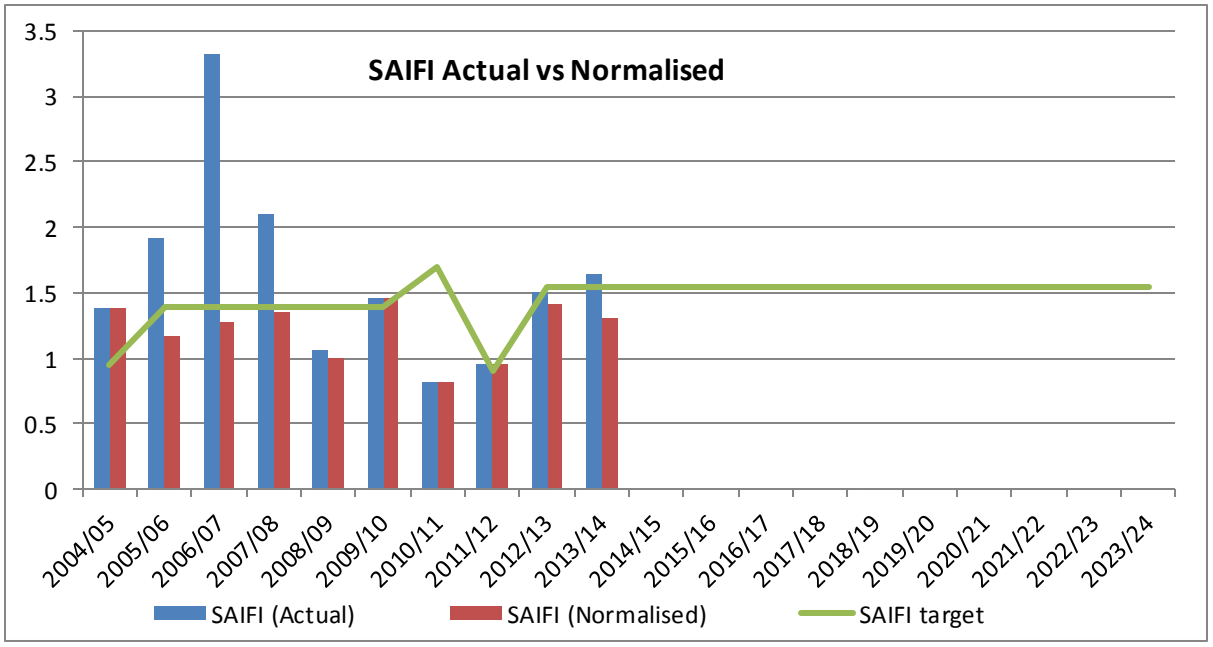
NWL has a proven record of achieving high levels of reliability and security of supply compared with other similar networks. Forward targets are based on maintaining a position in the upper quartile of performance.

In agreement with consumer representatives, NWL is not planning to increase its service level performance over the term of this Plan but seeks to maintain its position relative to the rest of the industry.

The following two charts show the historic levels of these two indices along with the target levels for the planning period.



Historical SAIDI Performance



Historical SAIFI Performance

1.4 Network Development Planning

Within NWL's area of supply network development has in the past decade been driven by load growth and change in the demographics of that load (i.e. the conversion of dry land sheep farming to dairying and the associated use of irrigation). Thus system growth has driven

capital expenditure in recent years and large parts of the network that would have required replacement due to condition in several years' time have been replaced as part of this load growth.

NWL is not planning to reticulate new areas or to remove reticulation from less economic areas. It aims to retain and service the consumers it has, and connect new consumers as economically as it can. It is not planning to significantly increase or decrease service levels but maintain its industry position.

NWL has developed planning criteria so that the network will meet the service level targets described in Section 4. The planning criteria are based on:

- Network Security
- Network Capacity
- Quality of Supply
- Network Reliability

The 33kV sub-transmission network that emanates from the NWL 33kV Switching Station at Weston 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.

The subtransmission developments described in the previous AMP were based on a new 66 kV GXP at Livingstone that would initially operate at 33 kV. Since then Transpower has completed a detailed investigation and solution studies report, sufficient for detailed costing of this option. The cost was found to be too high and instead the Waitaki GXP will be upgraded to provide more capacity and security.

However, the subtransmission strategy remains the same, which is to build a new 66 kV line between Kurow and Duntroon Substations, which will initially operate at 33 kV, and then build a 66 kV ring between Duntroon, Ngapara, and a new Awamoko Substation.

The following table lists the sub-transmission projects:

Project	Driver	FYE	Budgeted Cost k$
66kV Line –Kurow – Duntroon Stage 2	System Growth	2016	2,200
Kurow Zone Substation Stage 2	System Growth	2016	920
33kV Line Weston – Five Forks	System Growth	2017	1,500
Five Forks Zone Substation	System Growth	2017	1,700
66kV Line Ngapara - Awamoko	System Growth	2018	1,680
Awamoko Zone Substation	System Growth	2018	1,700
Otekaieke Zone Substation	System Growth	2019	1,700
66kV Line Duntroon Awamoko	System Growth	2020	2,320
Reinsulate Ngapara – Duntroon Line for 66 kV operation	System Growth	2020	350
66/33 transformers at Kurow and Duntroon Substations	System Growth	2020	1,680
66/33 transformers at Awamoko and Ngapara Substations	System Growth	2020	1,680
Upgrade Pukeuri Substation to Dual Transformers	Reliability, Safety, & Environment	2021	1,075

Table of Sub-transmission Projects

Development of the distribution network has been driven by load growth and new connections in the past decade. This growth is a result of dairy conversions and the associated irrigation. NWL expects this trend to continue in the early part of the planning period. Commentary on this work can be found in Section 6.

The following table lists the major distribution development projects:

Project	Driver	FYE	Budgeted Cost k$
Arc Flash Protection (One Substation per year)	Reliability, Safety, & Environment	2014-	~60 p.a.
Pole Replacements	Asset Replacement & Renewal	2014 -	500 p.a.
Optic Fibre Rollout to Oamaru Zone Substations	Reliability, Safety, and Environment	2015	250
Develop two new feeders out of Pukeuri Substation	Reliability, Safety, and Environment	2016	150
Rebuild Five Forks Feeder along Kakanui Valley Road	System Growth	2017	245
Upgrade and extend Windsor Feeder to Peaks Rd	System Growth	2017	205
Rebuild Tapui/Fuchsia Creek 11kV	Asset Replacement & Renewal	2017	450
Radio Link Upgrade	Reliability, Safety, & Environment	2018	603
Extend Five Forks Feeder to Peaks Rd	Reliability, Safety, & Environment	2019	160
Upgrade and extend Ngapara Feeder to Peaks Rd	Reliability, Safety, & Environment	2019	270
11kV Feeder Extension Arundel St. – Foyle St.	Reliability, Safety, & Environment	2019	300

Table of Major Distribution Development Projects

1.5 Lifecycle Planning

NWL's life cycle expenditure falls into four categories:

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

NWL operates a time based inspection and preventative maintenance programme, where all assets are regularly inspected to identify defects that require repair. The frequency of inspections varies for each of the different asset classes.

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.

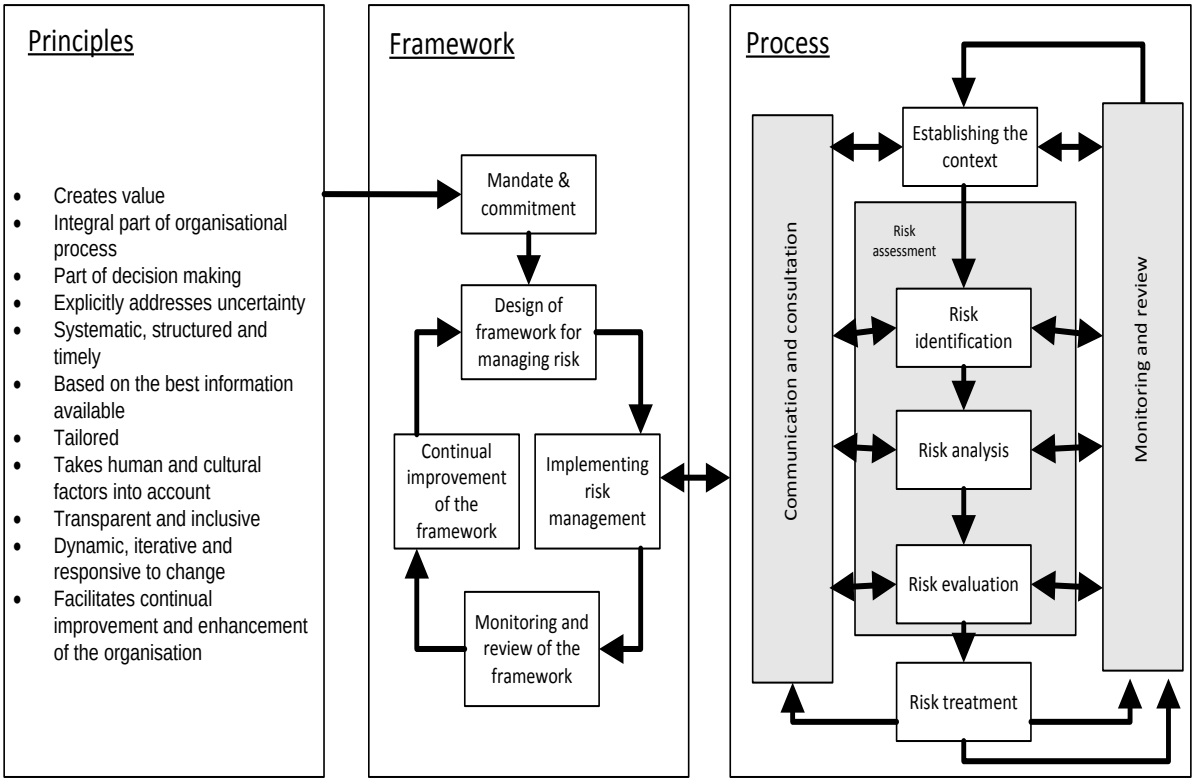
Unplanned fault based maintenance not only includes responding to faults but also to near fault situations, and critical safety situations. Examples of critical safety situations include such things as disconnecting power to property which is on fire, or isolating a section of line for a car versus pole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

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

The primary driver for replacing assets versus repairing them is economic, where the discounted cost of on-going repairs exceeds the replacement cost. The other major drivers for replacement which may override the most economic course of action are where, the risk and consequences of failure of an asset warrant replacement, and where the performance of the asset is likely to be poor following repairs.

1.6 Risk Management

NWL adopts a systematic network risk management process, based on ISO 31000 - Risk Management Standard, to identify and record all significant and known risks to the network. The Standard sets out the following high-level risk management framework:



Identified risks are analysed in a risk model, which is a matrix of probability and weighted impact, to determine priority and establish the expenditure level that can be reasonably applied to eliminating or mitigating risk.

NWL applies a variety of solutions to manage network orientated risks:

- **Physical Solutions:** Based on standards and quality systems. A stock of critical spares is kept at various locations both within Oamaru and in the upper Waitaki Valley.
- **Contractual:** Contracts provide for minimum resourcing, backup, and fault response
- **Financial:** Contracts with customers and suppliers define liability and performance penalties
- **Insurance:** Limited insurance exists for zone substations and the Oamaru offices. The remainder of the assets are self-insured by NWL.
- **Response Plans:** Contingency plans for responding to major incidents have been prepared and were well tested in the wind storm of 10 September 2013 and in the 2006 snow storm. NWL staff and Contractors are provided with copies of the Emergency Preparedness Plan which documents the responses that will be expected from staff and contractors to a specific type of emergency.

1.7 Performance Evaluation

In the 2013/14 financial year:

- The Customer Connection and Asset Relocations capital projects are driven by requests from third parties (mainly customers). All requested work performed under these categories was completed successfully.
- System Growth capital expenditure was greater than forecast due to a large new irrigation connection that required significant work outside that budgeted to increase the supply capacity at Kurow Substation.
- Reliabaility, Safety, and Environment capital expenditure was considerably less than forecast mainly due to the Pukeuri Substation Upgrade not proceeding as it did not get Board approval due to insufficient justification being provided by Management, and also because of a reprioritisation of work on new connections and system growth.
- Asset Replacement and Renewal expenditure was less than forecast as priority was given to consumer connections and System Growth. Next to safety related work, Network Waitaki Limited places the highest priority on to consumer driven work. With the ongoing conversion of dry land farming operations to dairying there will be years where the consumer driven work requires Network Waitaki Limited to reduce its expenditure in other areas.
- Service Interruptions and Emergencies operational expenditure was less than forecast reflecting a downward trend in recent years that is consistent with improved reported

reliability. Network Waitaki has analysed its budgets and modified them to reflect this new trend for future years.

- Vegetation Management operational expenditure was greater than forecast, primarily due to the opportunity that arose to complete one major tree felling job. The rest of the vegetation work was in line with forecast.
- Routine and Corrective maintenance expenditure was greater than forecast due to additional paper sampling tests done on zone substation transformers (because of inconsistent results) and more load controller maintenance than forecasted.
- Asset Replacement and Renewal operational expenditure was less than forecast due to 11 kV line renewal work not being completed due to contracting resources being less than anticipated.
- The SAIDI levels for both planned and unplanned outages were better than the target levels.
- The SAIFI levels for both planned and unplanned outages were higher than the target levels. The higher than targeted SAIFI levels, for the low level of SAIDI, indicates that there were a large number of outages where either the duration was short or the number of customer affected was small. This reflects Network Waitaki's strategy of targeting supply restoration to customers when considering various competing capital and maintenance projects.
- All three asset performance service measures used by NWL, loss ratio, transformer utilisation, and Opex/ICP met their respective targets.

As per the regulatory requirements NWL has completed an assessment of the maturity of its asset management practices using the prescribed Asset Management Maturity Assessment Tool (AMMAT). The key finding of the assessment was that NWL's asset management practices are mature with most elements scoring 3 out of 4.

1.8 Capability to Deliver

The mechanisms that NWL uses to ensure that the AMP work programme for the current financial year can be achieved involve:

- formal monthly reporting on the physical progress of the works programme against project milestone dates
- formal monthly reporting on the financial progress of the works programme against budgets (monthly and year to date)
- formal monthly reporting on the progress of the service levels against targets and historical monthly trends
- weekly meeting between the engineering staff and the internal contracting company
- monthly staff and management meetings where project progress, budgets, and service levels are fixed items on the agenda
- informal meetings involving the engineering staff

- monthly review of internal contractors resources to meet the AMP work programme and any external work opportunities
- regular review of available (external) contractor resources to complete the substation development and maintenance programmes, as the internal contracting company does not have technicians to do this work

The mechanisms that NWL uses to ensure that the AMP work programme over the medium and longer term can be delivered upon involve:

- planning the work programme so that the project man-hour and dollar budgets are, where practical, spread evenly over successive years
- regular reviews of the demand forecast, and whether the level of demand driven work needs to be raised or lowered
- regular reviews of the condition of the assets, and whether there are any significant trends developing within asset classes that needs addressing
- regular checking for any common mode failures with any specific equipment items
- monitoring any long term trends in service levels. Adverse trends may indicate insufficient expenditure or poor allocation of expenditure (spending the right amount but on the wrong things). Overly favourable trends could indicate too much expenditure in a certain area.
- annual review of the internal contractor's resources to match recruitment and training requirements with projected future work programmes
- regular review and forecast of future revenue streams to ensure there are sufficient funds to develop and maintain the network. This involves annual reviews of tariffs, discounts returned to consumers, and capital connection levies.

2 Background & Objectives of the AMP

2.1 Purpose Statement

The purpose of this AMP is to provide a systematic framework for the governance and management of Network Waitaki's electricity distribution assets. 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. This promotes productive efficiency.
- Ensure that physical, commercial and regulatory risks are correctly managed throughout the assets lives.

Preparation of the AMP in this format also promotes compliance with the Electricity Distribution Information Disclosure Determination 2012. As part of that compliance it is a requirement to include specific schedules of; the maturity of the company's asset management processes and forecasts for expenditure, asset condition, substation capacity, demand, and reliability. Those schedules are included in Appendix H.

2.1.1 Mission and Vision

Network Waitaki (NWL) is wholly owned by a Consumer Trust and is locally managed to meet the Trust requirements which are documented in the company's Mission Statement as follows:

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.

Both the AMP and the Network Development Plan serve the purpose of meeting these objectives in a coordinated manner.

2.1.2 Documented Plans Relating to the Annual Business Planning Process

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 Commerce 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
- the suite of emergency preparedness documents that detail the plans to maintain and restore supply following emergency events

2.1.3 Relationship and Interaction Between the AMP and Other Planning Documents

The relationship between this AMP and the other planning documents, described in Section 2.1.2, is shown in the diagram at the end of this section. The planning process should be viewed as a continuous cycle rather than a hierarchy of documents.

NWL is a lines company with 100% of its shares held by the Waitaki Power Trust, which is a consumer trust. The Trust represents the interests of its beneficiaries, who are the end-use consumers connected to the NWL network.

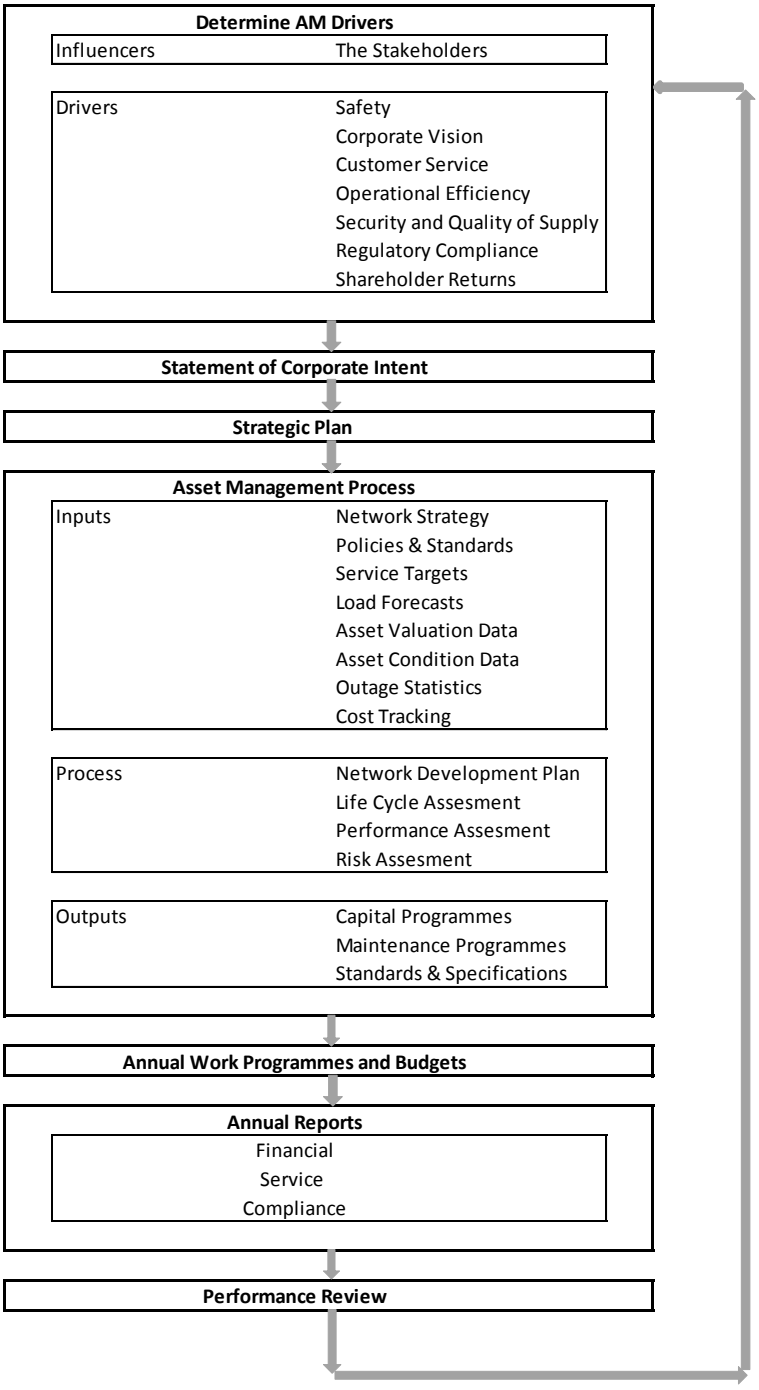
The Corporate objectives, goals, and related performance targets of the company are set out in the Statement of Corporate Intent (SCI), which is agreed annually between the Board of Directors and the Waitaki Power Trust. The SCI covers the coming financial year plus the two succeeding years and is updated annually.

The SCI also includes policies and objectives relating to Health & Safety, Risk Management, Human Resources, Environmental Management, Social Responsibility, Compliance, and the Efficient Use of Resources. The SCI includes statements of supply reliability (SAIDI and SAIFI) and revenue. Hence the Trust is informed of NWL's intended price-quality trade-offs.

The company's strategic planning, annual business planning and budgeting processes, identifies the key initiatives that are required to achieve the targets and objectives set out in the SCI and the Network Development Plan. Annual Business Plans and Budgets are prepared to schedule actions needed at a more detailed level to deliver corporate objectives, assign responsibilities, and allocate resourcing for the coming financial year.

The AMP provides a summary of the information contained in these internal planning documents, to enable stakeholders to assess NWL's asset management practices.

NWL Asset Management Process



2.2 Planning Period

The planning period for this AMP is from the 1st April 2015 to 31st March 2025.

NWL recognises that varying degrees of uncertainty will almost inevitably result in some changes to this AMP, especially in the latter years. Hence NWL ascribes the following accuracies to its various market segments.

Timeframe	Residential & commercial	Large industrial	Intending generators
Year 1	Very certain	Reasonably certain	Reasonable certainty
Years 2 and 3	Certain	Little if any certainty	Some certainty
Years 4 to 6	Reasonably certain	Little if any certainty	Little if any certainty
Years 7 to 10	Somewhat uncertain	Little if any certainty	Little if any certainty

2.3 Date Approved by Directors

This AMP was approved by Network Waitaki's directors on 30 March 2015.

2.4 Description of Stakeholder Interests

2.4.1 Stakeholders and their Interests

As a wholly owned consumer trust, corporate goals and objectives are primarily driven by the Waitaki Power Trust on behalf of consumers. However there are many other stakeholders who also have interest in the planning and asset management process.
NWL defines its stakeholders as any person or class of persons that does or may do one or more of the following:

- Has a financial interest in NWL (be it equity or debt).
- Pays money to NWL (either directly or through an intermediary) for delivering service levels.
- Is physically connected to the network.
- Uses the network for conveying electricity.
- Supplies NWL with goods or services (including full-time labour).
- Is affected by the existence, nature or condition of the network (especially if it is in an unsafe condition).
- Has a statutory obligation to perform an activity in relation to the network's existence or operation (such as request disclosure data, regulate prices, investigate accidents, included in a District Plan etc.).

The interests of stakeholders are identified through:

- Meetings with the Waitaki Power Trust
- Approval or amendment of the SCI by the Trust
- Approval of annual business plans and budgets by the Board
- Meetings and informal discussions with various stakeholders
- Annual visits with major customers
- Customer surveys
- Faults
- Reviews of major events (e.g. storms)
- Enquiries and complaints
- Quality of supply investigations
- Meetings with suppliers
- Meetings with contractors
- Project close out reviews with staff and contractors
- Industry seminars, conferences, and training courses
- Papers and submissions

The interests of stakeholders are defined in Table 2.4.1(a) below:

Table 2.4.1(a) – Key stakeholder interests

Stakeholder	Interests				
	Viability	Price	Supply quality	Safety	Compliance
Waitaki Power Trust	✓	✓	✓	✓	✓
Bankers	✓	✓			
Connected customers	✓	✓	✓	✓	
Connected generators	✓	✓	✓	✓	
Energy retailers	✓	✓	✓	✓	
Transpower	✓	✓	✓	✓	✓
Mass-market representative groups	✓	✓	✓		
Industry representative groups	✓	✓	✓		
Staff & contractors	✓	✓		✓	✓
Suppliers of goods & services	✓	✓			
Public (as distinct from customers)				✓	
Land owners				✓	✓
Councils (as regulators)				✓	✓
Transport Agency (TANZ)				✓	✓

Stakeholder	Interests				
	Viability	Price	Supply quality	Safety	Compliance
Ministry of Business, Innovation, and Employment		✓		✓	✓
WorkSafe New Zealand (including Energy Safety Service)				✓	✓
Commerce Commission	✓	✓	✓		✓
Electricity Authority					✓
Electricity Complaints Commission			✓		✓
Ministry of Consumer Affairs			✓		✓

2.4.2 Accommodating Stakeholder Interests

Table 1.4.2(a) provides a broad indication of how stakeholder interests are accommodated in asset management practices.

Table 1.4.2(a) – Accommodating stakeholder interests

Interest	Description	How interests are accommodated	Asset Management Activities
Viability	Viability is necessary to ensure that shareholders and other providers of finance such as bankers have sufficient reason to keep investing in NWL (and to retain ownership).	NWL will accommodate stakeholders' needs for long-term viability by delivering earnings that are sustainable and reflect an appropriate risk-adjusted return on employed capital. In general terms this will need to be at least as good as the Trust could obtain from a term deposit at the bank plus a margin to reflect the risks to capital in an ever-increasingly regulated lines sector.	Prices are set so that works programmes are funded and that a suitable return can be made. Costs are controlled.

Interest	Description	How interests are accommodated	Asset Management Activities
Price	Price is a key means of both gathering revenue and signalling underlying costs. Getting prices wrong could result in levels of supply reliability that are less than or greater than NWL's customers want.	NWL's total revenue is constrained through recognition of the beneficial ownership arrangement. Failure to gather sufficient revenue to fund reliable assets will interfere with consumer's business activities, and conversely gathering too much revenue will result in an unjustified transfer of wealth from consumers to shareholders. NWL's pricing methodology is expected to be cost-reflective, but issues such as the Low Fixed Charges requirements can distort this.	Prices are set so that works programmes are funded and that a suitable return can be made. Pricing methodology reflects expected costs.
Supply quality	Emphasis on continuity, restoration and reducing flicker is essential to minimising interruptions to customers businesses.	NWL will accommodate stakeholders' needs for supply quality by focusing resources firstly on continuity and restoration.	Expenditure is focused on maintaining current continuity of supply and restoration standards. Expenditure is targeted to address quality of supply issues where problems are identified (e.g. harmonics).

Interest	Description	How interests are accommodated	Asset Management Activities
Safety	Staff, contractors and the public at large must be able to move around and work on our network in total safety.	NWL will ensure that the public at large are kept safe by ensuring that all above-ground assets are structurally sound, live conductors are well out of reach, all enclosures are kept locked, and all exposed metal is securely earthed. NWL will ensure the safety of its staff and contractors by providing all necessary equipment, improving safe working practices, and ensuring that workers are stood down in unsafe conditions. Motorists will be kept safe by ensuring that above-ground structures are kept as far as possible from the carriage way within the constraints of private land and road reserve.	Maintain and improve the NWL's Public Safety Management System. Maintain safety policies and standards. Oversee safe work practices, including regular audits of contractors and work sites. Where practical, relocate assets away from the road.
Compliance	NWL needs to comply with many statutory requirements ranging from safety to disclosing information.	NWL will ensure that all safety issues are adequately documented and available for inspection by authorised agencies. NWL will disclose performance information in a timely and compliant fashion.	Carry out annual internal and external audits of the Public Safety Management System. Complete AMP, AMMAT, and all other required disclosures.

2.4.3 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 contractors, 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 - NWL will give top priority to safety, including significant property damage. Even if budgets are exceeded or non-compliance arises, NWL will not compromise the safety of its staff, its contractors, or the public.
- Viability - NWL will give second priority to viability (as defined above), because without it NWL will cease to exist which makes supply quality and compliance pointless.
- Pricing – NWL will give third priority to pricing as a follow on from viability (noting that pricing is only one aspect of viability). NWL recognises the need to adequately fund its business to ensure that consumer's businesses can operate successfully, whilst ensuring that there is not an unjustified transfer of wealth from its consumers to its shareholders.
- Supply quality – NWL will give fourth priority to supply quality because a reliable electricity supply is a key input to a prosperous and orderly community.
- Compliance - NWL will give lower priority to compliance that is not safety related.

2.5 Accountabilities & Responsibilities for Asset Management

Trustee

NWL Limited has a single shareholder, the Waitaki Power Trust. The shares are held on behalf of the NWL consumers and the Trust appoints the NWL Group to carry out the governance and management functions of the business.

The Trust is subject to the following two accounting mechanisms:

- By an election process where three of the trustees stand for election by the connected consumers/electors every three years
- By the Trust Deed which holds all Trustees collectively accountable to the New Zealand judiciary for compliance with the Deed

Director

The ultimate accountability for the network assets lies with the Directors of NWL, who are appointed by the Trustees, and who approve the Asset Management Plan. Directors are also accountable to the Trustees for meeting the requirements set out in the Statement of Corporate Intent, which includes specific asset management objectives and service targets.

Directors have an involvement in approving projects and budgets needed to support the AMP. For larger projects, new investments, and projects committing the company to expenditure over several years the approval process includes a formal Sanction for Expenditure. This provides Directors with technical detail and presents the business case for the proposal. Directors review Sanctions, post implementation, to confirm delivery on benefits and continued need. The Asset Management Plan 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.

Management 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.

The management of the assets is the responsibility of NWL's executive management, organised per the NWL Organisational Structure shown on page 26.

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

This manager has overall responsibility for the performance and development of the network. This includes the management of the annual capital and maintenance work programmes, contractor interface, and the development of standards and policies.

Network Operations Manager

This manager has responsibility for the day to day operation of the network and the implementation of the annual capital and maintenance work programmes.

General

Pricing and disclosure duties are shared by the both the Network and Commercial Managers with assistance and input from the Finance Manager.

NWL's fault service is currently resourced by NWL Contracting Ltd, a distribution contracting company, which is 100% owned by NWL. The service is secured via a monthly fee to ensure resource availability is always maintained in Oamaru. Performance is reviewed annually and compared with industry benchmarks.

The majority of the annual work programme is undertaken by NWL Contracting Ltd (NWCL), who has a staff of approximately 25 people located in Oamaru. NWCL does not provide technician services and these have to be out sourced.

NWL has a relatively small staffing establishment intended to resource a narrow business model i.e. operational management of a lines business. Work activity is shared by a discipline based team and assigned on the basis of competence to do the task not seniority of an individual position e.g. the entire engineering team, from the Network Manager to the Engineering Officer, man the Control Room on a roster basis. The organisation chart is shown below.

The primary and other accountability mechanisms are summarised in the following table:

Function	Primary accountability mechanism	Other accountability mechanisms
Representation	Election of trustees by connected customers/electors.	Company annual report. Information disclosure. Disclosed AMP. Public notices in newspaper. Consultation on major issues. Trustees being approached in the street by concerned customers.
	Trustees are accountable to the NZ judiciary for complying with the Deed.	Occasional challenges of Trust decisions and activities by any other stakeholders.

Function	Primary accountability mechanism	Other accountability mechanisms
Ownership	Statement of corporate intent.	Meetings between Trust, Board, and Chief Executive Quarterly Reports
Governance	Employment contract.	Monthly board reports. Informal discussions between Chairman and Chief Executive.
Management & service delivery	Employment contract.	Monthly management meetings. Monthly staff meetings. On-going daily contact. General work-place accountability (master-servant relationship).
Internal contracting	Employment contract. Internal service level agreement.	Internal company dynamics. Competitive tendering of large one-off projects.
External contracting	Performance based contracts	Competitive tendering. Unstated threat of taking work back in-house.

The key formal reporting mechanisms and their content are summarised below:

Reporting line	Reporting mechanisms & content
Trust to customers and wider community	Trust's AGM. Trust's annual report and audited accounts. The company website includes the AMP 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.
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 Capex 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.

Reporting line	Reporting mechanisms & content
	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

2.6 Significant Assumptions

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

Parameter	Assumption	Basis for the Assumption	Potential Impact of Uncertainty
Consumer Connections	That the demand for new and upgraded connections, especially in the dairy and irrigation sector, will continue. Regional Council 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. The Holcim cement plant development has been further delayed. Holcim is now building a cement import facility at the Port of Timaru. If the proposed Holcim Cement plant proceeds then it will impact on demand. NWL is mindful of the Holcim decision, but for now is focused on	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. 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, planning, and capital funding are based primarily on recent trends in customer connections. System growth developments are also partially funded from charges levied on new and upgraded connections. The result of a significant reduction in new connections such as that, which occurred in 2009/10 and continued through 2010/11, resulted in NWL reviewing its timing of system growth related work and pushing some projects out. However the rate of customer driven work has picked up again significantly in 2013/14 and continued in 2014/15 forcing NWL to bring some

Parameter	Assumption	Basis for the Assumption	Potential Impact of Uncertainty
	servicing the dairy irrigation growth.		project work forward.
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. To meet this demand, a major upgrade in GXP capacity in this area will be required. The dairy and irrigation load growth will provide the basis for an application to Transpower to upgrade the supply into this area.	Discussions with farming and irrigation industry representatives, along with media reports of Government promoting irrigation.	The main impact around the certainty of this growth is the timing required for upgrade in the transmission GXP capacity required. New GXP capacity will come with significant costs, which will be passed on to consumers. Hence committing too soon could result in higher charges to consumers. On the other hand committing too late could result in there being insufficient capacity to meet demand, and possible rolling irrigation power outages.
Reliability, Safety, and Environment	That consumer feedback will continue to support the present level of reliability and quality of supply. That maintaining this level of security in high growth periods will require additional field equipment, and live line work procedures to minimise the impact of planned and unplanned outages.	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. Live line glove and barrier work practices are a useful tool in minimising the impact of planned capital and maintenance work. However this type of	To maintain reliability and quality of supply at current levels requires that any adverse impact in terms of SAIDI, SAIFI, and CAIDI associated with the growth in load or consumer density or increase in line length is mitigated. However as growth is largely dictated by the consumers requirements, the cost of any

Parameter	Assumption	Basis for the Assumption	Potential Impact of Uncertainty
	That any changes to the regulations regarding safety will not require significant capital expenditure.	work is more expensive than the de-energised option. Increases in feeder loadings and ICPs connected requires the installation of additional auto sectionalising, isolating and fault locating equipment to limit the number of consumers that are affected by both planned and unplanned outages.	mitigation measures will depend on where this occurs and the magnitude of the change. Consumers installing DG and the widespread replacement of night storage heaters with heat pumps also impacts on usage patterns, network loading, and therefore on reliability and quality. The costs associated with regulatory changes can also be significant as with the recent requirement around the development of an audited Safety Management System for Public Safety.
Asset Replacement and Renewal	That expenditure on asset replacement and renewal will remain moderate in the next couple of years when system growth driven expenditure is high, due to the capacity to finance and resource a certain level of expenditure. Expenditure on timber pole replacement is expected to remain high over the planning	Load growth has occurred predominantly in rural areas where the availability of irrigation water has prompted a change in land use to dairy farming. These are also the areas where the majority of the older line assets were located. Many of these assets have now been replaced under the "system growth" section of the budget.	Although many of the older assets have been replaced under the "system growth" section of the budget, a significant number of these assets were replaced prematurely due to the requirement for additional capacity rather than asset condition. If the present level of load growth does not continue the "Asset Replacement &

Parameter	Assumption	Basis for the Assumption	Potential Impact of Uncertainty
	period due to the age profile of these poles.		Renewal" section of the budget will increase. Extreme events such as the snow storm that occurred in June 2006 can result in the unplanned and premature replacement of a significant number of distribution line assets. This is not budgeted for. The age of timber poles is such that NWL expects to have to replace a significant amount of these in the next few years.
Routine and Corrective Maintenance	That routine and corrective maintenance costs will remain reasonably static in the medium term.	This assumption is based on historic trends with a small annual increase to cover the cost associated with changes in asset testing and condition assessment activities.	Regulatory changes can impact on these costs and the requirement for an externally audited SMS for public safety is an example of this.
Asset Replacement & Renewal Maintenance	That asset replacement & renewal maintenance costs will remain reasonably static in the medium term.	The results from asset condition assessment programmes and fault reports do not indicate any change in the rate of ageing. Premature capital replacement of assets due to load growth has also resulted in a significant quantity of older NWL assets being replaced.	Asset condition assessment techniques are continually being updated and refined and the range of assets that are subject to regular planned inspections is increasing. Assets that show a high incidence of premature failure are identified and programmed for

Parameter	Assumption	Basis for the Assumption	Potential Impact of Uncertainty
			early replacement. Although this is not a common occurrence it has occurred on several occasions in the past.
Vegetation Management	That vegetation management costs will remain static over the medium term.	NWL's monitoring and assessment of vegetation management practices indicates that this will remain static.	Trees outside the notice zone can impact on network reliability. Where landowners declare no interest in these trees it may be in NWL's interest to remove them. This and any future changes of the tree regulations could impact on the level of expenditure.
Service Interruptions & Emergencies	That the contingency allowance for providing a 24/7 fault service and responding to network faults will remain relatively constant.	Fault expenditure consists of both fixed and variable components. The fixed cost components cover the provision of an afterhours call centre plus standby costs for the fault response contractors. The variable costs depend on the number of callouts and the nature of the fault. The costs associated with replacing capital assets that have been damaged during a fault are treated as unplanned capital asset replacement.	NWL does not make any provision in its faults contingency budget for extreme events as these are relatively rare. NWL has a relatively low incidence of faults and any relatively small increase in the incidence of a particular fault type e.g." car v pole" could result in increased expenditure.

2.7 Overview of Asset Management Strategy and Delivery

NWL's asset management overarching strategy is to ensure that its asset management practices continue to deliver agreed service levels as set out in this AMP at minimum long-term cost. The strategy is outlined below under the headings of Safety, Service Levels, Asset Configuration, Resourcing, Materials, and Risks.

Safety

- NWL will provide a safe public environment by ensuring that its network remains safe, and meets the requirements of its own Safety Management System and other relevant requirements such as ECP34:2001, ECP35:1993, ECP41:1993 and the Electricity (Hazards from Trees) Regulations 2010.

Service Levels

- NWL will target reliability service levels of 116 SAIDI minutes and SAIFI of 1.5, as most customers have expressed a preference for similar levels of reliability to what they receive now. These target levels are the same that would apply if NWL was a regulated EDB under the DPP regime.
- NWL will meet the minimum of either statutory levels or agreed terms for supply voltage.
- NWL will endeavour to meet its security of supply standards unless the required investment levels appear significantly inconsistent with common power engineering practice.
- NWL will endeavour to limit flicker to levels specified by AS/NZS 61000.3.7 1996
- NWL will endeavour to limit harmonic levels to those specified in NZ ECP36 : 1993
- NWL will permit connection of distributed generation in accordance with Part 6 of the Electricity Industry Participation Code, where such connection does not compromise safety or network operation. NWL will also require a connecting generator to pay the full economic cost of connection where that is not inconsistent with Part 6 of the Code.

Asset Configuration

- NWL will take a long term view of asset requirements, noting that customers ultimately benefit from well planned investments
- NWL 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 sort-term.
- When building new substations NWL will purchase sufficient land to enable dual transformer 66 kV substations to be built.
- NWL 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.

Resourcing

- NWL will identify the required skill sets needed for effective asset management and have a well-developed recruitment and training plan in place.

- NWL will retain its internal contracting business for fault restoration, maintenance, inspections, and renewal work.
- NWL will ensure that its contracting business has a well-developed recruitment and training plan.
- NWL will continue to engage suitable contractors to maintain its communications and SCADA networks.
- NWL will continue to engage suitable consultants for specialist work including civil design, protection, and regulatory advice.

Materials

- NWL will use only materials and equipment approved by its internal policies and standards.
- In assessing offers to supply materials or equipment, NWL shall consider the total life cycle costs of the offer.

Risks

- NWL shall regularly review its risk position using a prevailing standard such as ISO 31000.
- NWL shall adopt a risk averse position, especially with regards to worker and public safety.
- NWL shall continue to invest in contingent capacity in line with its security standard, thereby recognising the need to minimise the risk of in-service failure.

2.8 Overview of Systems and Information

The following asset management systems are used in managing NWL assets:

- An Intergraph (G-Electric) Geographic Information System, which is used to record and display the location and condition of network assets. The primary functionality of the GIS is that it provides a connectivity model of the network and therefore delivers a powerful query tool for asset management applications

- An Asset Database, which is used to record the attributes, current status, and service history of network assets. This database is linked to the GIS i.e. provides the attribution for the connected asset elements.

- A Financial Asset Register, which is used for recording the financial, tax, and regulatory values of the company's assets.
- An Outage Database, which is used to record and analyse outage reports and calculate the reliability indices. The GIS is used to identify consumers affected during switching.

- A condition based inspection and assessment programme, which is used to determine asset maintenance and replacement requirements and priorities. Each asset group has an appropriate inspection/testing action and frequency cycle identified. These may

trigger more detailed inspection, more frequent inspection (closer management), maintenance actions, or a planned replacement action. NWL selects the inspection technique it considers the best practice for its network and ensures its effectiveness by analysis of results.

- A financial management system (ACPAC), which is used to record and track the value of stock inventory.

- ETAP load flow modelling software, which is used to model the impact of load growth, network development options, and unusual operating configurations.

NWL is in the process of replacing its asset database and works order database with an integrated asset and works management system from Technology One. This system, that will also replace the company's existing financial and supply chain systems, is planned to go live on 1 April 2015.

2.9 Limitations of Asset Management Data

The accuracy and completeness of the data NWL has at its disposal to plan and manage assets is limited by the following issues:

- **Original data capture**: the data contained in NWL's data systems was originally captured from limited hard copy records and field inspections. For some key data items, such as age, it is not possible to get an accurate determination by looking at the asset or testing it. Such data is therefore an informed estimate; however by basing asset management actions on condition assessment rather than age overcomes this issue. In some instances, data was captured for a specific regulatory application, for example valuation. This data is subject to independent audit.
- **Conversion errors**: Converting data from one record system to another and applying it to a different application can introduce errors. Such projects are therefore inclusive of quality control measures. Occasionally it is found that where the accuracy of data is acceptable for one application it is not for another. Similarly, additional data is often required for new applications. Data washing is generally undertaken prior to conversion in these cases.
- **Data maintenance**: Keeping data up to date with physical changes on the network can be a challenge when new investment and upgrade is intensive. The multiple entries of the same data that are required to maintain the existing database records and GIS lead to data errors. It also does not make the most effective use of the limited staff resources available in this area.

Many of these issues will be resolved by the implementation of the proposed Asset and Works Management system, which is scheduled to go live on 1 April 2016, as it will remove the current duplication in data entry that is required to populate the various databases. It will

also significantly enhance NWL's ability to produce reports and disclosures as all of the data will be linked. To transfer the data from the existing Asset Database to the proposed Asset and Works Management System will require data cleansing to address any inconsistencies in the current NWL asset records.

The faults, planned outage data, and switching times are recorded from contractor fault response sheets, switching programmes, and SCADA records, which are manually loaded into an access database. A list of the number of consumers that are located between the various switching points on the network is derived from the GIS and is updated annually.

Many outages have various stages during restoration when the number of consumer affected by a fault will vary. The customer minutes from each of these stages is calculated manually to provide a single SAIDI, SAIFI, and CAIDI figure for each outage. The number of ICPs affected by the fault takes no account of the status of the ICPs, and the total number of ICPs is simply the average of the start and finish number of ICPs for that financial year.

Temporary changes to the configuration of the network can result in errors in the number of ICPs counted if these changes are not known at the time the fault calculations are undertaken.

This process was based on the guidelines produced by the long defunct Electricity Supply Association of NZ as the default for standard industry practice. It is subject to the annual disclosure audit and no changes to the process have been required.

2.10 Routine Asset Inspections and Network Maintenance

NWL has a time based asset inspection regime that covers all assets except for service pillars. The frequency of inspection is determined by two factors:

- a risk based assessment of the consequences of a failure within each class of asset
- expected failure rate within each class of asset

The in house contractor is used for 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 and partial discharge analysis) of key assets such as substation transformers, ground mount switch gear, and cable terminations.

Defects found during the course of these routine tests and inspections are recorded in a defects database, where they are prioritised and actioned within approved budgets and timeframes.

Results from the routine inspections and tests are evaluated and subsequently used to adjust the maintenance plan and budgets for the following years, taking into account any newly found deterioration in asset condition.

NWL and its internal contractor meet weekly with the maintenance engineers to discuss progress, resourcing, and any issues arising.

NWL's internal contractor also operates a 24 hour fault service that provides prompt repair of network faults and defects that pose a threat to public safety.

2.11 Network Development Planning and Implementation

NWL typically performs a full reassessment of its Network Development Plan on a three yearly basis, with annual adjustments following the annual update of the demand forecast. NWL peak demand is now in summer as a result of the increase in summer irrigation load that has taken place in the last decade.

The annual demand forecast is based on extrapolating the actual demand from the last few years with a greater weighting placed on dry years (when irrigation is being used to a greater extent), and forecasting demand based on the categories of irrigation and dairying, major industrial/ commercial load, and other load (i.e. mainly residential). 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 customers and from media sources. Growth in the other load category is based on long term trends.

In 2012 NWL engaged PSC to independently review its subtransmission development strategy, with a particular emphasis on how it should deal with the transmission constraint into the Oamaru GXP. As a result of that work NWL has made a number of changes to its Network Development Plan. NWL now has greater certainty around how it should develop its network, and where and how it should take supply from the grid. It is now working with Transpower and other stakeholders on upgrading the capacity of existing GXPs.

More detail of the Network Development Plan is presented in Section 5 of this AMP.

2.12 Network Performance Measurement

NWL records all faults in its Faults Database. The database records information for each fault, such as fault number, date, time, location, duration, time power restored, time all work completed, description of fault, fault category, voltage category, customers affected, and faultman in charge. This information is obtained from several sources, as shown in the table below:

Data Source	Information Obtained from this source	Completed By
NWL Fault Report	Fault Number, Date, Time, Location, Description, Voltage, Fault Category, Repairs Chargeable to, Work Done/Recommendations, Field switching log and times, Significant Hazard notification, Time Supply Restored, Time Work Completed, Faultman (in charge)	Faultman
Duty Engineer Log	Fault Number, Date, Time All Switching (including field switching) and times	Duty Engineer
SCADA Log	Time stamped log of SCADA operated switches	
GIS	Number of customers affected at each stage of the fault restoration sequence	GIS Administrator

The paper forms and reports are filed by month and year.

Each month an audit is performed on several of the faults. The audit examines the accounting of the customer-minutes, the logging of the switching operations, and the actual steps taken to restore supply. If any errors are found in the accounting of the customer minutes, then these are corrected and the audit is extended to look at more faults. Problems or issues with the actual restoration process are discussed by the engineering team, useful or unusual switching notes are logged in a database, and actions raised if necessary to resolve any problems found.

Each month a list and description of all HV faults are provided to the Board, who can then question Management about them.

Each year an external audit is performed as part of the Electricity Industry Information Disclosure requirements.

2.13 Overview of Documentation, Controls and Review Process

NWL asset management documentation starts with its Asset Management Policy and Asset Management Strategy documents. The objective of these documents is to ensure that the company's asset management activities occur within a structured framework that focuses on delivering agreed service levels at minimum long term cost. These documents are reviewed every two years.

Below the AMP Policy and Strategy documents are the network standards. The standards are catalogued under a number of different categories. Those specifically relating to asset management are:

- Network Maintenance
- Network Management
- Network Design, Practice, and Equipment Specifications

- Network Information
- Training
- Safety
- Emergency Preparedness
- Network Forms

Read only copies of the standards are stored on a common library file share server where they are available to all staff and the internal contractor. The standards are reviewed on an as required basis. Changes to the standards are advised to staff and the internal contractor.

Line patrol inspections are recorded on paper based forms and these drive the works programme for the following financial years.

A project to implement a new Asset and Works Management System commenced this year and is scheduled to go live on 1 April 2015. This system when completed will enable more trend based analysis to be done around the condition of the assets

3 Assets Covered

3.1 Details of Assets

The NWL network is predominantly a rural network supplying the North Otago, Hakataramea, and Ahuriri regions. Key economic activities are dairy farming, sheep farming and rural servicing.

Key features of the network as at 31 March 2014 include:

Parameter	Value
Length of 33kV lines and cables	166 km
Length of 11kV lines and cables	1407 km
Length of LV lines and cables	333 km
Number of zone substations	14
Number of connected customers	12431
Coincident max demand	51 MW
GWh energy throughput	237 GWh
Percentage of customers in urban areas	54%

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

Customer	Supply arrangement
North Otago Irrigation Company	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-security level 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 factory but do provide sufficient capacity to maintain the freezers and essential services.
Summit Wool Spinners	Able to be supplied from both Redcastle and Chelmer Substations. 11kV feeders are not dedicated but there are multiple alternative supply options.
Lean Meats	Supplied from Redcastle Substation. The 11kV feeders supplying Lean Meats are not dedicated but there are multiple alternative supply options.

None of these installations have a significant impact on network operations other than they are 11kV connected via dedicated assets and their security arrangements are more directly related to the connection asset they are prepared to pay for. However the network is configured to specifically service the load they present at their existing locations.

3.2 Description of Network Configuration

3.2.1 Bulk Supply Points

NWL takes bulk supply from the following points:

Supply point	Voltage	Firm capacity	Max demand 2013/14	Energy throughput 2013/14
Oamaru GXP	110/33kV	40 MVA	39.0 MW	180.4 GWh
Black Point GXP	110/11kV	25 MVA	10.7 MW	15.8 GWh
Waitaki	11/33kV	5 MVA	4.6 MW	17.8 GWh
Twizel GXP	220/33kV	20 MVA	3.0 MW	7.4 GWh

Transpower claims that the 60 MVA 110/33 kV GXP at Oamaru is voltage constrained to about 40 MW. However, this is inconsistent with Schedule 2 of the transmission agreement (dated 1 April 2014) which states that Oamaru GXP is not subject to any regional grid constraints. During the last dry year in 2009/10 the maximum demand with all controllable load switched out approached this 40 MW level for several half hour periods. Since then there has been more growth in summer irrigation demand. NWL will struggle to meet this demand in the next dry year. NWL is working with Transpower to resolve this issue. This is discussed in more detail in Section 5.

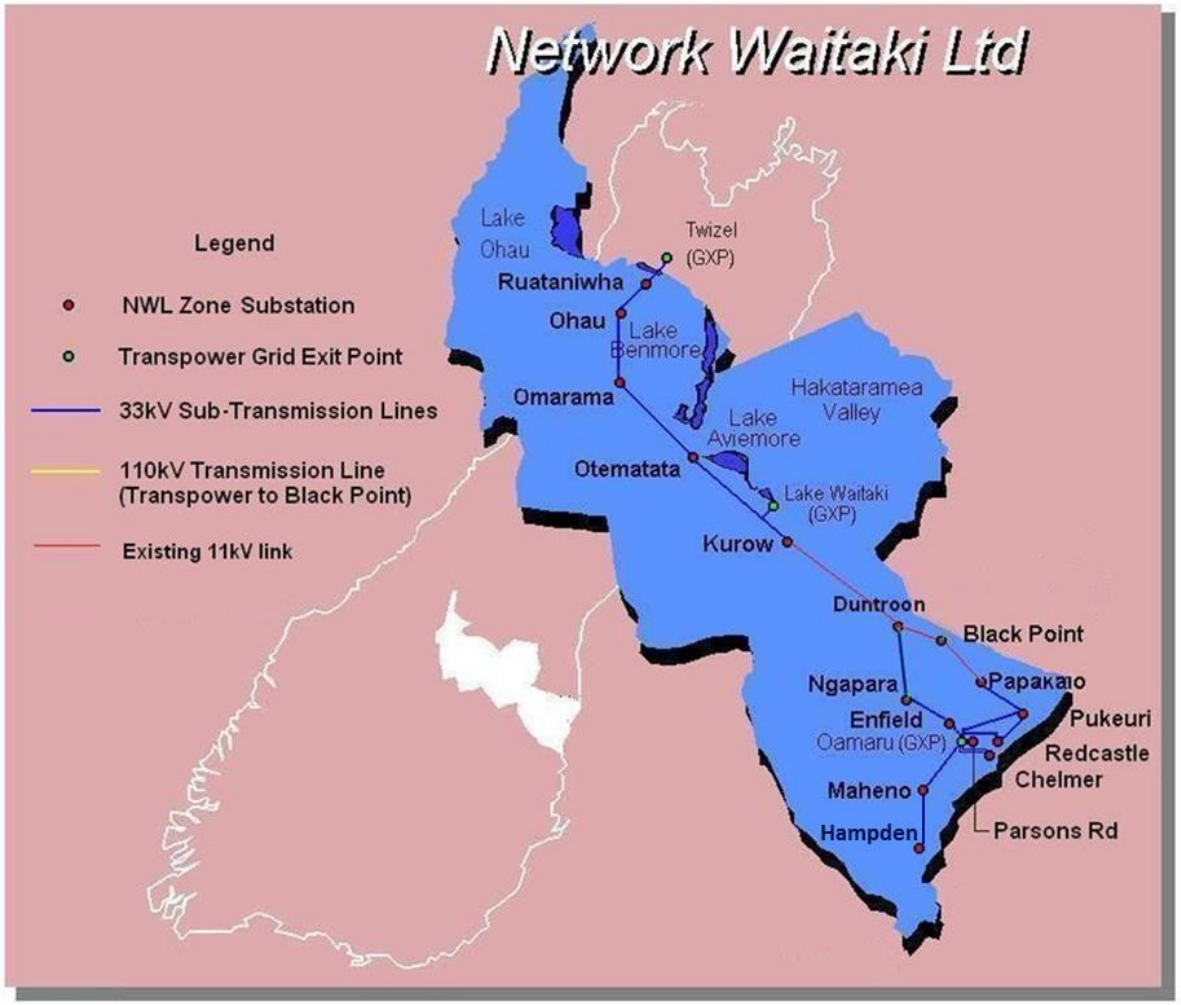
As an interim solution NWL has installed load control ripple relays on all pumps greater than 30 kVA, so that it can control this load on a rotating basis should this be necessary before the transmission is upgraded to serve the load growth.

The 25MVA 110/11 kV GXP at Black Point was commissioned in 2006 and has three 11kV feeders dedicated to the NOIC irrigation scheme which is NWL's largest single consumer. NOIC take supply at 110kV and own the transformer and 11kV switchboard. The point of common coupling to NWL's network is at 110kV to manage voltage quality issues associated with starting the 11kV 2.5 MVA motors. Phase displacement precludes any interconnection between the NWL and NOIC 11kV networks.

The Waitaki GXP is constrained to 5 MVA. Continued load growth in the Waitaki GXP supplied area has necessitated a permanent shift of 2.4MW of load on to the Twizel GXP. In 2013 the Haka Irrigation Company applied to connect a 2.8 MVA irrigation scheme. This scheme when commissioned in April 2015 will necessitate the upgrading of capacity at the Waitaki GXP. This is discussed in more detail in Section 5.

3.2.2 Subtransmission Network

The subtransmission network is shown in the following diagram.



A 33kV sub-transmission network connects the zone substations to three grid exit points (GXP) at Oamaru, Waitaki, and Twizel. The Oamaru GXP has a maximum demand of approximately 41MW, and supplies 10 zone substations. The Waitaki GXP has a maximum demand of approximately 4.6MW and supplies 2 zone substations. The Twizel GXP was previously utilised solely as a backup supply for the Waitaki GXP to facilitate both NWL and Transpower planned maintenance. However to cope with peak demand and to maintain contingent capacity at Benmore Dam, NWL has now permanently shifted the Omarama and Ohau Zone Substations and the Ruataniwha 33kV connected farm supply, approximately 2.4MW of load, from the Waitaki GXP to the Twizel GXP.

The majority of NWL zone substations are radially connected to their GXP. Therefore supply restoration is dependent on 11kV interconnection between substations. The main urban substation, Chelmer Street, which supplies 30% of NWL's peak winter load, has an ***N-1*** security configuration with dual 33kV lines and transformers.

The second urban zone substation at Redcastle Road has also been upgraded to a dual 15 MVA transformer configuration. A 33kV ring interconnects Oamaru GXP, Redcastle Substation and Pukeuri Substation, which supplies NWL's second largest consumer the Alliance Pukeuri Works. This 33kV ring provides ***N-1*** security to both substations. However, the Pukeuri Substation load is supplied from only a single transformer making this an N security site.

Two zone substations were established and commissioned at Enfield and Papakaio, in 2006. These are both ***N*** security, 5/7MVA 33/11kV substations, which is NWL's standard for a rural substation. Enfield Substation is an intermediate substation that is supplied from the Ngapara 33kV sub-transmission line and has three 11kV feeders.

Duntroon Substation was commissioned in 2010/2011 to meet the increasing dairy and irrigation loads in the general Waitaki Plains area. The 5/7MVA 33/11kV substation, which is NWL's standard for a rural substation, is supplied from Oamaru GXP. A new 15km 33kV line extension utilising Jaguar conductor was established between Ngapara and Duntroon Substation. The substation has three outgoing 11kV feeders.

The Weston - Ngapara 33kV line has been upgraded to Jaguar conductor to maximise its development potential.

The Weston – Pukeuri 33kV line has enough capacity for Papakaio Substation and to carry the full load of the Oamaru GXP/Pukeuri/Redcastle ring in the event of a line fault. This ring between Pukeuri and Redcastle provides improved security to all three substations. This consists of 1,507m of 300mm^2 Al underground cable and 6,445m of Neon overhead conductor. The 33kV protection has been upgraded to allow these lines to operate as a closed ring providing ***N-1*** security to both Redcastle and Pukeuri substations.

The 33kV line from Weston to Pukeuri was extended by 7.9 km to a new substation at Papakaio, constructed in 2009. The extension uses Neon overhead conductor and 110m of 33kV underground cable. The Papakaio Substation has four 11kV feeders.

There is a single circuit 33 kV line supplying Maheno and Hampden Substations. The latter was commissioned in the 2013 financial year.

3.2.3 Distribution Network

There are a total of fifty 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, NWL has 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 NWL's total consumer base.

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. Rural 11kV lines are fitted with Reclosers and Sectionalisers to provide automatic sectionalising and thereby reduce the numbers of consumers affected by line faults. The majority of these devices are linked to the SCADA system and can be remotely operated. Fault indicators are also used extensively in the rural 11kV network to reduce the time taken for field staff to locate and isolate faulted sections of line.

Approximately one third of the 11kV network is 2 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.

The 11kV distribution network supplies 2,657 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.

LV lines amount to 249km or 13 of NWL's 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.

Approximately 56% of the LV network is under-built on HV pole lines, with only 13% of LV service connections being via underground cable. In overhead reticulated areas road crossing is via Chorus poles where they exist and are in an acceptable condition. The Waitaki District Plan requires any new reticulation to be placed underground in areas that are specified as urban or residential. 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.

Underground reticulation is a minority feature of NWL's network: 33kV cable accounts for 5km or 0.26% of the network, 11kV cable accounts for 56km or 2.9% of the network, and LV cable accounts for 84km or 4.4% of the network. The District Plan requirements introduced after initial reticulation programs only impacts new extension work or new interconnections for security purposes with regard to under-grounding. Capacity upgrades in urban areas where under-grounding rules apply are often achieved by the installation of intermediate distribution substations rather than by conductor upgrades.

A breakdown of the assets, their relative value and quantities is given in Appendix A. This is based on the NWL last ODV dated 31 March 2004 and therefore is not up to date with the relatively intensive developments in NWL's sub-transmission system over recent years. This table will be updated annually when the new Asset and Works system is operational.

The growth in irrigation load has resulted in NWL becoming a summer peaking network. Diversity between GXP's and zone substations therefore change significantly with the weather conditions in each area.

In total NWL transported 237GWh of energy across its network in 2013/14 including 15.8 GWh to the NOIC irrigation scheme via the Black Point GXP. It should be noted that energy consumption is now dominated by irrigation load which is driven by dry weather conditions.

3.2.4 Generation

There is no distributed generation connected on to the NWL network that is greater than 1 MW.

NWL owns three 635kVA diesel generator sets, one of which is connected onto the 11kV bus at Enfield, with a second being connected into the 11kV bus at Otematata Substation. These two generator sets are normally used for meeting network or transmission grid emergencies. They are currently not being used for peak load management. The generator sets at Otematata and Enfield are re-configurable to enable them to be transported to other locations to maintain supply to consumers during major line reconstruction projects or unplanned outages. The 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.

3.2.5 Secondary Assets

NWL owns and operates Enermet solid state 33kV Ripple Injection Plants at both the Oamaru and Twizel GXP's. The Twizel plant was established in conjunction with Alpine Energy to

service both areas. An indoor Enermet solid state 11kV injection unit is installed at the Kurow Zone Substation and services the load connected to the Waitaki GXP.

Each ripple plant is individually controlled by NWL's Load Management System which is integrated into the master station of its Abbey Systems Powerlink SCADA system. The SCADA system is connected to all NWL's zone substations and provides remote control, indication, logging and alarming 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 auto-reclose function on all CBs and reclosers can be remotely disabled via the SCADA system to facilitate Live Line work.

The SCADA system uses UHF radio data communications provided by NWL's 3 repeater radio network. 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 SCADA Master Station is located in NWL's main office in Chelmer Street, Oamaru. It can be remotely accessed over the PC LAN and via the remote modem access. The Control Room is not manned but the duty Controller is able to access the SCADA system from home or wherever they are working. An SMS text system notifies the duty controller of any SCADA alarms and provides a brief description of the alarm.

NWL's IT and PABX facilities are co-sited in the Control Room and share dual backup power systems, etc. A dedicated secure, temperature controlled server room is being built in a separate building to house the company's servers. This will be operational by June 2014. The main office has a 20kW standby diesel generator to keep all essential systems operational during power outages.

3.3 Asset Categories

3.3.1 Asset Descriptions and Age Profiles

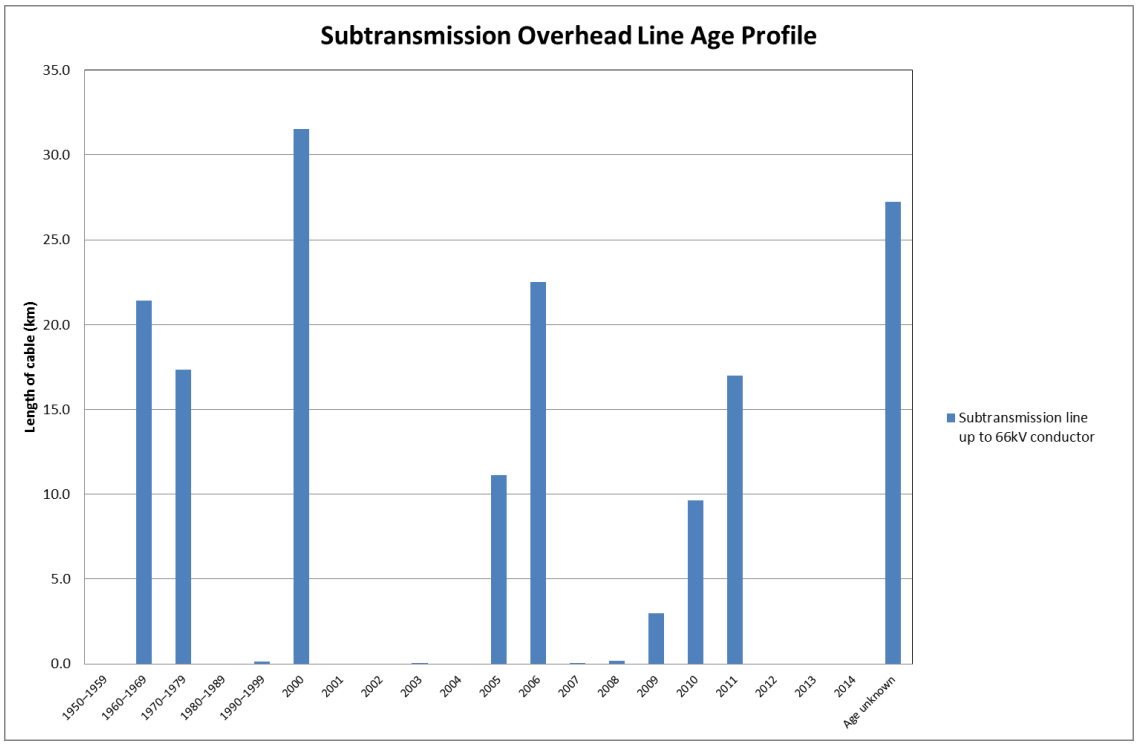
110 kV Switchgear

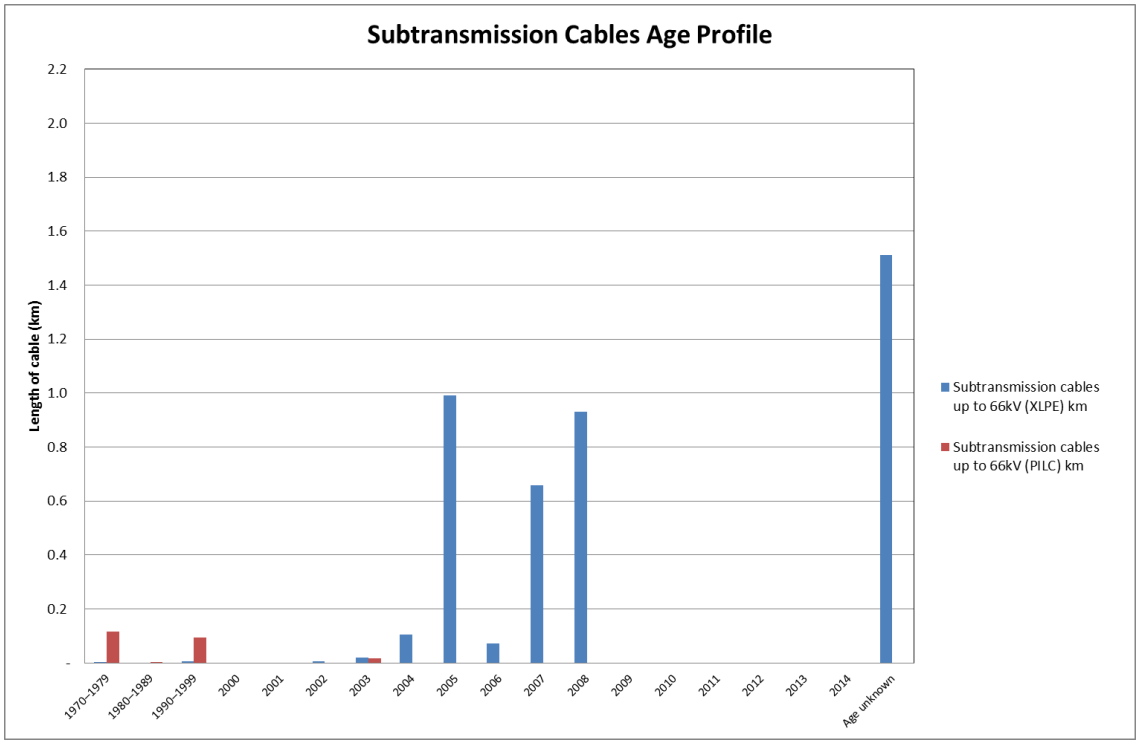
Network Waitaki owns one 110 kV air break switch and one 110 kV circuit at the Black Point GXP. This GXP is dedicated to the supply of one customer, the North Otago Irrigation Company (NOIC). This equipment was purchased and installed in 2006.

33 kV Subtransmission Circuits:

The 33kV sub-transmission network is predominantly overhead construction, apart from the line to Parsons Road substation, parts of the Redcastle – Pukeuri 33kV tie, and some short cable connections between the feeder CB's and line terminations at the Oamaru GXP. The

total route length of the sub-transmission network is 166km, of which 5km is underground cable. The age profile of these assets is shown in the following two charts.





11 kV Distribution Circuits

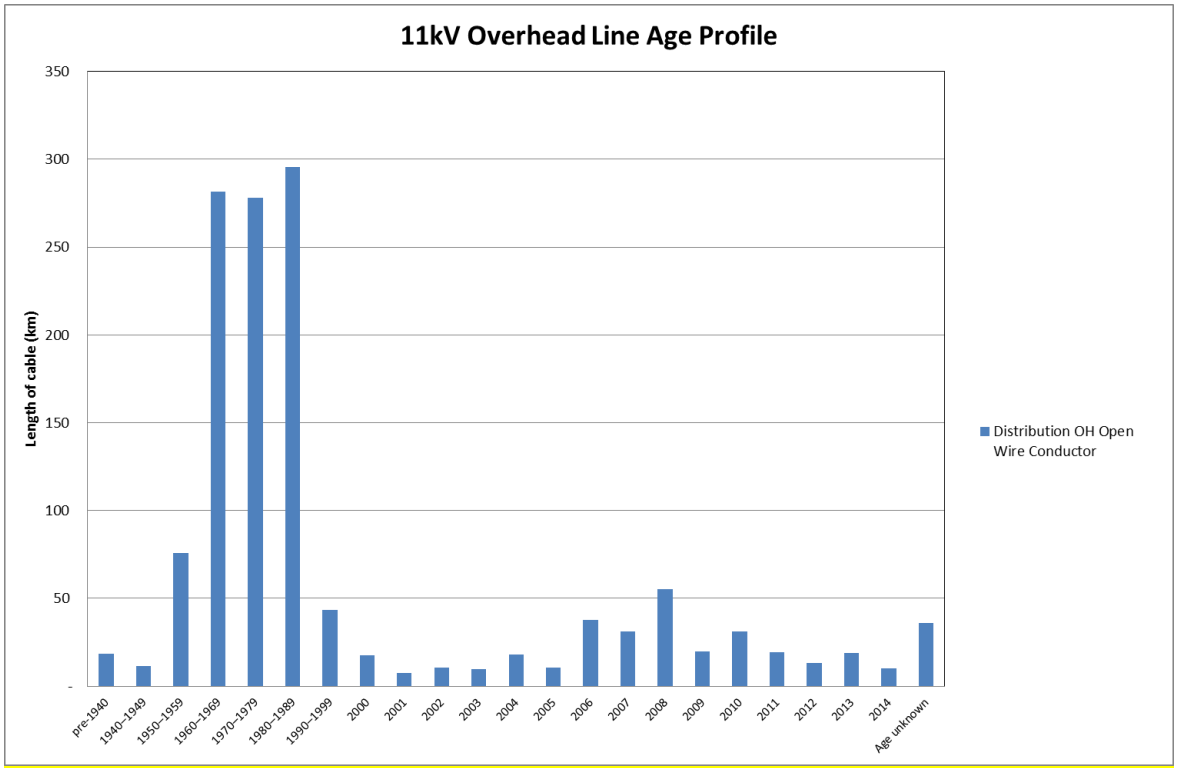
The bulk of the 11 kV network was installed between 1960 and 1987 at a relatively consistent rate of 41 km p.a. This represents the period of rural electrification.

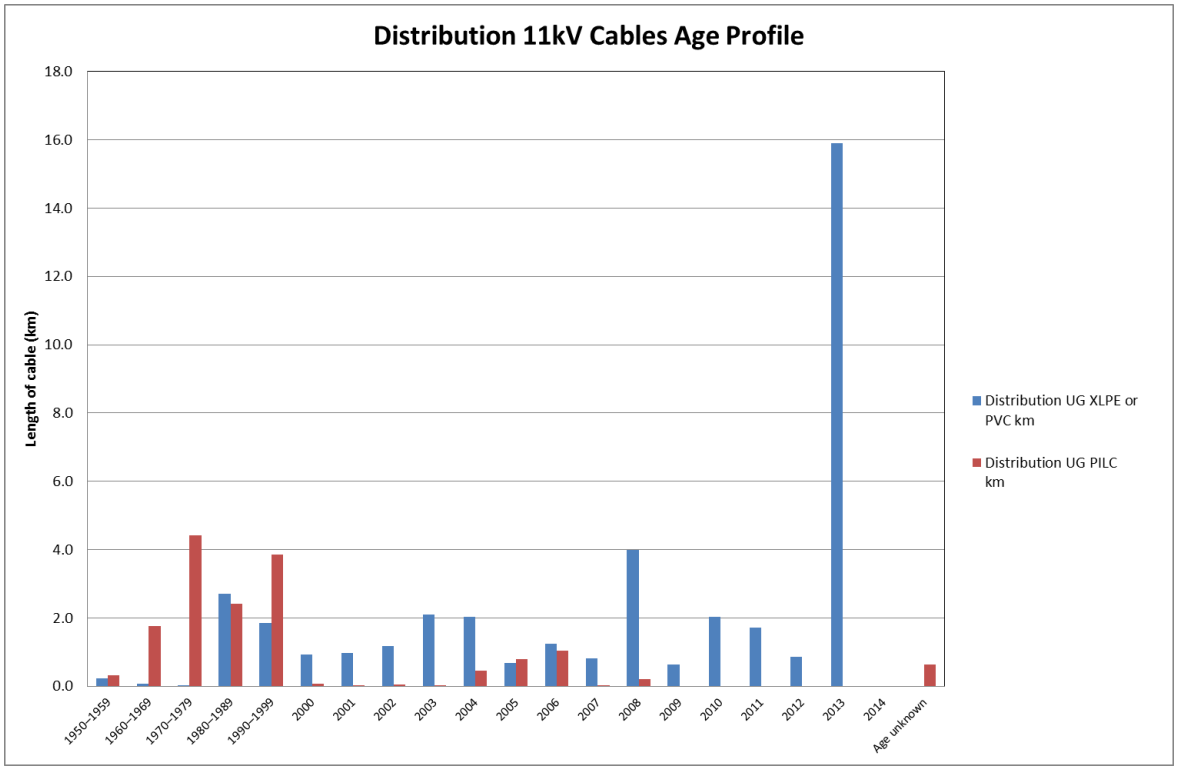
The weighted average age of the entire population is 33 years. This is approaching the age at which minor maintenance issues, such as cross-arm and hardware condition would be expected to increase. These components get specific, targeted maintenance from about 35 years onwards

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), which for more critical main line situations tends to happen well before 45 years.

The period from 1988 to 2000 indicates very low levels of growth or the need for maintenance with approximately 10km of line being built p.a. From 2001 onwards construction has increased to approximately 17km p.a. This consists of both new line extensions and capacity rebuilds.

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





LV Circuits

The following age profile has the following limitations with regard to source data accuracy. This data was initially captured for ODV purposes where the installation date of all LV lines emanating from a distribution transformer was based on the age of the transformer site. All new additions or upgrades to LV lines were also assigned the transformer site age for valuation purposes. Lines older than 1945 should also be interpreted as age not accurately known i.e. they are assumed old by default. This data has now been captured in the GIS and the age of the installed LV assets will be reviewed as they are transferred to the new Asset and Works system database.

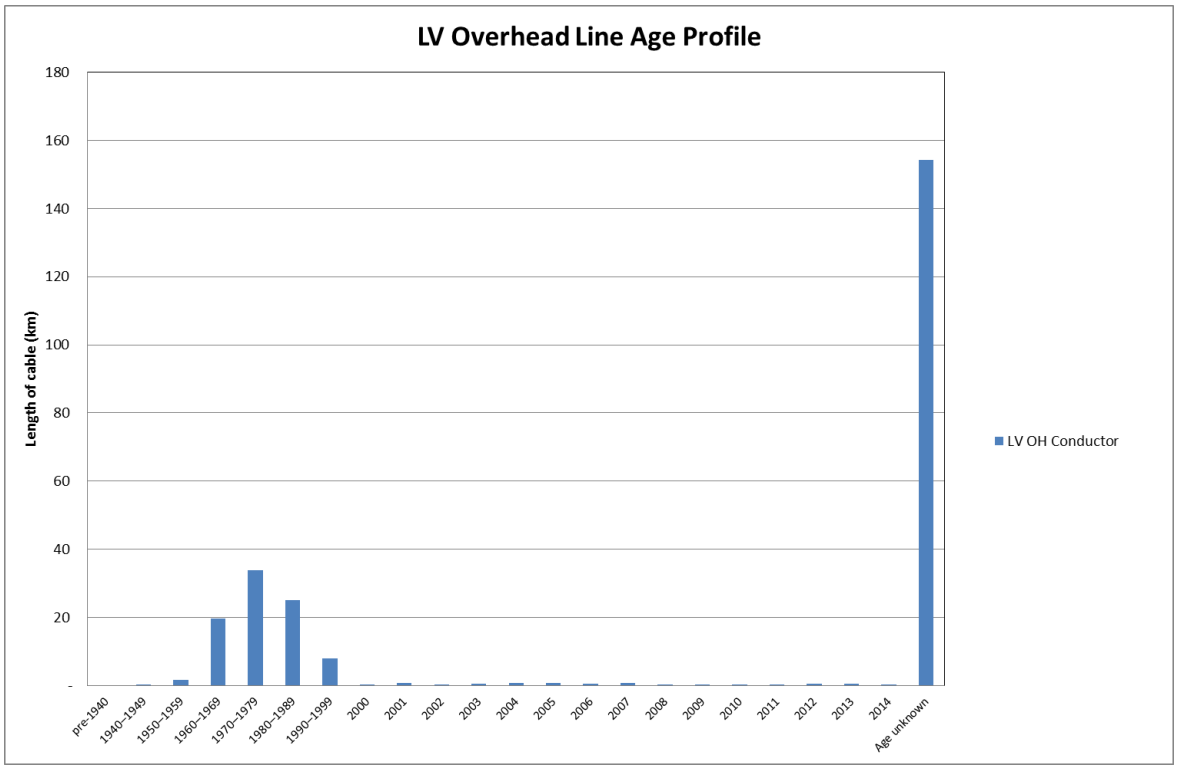
NWL's 188km of LV overhead lines show a similar age profile to the HV overhead lines, and are predominantly located in urban residential areas. Their age reflects the urban development cycles. Approximately one third of all LV lines are under-built on HV poles.

There are 1158 LV poles (5% of the total pole population) on NWL's network. 58% of these are wooden. LV poles are shorter and typically only support spans of 45m. Accordingly LV construction is quite robust and very few problems arise.

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.

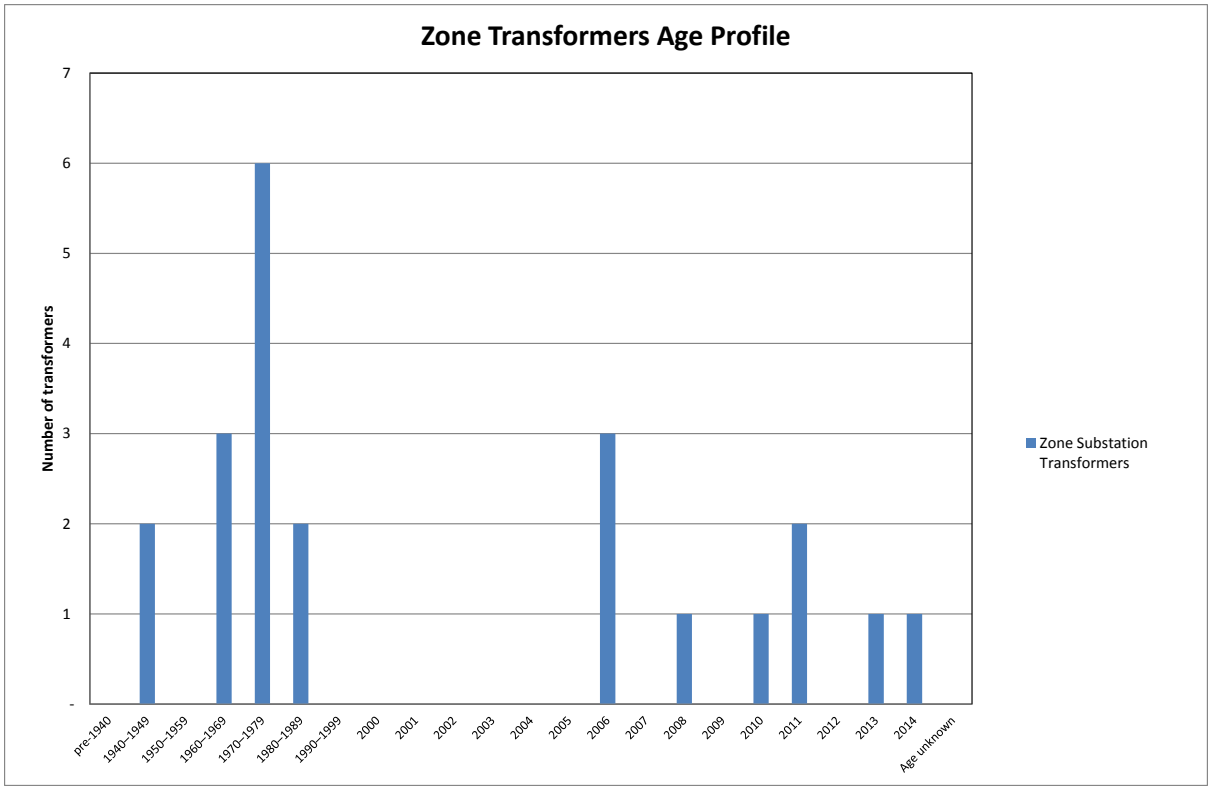
Overhead reticulation within residential areas is no longer permitted under the Waitaki District Council "District Plan". Therefore any extension or upgrade work tends to result in conversion to underground. There is only 28km of LV cable network.

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



Zone Substation Transformers

The age profile shown in the following graph is based on the date of manufacture of the transformers. The average age of the population is 26 years.



33 kV and 11 kV Switchgear

NWL owns and operates the 33kV Indoor switchboard associated with the Oamaru GXP. This consists of 2 Incomer CB's, a Bus Coupler, and 8 Feeder CB's (including 1 spare). This switching station was commissioned in 2007 and overcame the configuration/operational issues associated with the previous Transpower outdoor 33kV Bus. This 33kV switchboard utilises vacuum switchgear with air insulated busbars in preference to the cheaper option of SF_6 insulated switchgear and busbars. This decision was based on environmental considerations and future maintenance and compliance costs associated with SF_6. This decision was supported by both the Board and the Trust. It is intended that this stance of SF_6 in the network will be maintained until all other economical choices are exhausted. However, there are a few reclosers and sectionalisers on the 33kV sub-transmission system which are of the SF6 type.

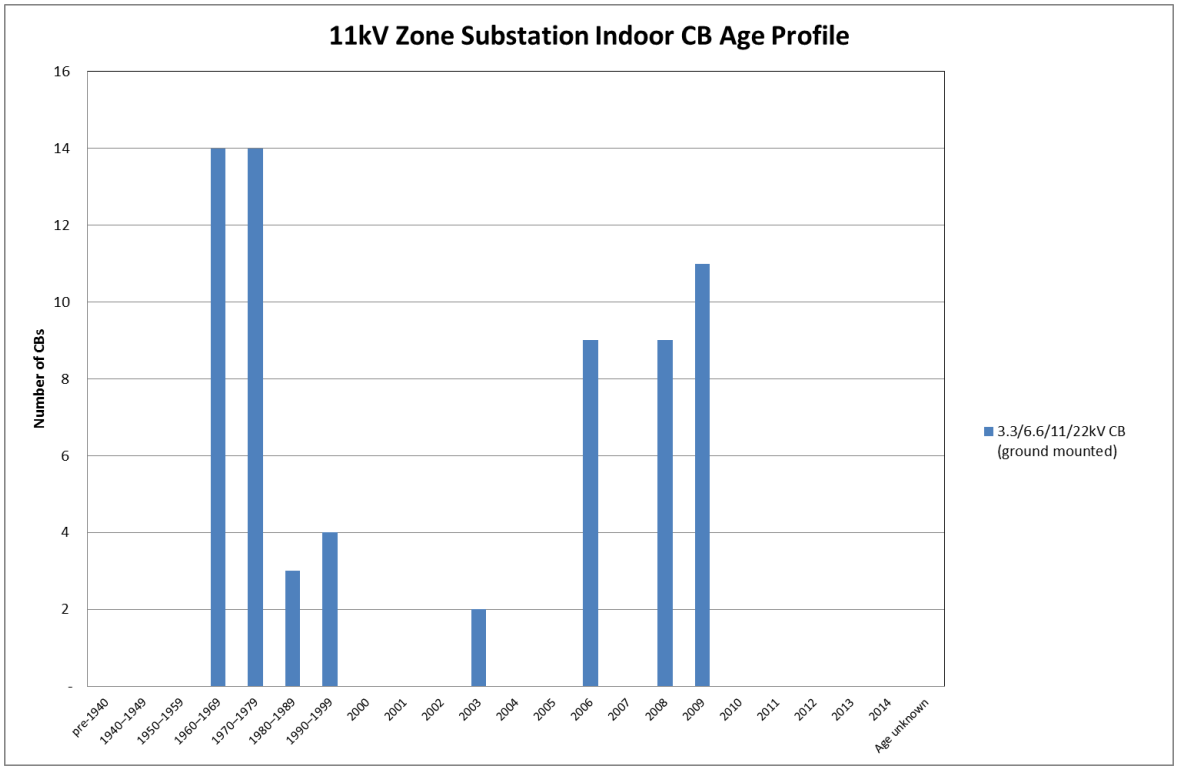
The majority of 11kV circuit breakers are of the bulk oil type, and were installed during the late 1960's when the sub-transmission lines and zone substations were being installed. Consequently the age profile shows high installation rates over short periods and correlate exactly with the ages of the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

The oldest 11kV circuit breakers 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 circuit breakers 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 of their 45 year ODV standard life before the end of the planning

period covered by this plan. Condition however is not an issue and these breakers will be capable of operating safely and reliably beyond 45 years.

Redcastle Substation has been upgraded from a single bus section to a two incomer two bus section switchboard. This has seen the six CB's installed in 1972 replaced with nine CB's in 2009. The switchboards recovered from Redcastle and Chelmer Substations will be refurbished and reused elsewhere in the network.



Black Point also has an indoor 11kV switchboard which is owned by the customer and operated by NWL.

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

An additional two 33kV CB's 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.

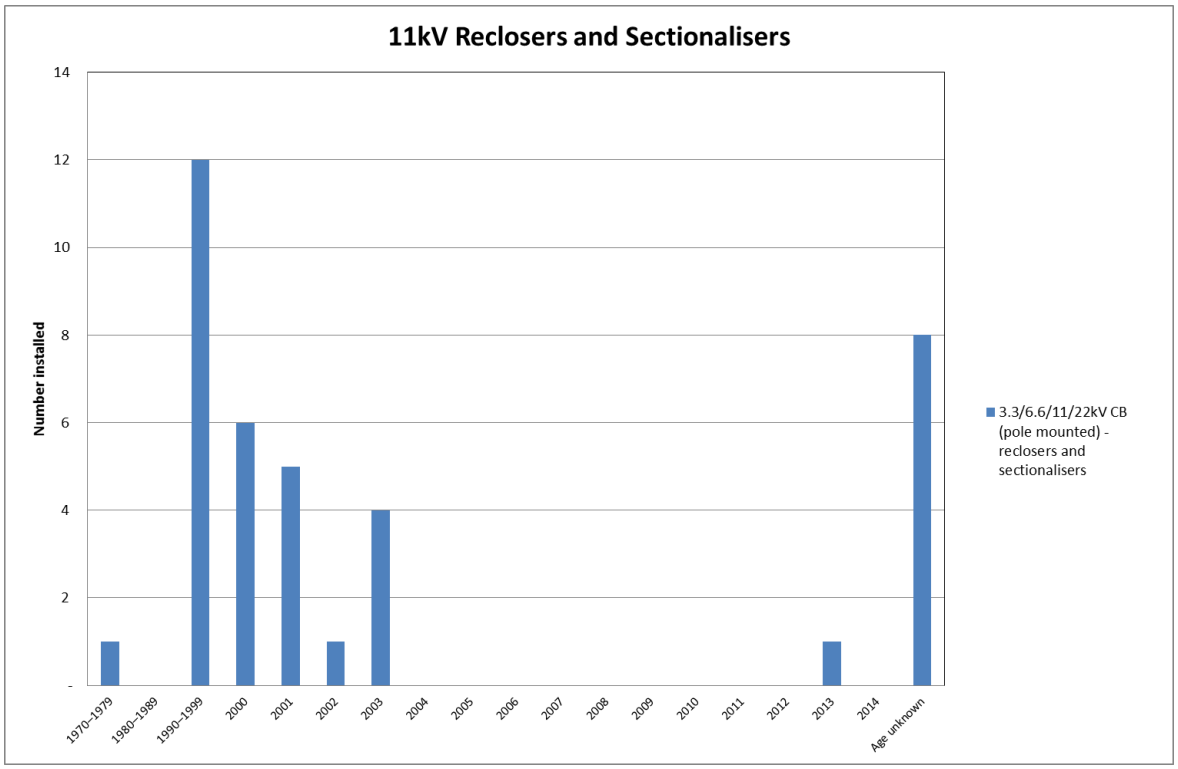
33kV reclosers and sectionalisers installed in the Waitaki – Twizel 33kV sub-transmission line at each connected zone substation provide automatic sectionalising of the line in the event of a fault. All 33kV and 11kV circuit breakers are connected to the SCADA system and can be switched remotely.

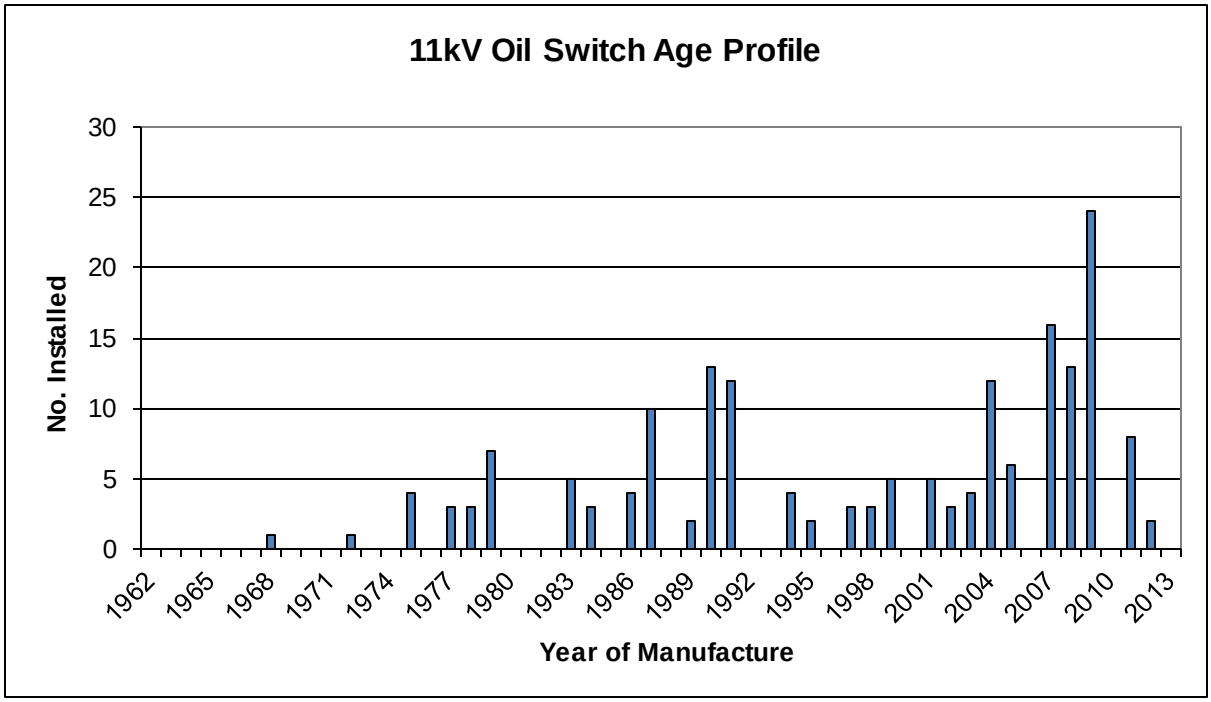
11 kV Distribution Switchgear

Reclosers and sectionalises are used extensively in rural areas to automatically clear transient faults, and to minimise the areas affected by fault outages.

11 kV oil filled ground mount switchgear have been installed from 1990, as part of the major urban under-grounding programmes that commenced then, and the more recent network reinforcement programs.

The age profiles of these assets are shown in the following two charts.



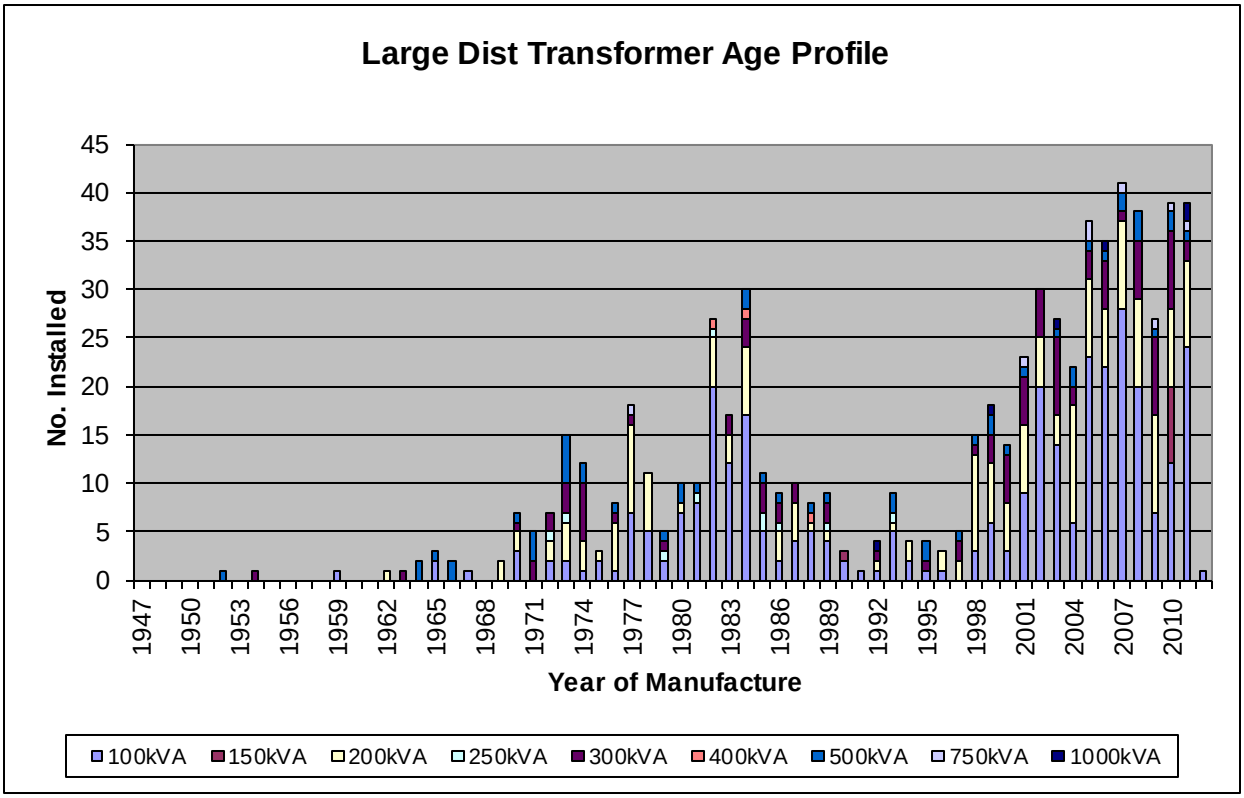


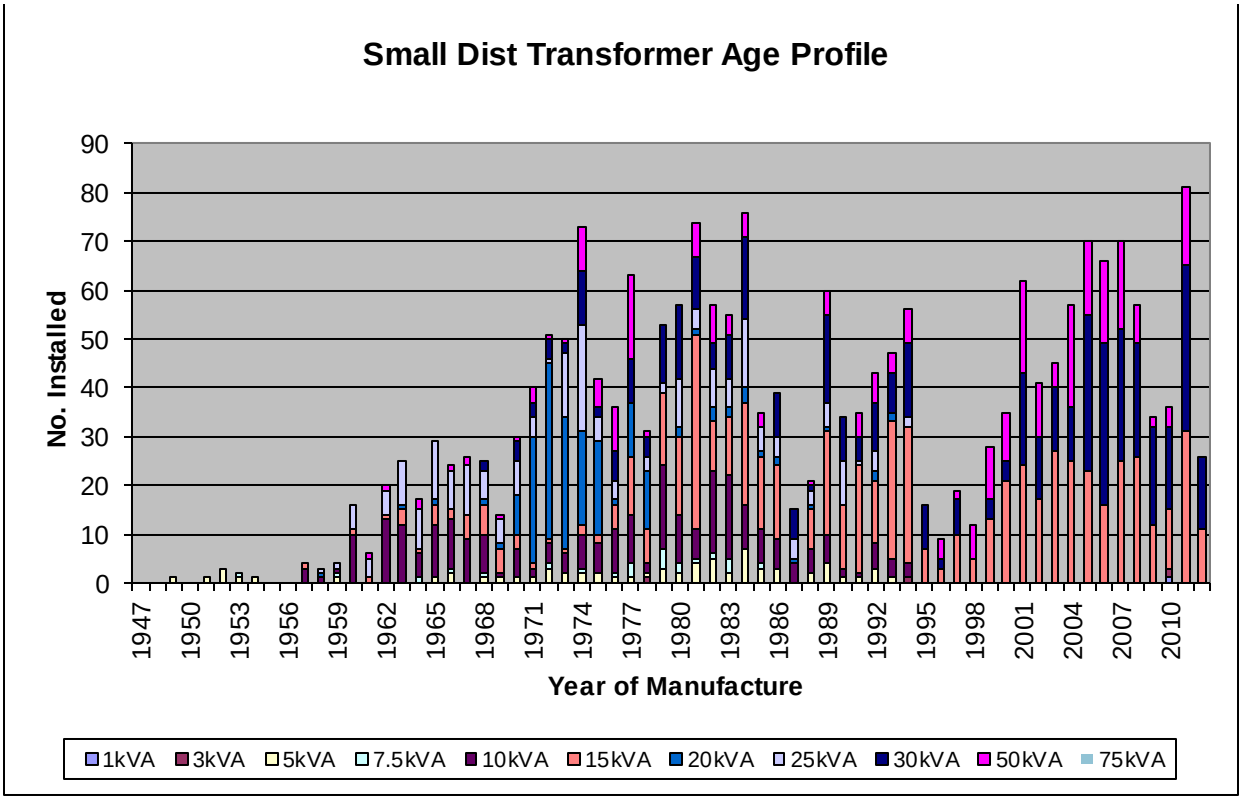
Distribution Transformers

NWL classifies its distribution transformers into large transformers 100 kVA or greater, and small transformer that are those less than 100 kVA. The age profile of these assets is shown in the following two graphs.

For the large transformers, the age profile has a large peak in installation numbers during the early to mid-1980's, associated with 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 average age is 17 years. 48% of the population has an age below 10 years, 31% above 25 years (manufacturer's design life) and 1% above 45 years (ODV Standard Life).

The small distribution transformer (<100kVA) age profile shows the same dual peak periods. The latest development period is showing a tendency towards larger-sized transformers than the earlier period. The average age for the small transformer population is 25 years. 52% are over 25 years old and 7% are over 45 years. Again it is considered that transformers of older manufacture will have longer service lives than more modern units. Manufacturers do not design for the 45 year life assumed in the ODV Handbook and no guarantees regarding the quality needed for this life expectancy are available.

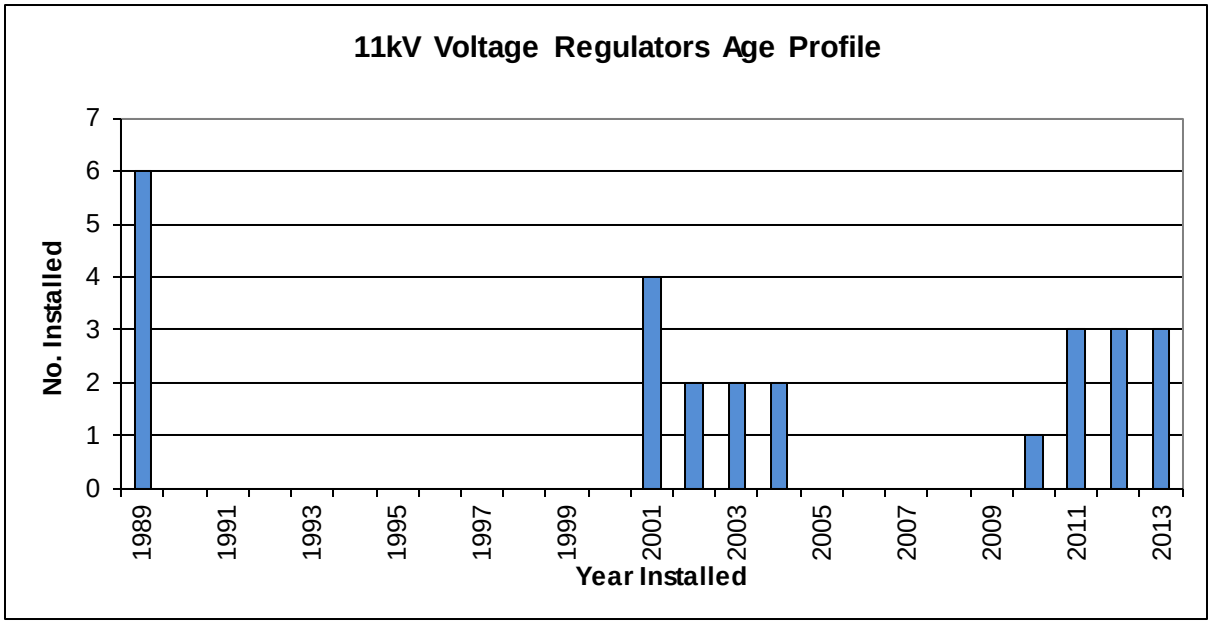

Large Dist Transformer Age Profile
No. Installed
0
5
10
15
20
25
30
35
40
45
1947
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007
2010
Year of Manufacture
100kVA
150kVA
200kVA
250kVA
300kVA
400kVA
500kVA
750kVA
1000kVA


Small Dist Transformer Age Profile
No. Installed
0
10
20
30
40
50
60
70
80
90
1947
1950
1953
1956
1959
1962
1965
1968
1971
1974
1977
1980
1983
1986
1989
1992
1995
1998
2001
2004
2007
2010
Year of Manufacture
1kVA
3kVA
5kVA
7.5kVA
10kVA
15kVA
20kVA
25kVA
30kVA
50kVA
75kVA

Voltage Regulators

Voltage Regulators are used to ensure good voltage regulation at the far end of feeders, especially where there is load growth due to dairy conversions and irrigation. This is an interim measure until the load growth warrants reinforcement of the supply.

The age profile of the voltage regulators is shown in the following graph.



4 Service Levels

4.1 Introduction

NWL distributes electricity to more than 12,500 consumers over approximately 1,906 km of lines and cables, of which 92% is overhead. This gives an average consumer density of 6.6 consumers per km. This groups NWL with companies such as Alpine Energy, Buller Electricity, MainPower, Marlborough Lines, Eastland Network, and ScanPower. Like NWL these networks also have significant rural supply areas.

NWL's corporate strategic direction is reflected in the Mission Statement and specified in the Statement of Corporate Intent (SCI). The objectives of which are to:

- own and operate a safe, reliable, and efficient distribution system, and
- support the economic growth and wellbeing of the community it serves.

In this context, service for NWL is about understanding stakeholder's expectations and delivering cost effective solutions wherever possible to meet these expectations. Levels of service encompass not only quality of power supply but also network design, account management, project management and good communication and interaction between NWL and its stakeholders.

NWL endeavours to achieve the service level targets discussed below within its supply coverage area. These targets are benchmarks by which actual performance is to be assessed, enabling understanding of where improvement and focus is required.

4.2 Consumer-Oriented Performance Indicators

NWL's customer surveys have revealed that the service attributes most highly valued by customers are "keeping the power on" and "getting the power back on if it goes off". Hence the measures that NWL uses for the development of customer service targets are the industry performance measures used to monitor the reliability of the electrical network, SAIDI and SAIFI, as these are not discretionary and, in the view of NWL effectively measure the extent to which it is able to achieve its objective of supplying a safe, reliable, and efficient electricity supply to its customers.

This aligns with the view of the Commerce Commission which, following a process of intensive public consultation at a national level also uses these indicators as the basis for setting a quality threshold which it uses to determine whether the electricity distribution businesses that it regulates are performing to an acceptable standard. While NWL as a consumer owned Electricity Distribution Business (EDB) is exempt from default price-quality path ("DPP")

regulation, it believes that it makes good sense to use the same methodology used by the regulated EDBs.

Hence the two indicators that NWL uses for the development of customer service targets are:

- **SAIDI**: System Average Interruption Duration Index. This 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 the NWL network. The units are minutes.

- **SAIFI**: System Average Interruption Frequency Index. This 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 NWL network. The units are outages per customer 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 measuring its performance against these targets NWL will adopt the normalising approach that is now being taken by the Commerce Commission ("Commission") in measuring the reliability of supply provided by all the EDB's that it regulates. Normalisation of the raw performance measure is designed to exclude the impact of events (such as extreme weather) that are outside the reasonable control of an EDB. NWL believes that setting targets using normalised measures will provide a better indication of the success of its asset management strategies by limiting the extent to which events outside its control impact on its measured performance.

The normalisation process will have the following effect.

- As at present, interruptions due to an outage of the Transpower network (Class A SAIDI) will be excluded. NWL has no control over these outages and their impact on measured performance can be substantial.
- The impact of interruptions occurring on "major event days" will be limited to an "interruption envelope". The criteria for determining a "major event day" and the value of the interruption threshold will be determined from a statistical analysis of daily interruptions using the methodology defined by the Commission. In practice it has been found that the impact of interruptions over a year generally follows a statistical "log-normal" distribution, where interruptions occurring on only one or two "major event days" each year have a substantial impact on the measured performance. These major event days correspond to days of severe storm activity or days on which another event occurs that is outside the ability of NWL to control.

The analysis methodology used by the Commission to normalise reliability performance for measurement purposes is based on IEEE standard 1366-2003, which has been developed for this purpose by the IEEE. The Commission's methodology, however, differs from the IEEE standard by requiring the actual impact of major event days to be replaced by an assessed

threshold level, rather than allowing major event days to be ignored altogether. NWL's normalised SAIDI and SAIFI targets for the planning period are shown in the figure below.

Service Level Target	YE 2015 Target	YE 2016 Target	YE 2017 Target	YE 2018-25 Target
SAIDI	116.50	116.50	116.50	116.50
SAIFI	1.54	1.54	1.54	1.54

Table of Customer Oriented Service Levels Targets

These service level targets are based on the methodology prescribed by the Commission for non-exempt EDBs under the 2010-2015 DPP. This methodology used a normalised dataset with a historic reference period from 1 April 2004 to 31 March 2009. It should be noted, however, that as a consumer owned EDB, as per Section 54D of the Commerce Act, NWL is exempt from DPP regulation.

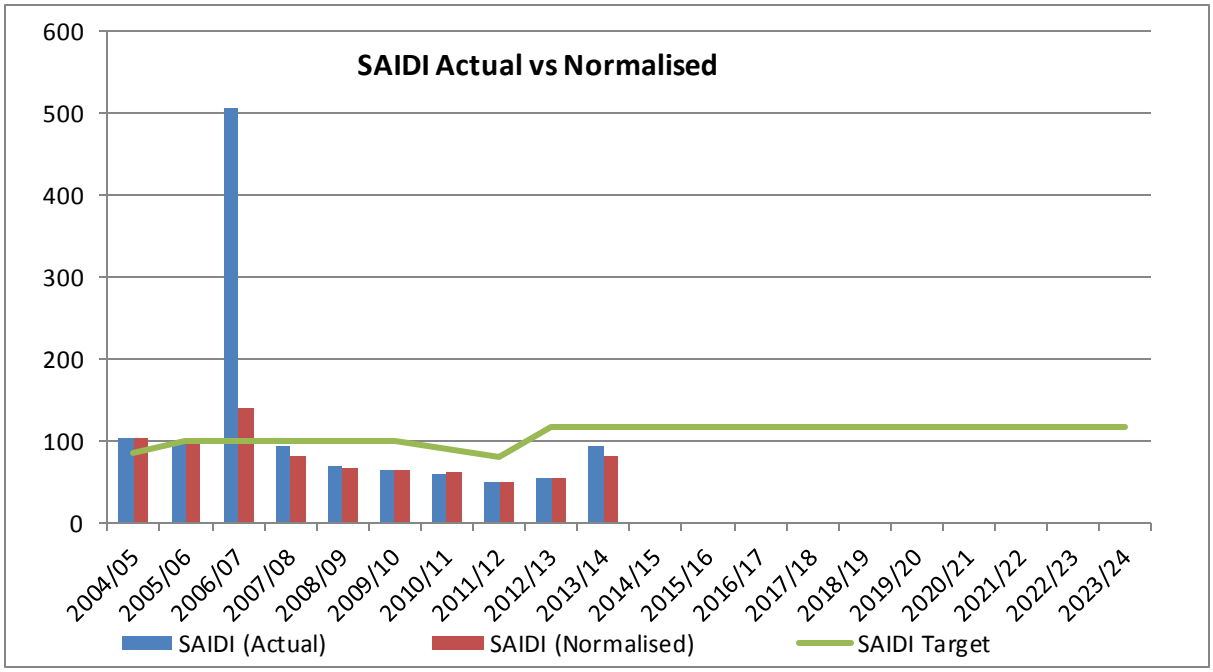
NWL is aware that the DPP for 2015-2020 now prescribes a historic reference period from 1 April 2004 to 31 March 2014, however at the time of writing the Commission's current Information Disclosure Determination 2012 (and the draft revised Information Disclosure Determination 2015) still requires that disclosed SAIDI and SAIFI service levels are normalised with values obtained from the old 1 April 2004 to 31 March 2009 reference period. If NWL set revised targets based on the 2015-2020 DPP, they would not be comparable with disclosed normalised service levels.

4.2.1 Historic Service Levels

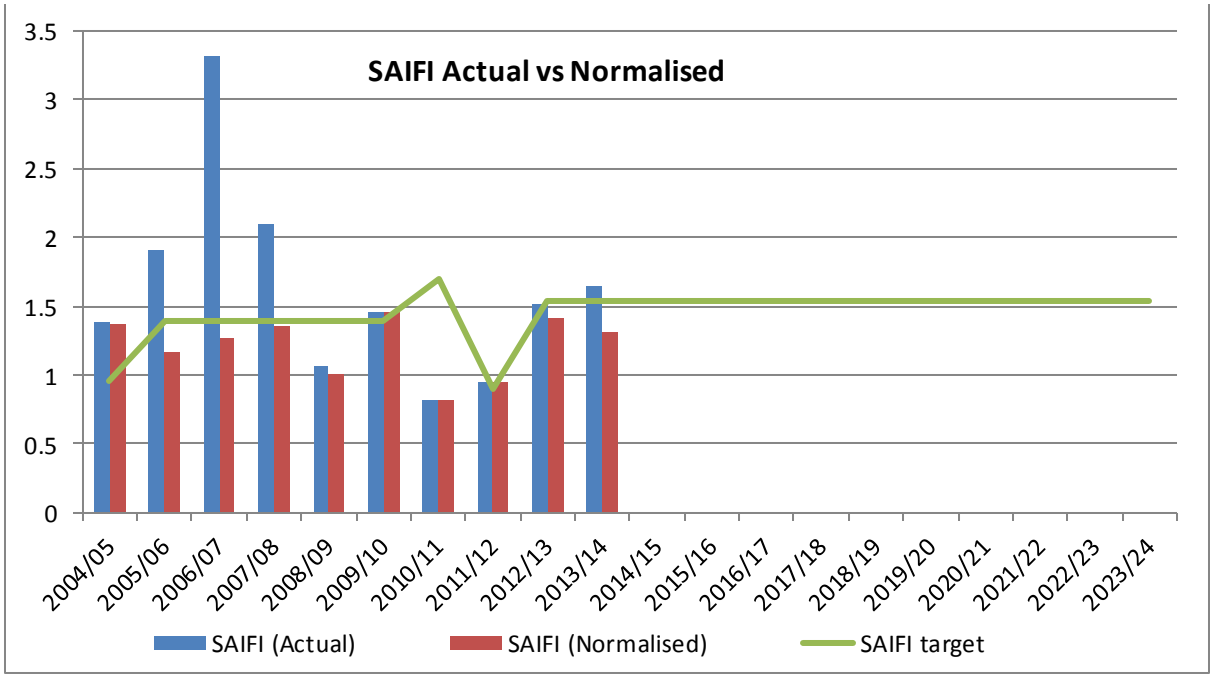
The following figures show NWL's historical performance for both of these measures. The performance levels shown exclude the impact of Transpower outages, and have been normalised for major event days.

Year	SAIDI (Actual)	SAIDI (Normalised)	SAIDI Target	SAIFI (Actual)	SAIFI (Normalised)	SAIFI target
2004/05	104.85	103.04	85.00	1.38	1.03	0.95
2005/06	102.31	99.75	100.00	1.91	1.08	1.39
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

Table of Historical Performance for Customer Service Levels



Historical SAIDI Performance



Historical SAIFI Performance

4.2.2 Service Level Strategies

NWL has a proven record of achieving high levels of reliability and security of supply compared with other similar networks. Forward targets are based on maintaining a position in the upper quartile of performance.

In agreement with consumer representatives, NWL is not planning to increase its service level performance over the term of this Plan but seeks to maintain its position relative to the rest of the industry.

NWL will maintain its position by using the following strategies:

- Continue with the program of deploying automated devices, such as reclosers, sectionalisers, and tie-switches to limit the number of customers affected by faults.
- Continue with the programme of deploying fault indicators and isolators to minimise the time taken to locate and isolate faulted equipment.
- Continue with the program of building ties between neighbouring spurs to form rings when load growth occurs to make this economically viable. This strategy enables adjacent feeders to provide back-up capacity to each other during outages.
- Investigating new technologies such as smart meters, modern communications technology, and smart devices, and incorporating these into the network as and when the business case for each stacks up.
- Increase the use of live line work.
- Provide alternative supplies, such as portable generation, during planned outages where this is economically practical.
- Continue monitoring, analysing, and benchmarking service level performance and reacting quickly when adverse trends appear.

4.2.2.1 Distribution Network Reliability Targeted Design Features

The 11kV distribution network is of predominantly aerial construction, with a small amount of underground reticulation in the main urban areas. The network is extensively intermeshed in and around the main urban areas, while the rural network is predominantly radial in nature with few interconnections.

Urban feeders, and those used to backup neighbouring substations, are designed to have a maximum 10 year projected load of no more than 67% of the line capacity, which enables the feeder to back up a neighbouring feeder circuit. Rural feeders are normally voltage constrained, and are also subject to economic value analysis under the ODV process. These feeder lines are designed to meet quality of supply requirements based on a 10-year projected load, and are also not subject to optimisation under the ODV process.

Aerial 11kV distribution lines are strung with ACSR conductor (or AAC conductor if located within 1km of the coastline), and are designed such that the whole structure or any component can be replaced live-line. Except in urban areas, a double-stayed hardwood pole is installed at approximately 2km intervals, and every tenth pole in a predominantly concrete or softwood pole line must be a hardwood pole.

All customer-owned 11kV service lines must be self-supporting, and must be fused at either the tap off pole, or at the first pole in the service line.

The maximum distance between isolation points on the network shall be 2km, with isolation being achieved by means of a Recloser, Sectionaliser, or air break switch.

Reclosers and sectionalises are used in rural and remote rural areas to provide automatic isolation of faulted sections of line. Reclosers are typically situated at the midpoint of long rural feeders, or immediately down line from a rural township. Sectionalisers are used in conjunction with reclosers or substation circuit breakers in remote rural areas. Fault indicators are located along major feeder lines, at feeder and spur line isolation points and are used in conjunction with the reclosers and sectionalisers to reduce fault location and restoration times.

The majority of underground 11kV distribution lines in the Oamaru area are all intermeshed with neighbouring feeder circuits. Ground mounted switching stations, comprising 11kV oil switches and fused oil switches, are used to facilitate feeder interconnections, spur line connections, and transformer connections.

4.2.2.2 Security Standard and Fault Restoration Targets

NWL has a security standard (Appendix D) that it uses as part of its network development process. The security standard incorporates restoration targets specific to each security level in the standard.

In conjunction with the security standard NWL applies a Value of Lost Load (VoLL) approach to outage probability and impact assessment to determine the merits of security enhancement options. Hence, NWL considers the economic cost of outages to the community in its decision making processes.

4.2.2.3 Analysis of Outages

NWL undertakes outage cause and response analysis on an annual basis to identify whether outage trends are design, condition, or work practice related, or are due to factors that are outside of management control.

SAIDI levels have been relatively static over the past 3 years. Analysis of the unplanned outage data has not identified any significant issues regarding equipment condition or performance. Analysis of storm events has determined that outage levels are within the expectations of the variance that these events create i.e. current design standards and network condition are

satisfactory. Following the major snow storm of 2006, NWL reviewed its line design standards with regard to snow loadings at lower altitudes than had previously been assumed.

Analysis of outages has identified several outages in the last few years were due to protection grading issues, where more customers have been affected, and for longer, than would have occurred if the protection had operated as expected. These few outages have accounted for significant customer minutes. NWL has reviewed (internally and using a consultant) its protection designs and settings, and its processes for managing them. Settings changes and improvements in the way they are managed have been recommended, that when implemented should minimise the likelihood of these outages occurring. These inexpensive fixes should result in an improvement to the company's reliability service levels.

4.3 Asset Performance Indicators

As well as delivering supply reliably, there is a need to ensure that this is done in an economically efficient and cost effective manner. NWL uses a number of indicators to understand whether the asset investment strategies are delivering efficient outcomes.

Given the relative low density of the customer base at NWL, benchmarking against industry averages for asset performance often results in inappropriate comparisons. Benchmarking is performed against peer electricity distributors sharing similar load density ratios. Current performance is also compared against past performance. The targets reflect the effectiveness with which NWL manages its asset base for the benefit of electricity consumers in the region.

The current measures employed are network loss ratio, transformer utilisation, and operational expenditure per connection point.

4.3.1 Loss Ratio

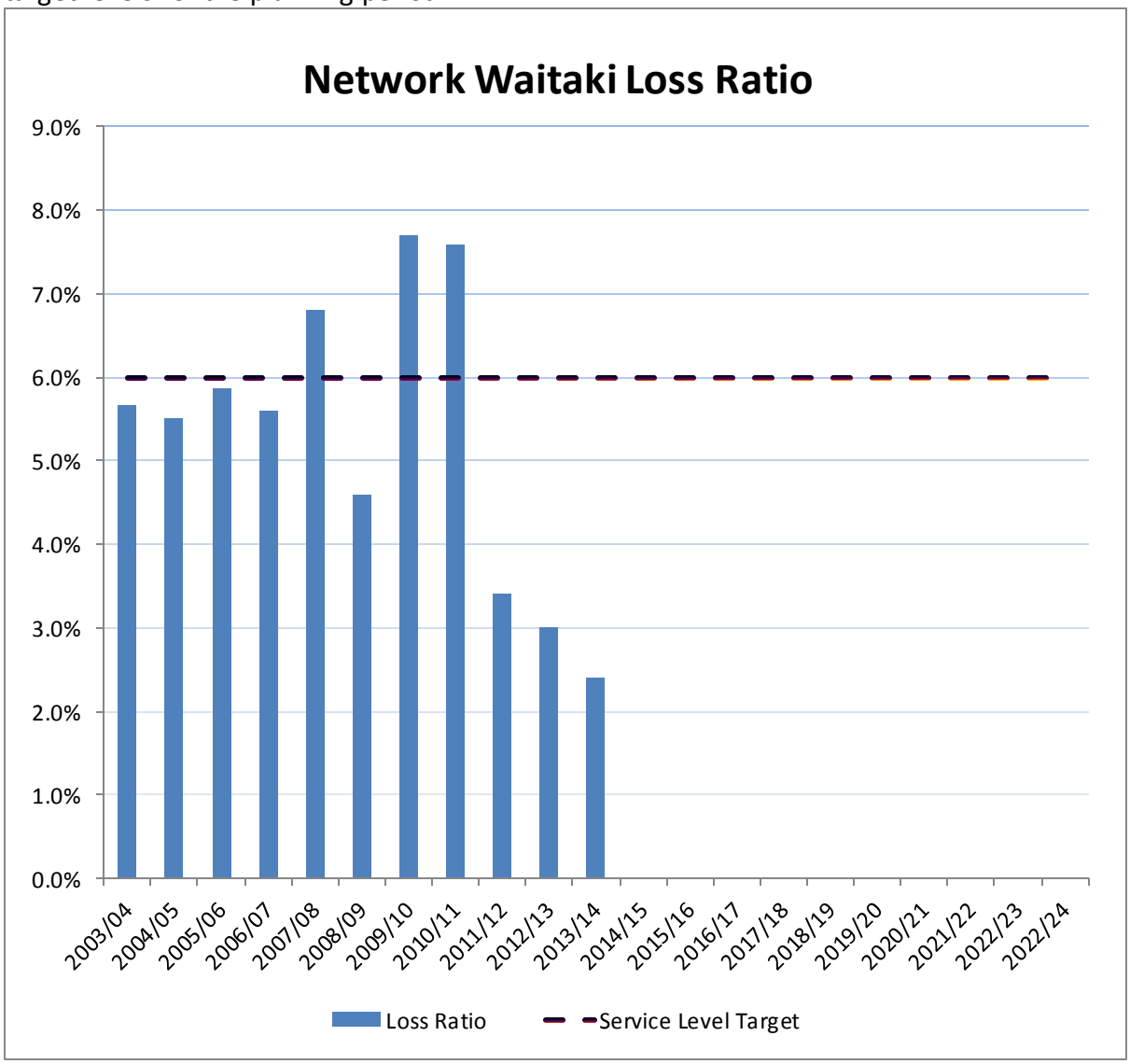
Network losses are calculated as a percentage difference between the energy coming into the network and the energy being delivered out of it. Loss ratio compares Retailer sales declarations with units recorded by the various GXPs and exported from DG installations. Three years ago the loss ratio fall significantly from 7.6% to 3.4% which is below NWL's target of 6%. The drop is partly attributable to the resolution of the billing and metering issues that the main electricity retailer in NWL's region was having after their systems were disrupted by the Canterbury earthquakes, and partly by NWL's efforts to operate an efficient network where losses are kept to a minimum.

NWL considers loss ratio to be a valid performance measurement indicator since minimisation of losses benefits all parties in the energy supply chain, including consumers. Losses are also becoming increasingly recognised as a critical long term issue. Tracking the network loss performance and how design decisions impact on these is considered important information.

Tracking this statistic also ties into the AMP objective of linking asset management processes to consumer preferences for prices. When surveyed the vast majority of consumers stated

that they would prefer to pay the same as they are paying now in return for a similar level of service. Higher network losses from an inefficient network impact directly on prices when from time to time NWL revises the loss factors it uses for reconciliation purposes. A higher reconciliation loss factor could mean that NWL would have to raise its prices to compensate.

The following graph shows the historic performance for Loss Ratio, and the table shows the target levels for the planning period.



Service Level Target	YE 2015 Target	YE 2016 Target	YE 2017 Target	YE 2018-25 Target
Loss Ratio	6%	6%	6%	6%

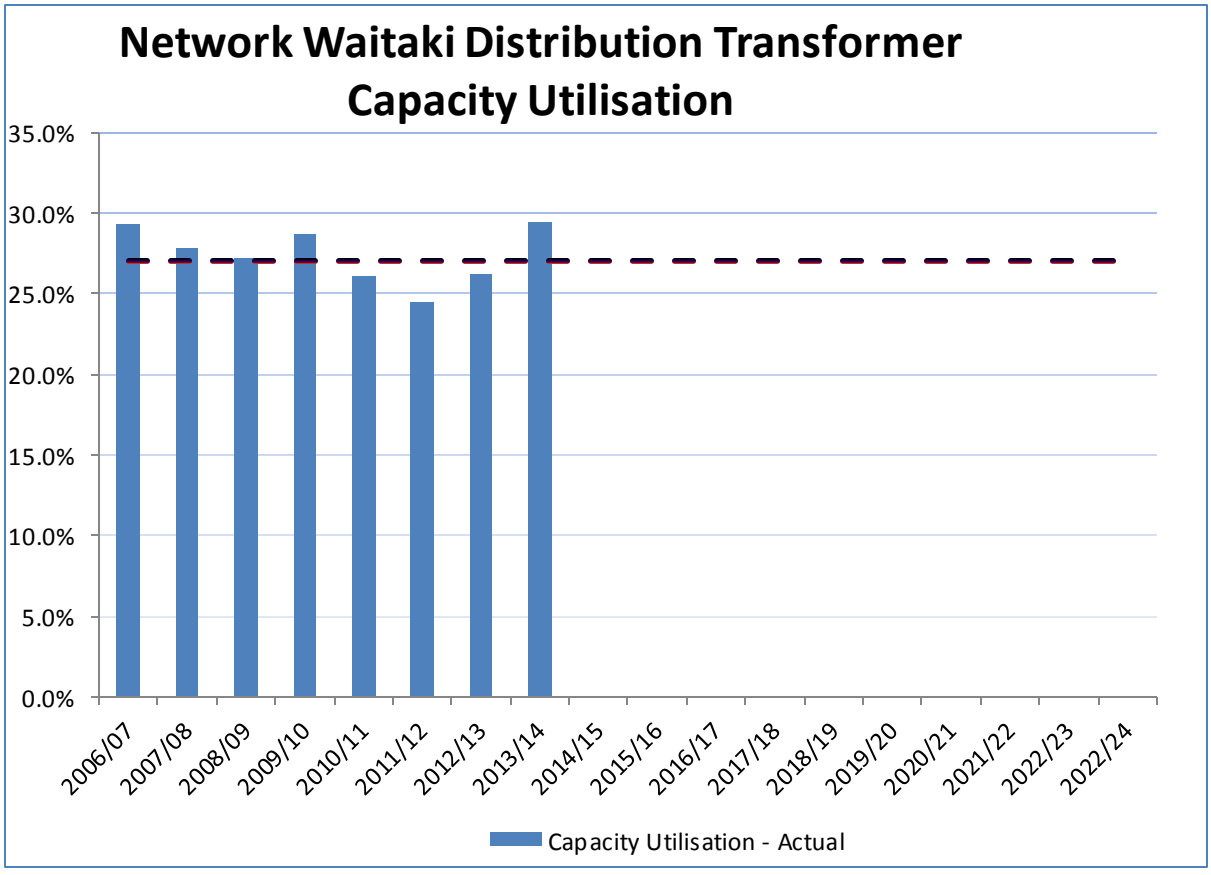
Loss Ratio Target Levels

4.3.2 Distribution Transformer Capacity Utilisation

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.

NWL's distribution transformer utilisation is below the national average, as expected for a low density distribution system in which rural customers each require a transformer because they are too far apart to supply with LV lines. The following graph details recent performance and the table shows the target transformer utilisation for the planning period.

Tracking this statistic also ties into the AMP 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.



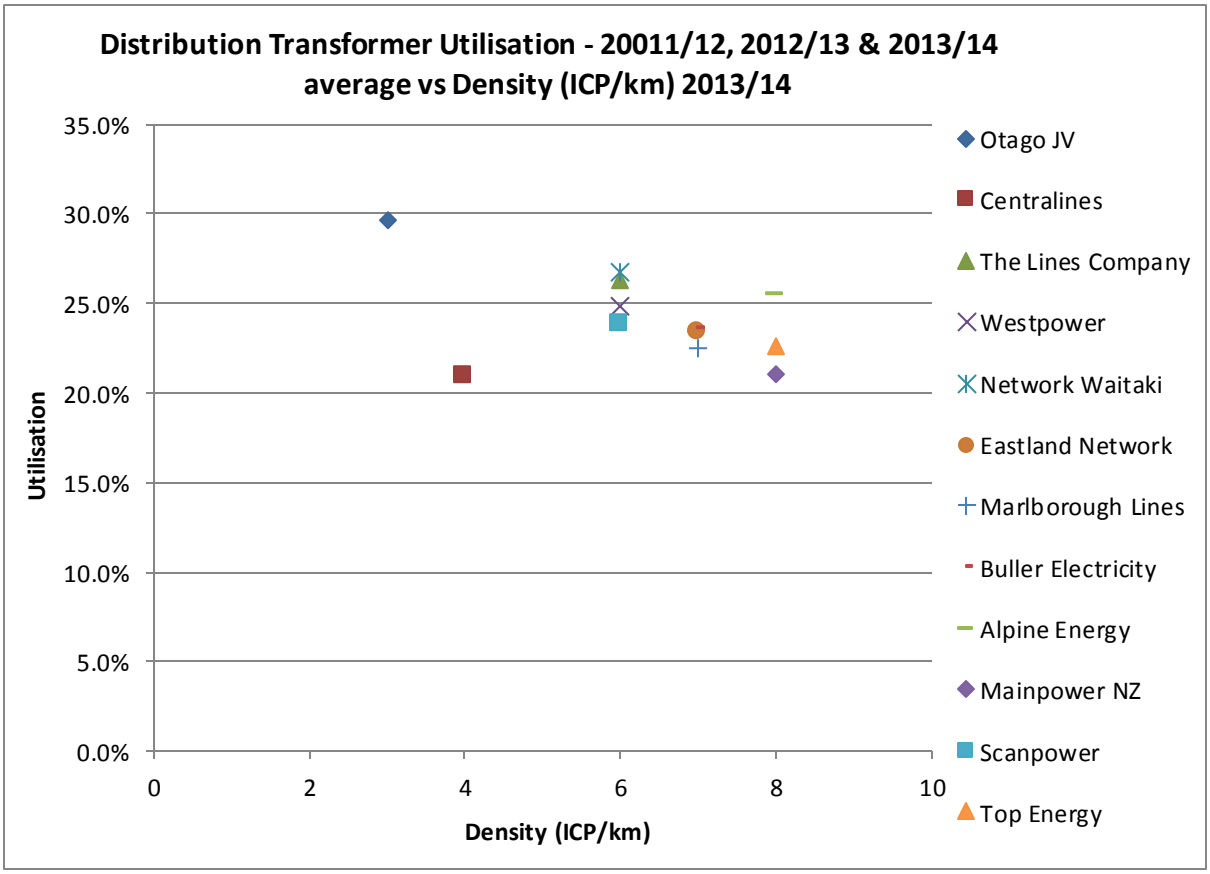
Historical Transformer Utilisation

Service Level Target	YE 2015 Target	YE 2016 Target	YE 2017 Target	YE 2018-25 Target
Distribution Transformer Capacity Utilisation	27%	27%	27%	27%

Transformer Capacity Utilisation Service Level Targets

NWL has changed from a winter to summer peaking network in a relatively short period of time and has 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. NWL also has 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.

While NWL's transformer utilisation is lower than the national average, it is high when compared with EDB's with similar ICP densities. This is illustrated in the following chart.



Transformer Utilisation for peer distribution companies

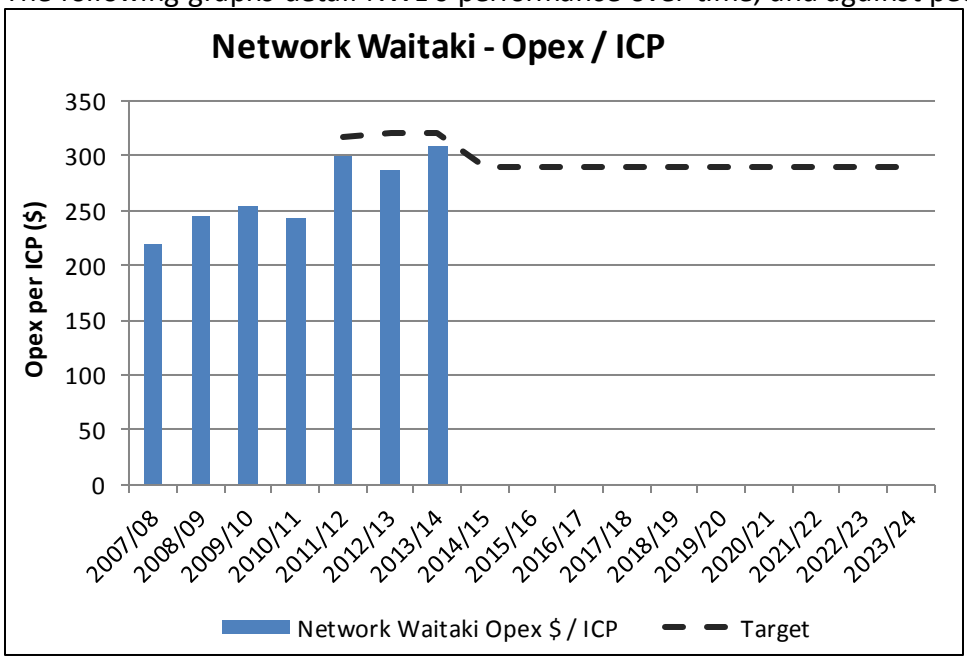
NWL intends to maintain this position by providing a suitable range of transformer capacity options for new connections.

4.3.3 Operational Expenditure per Connection Point

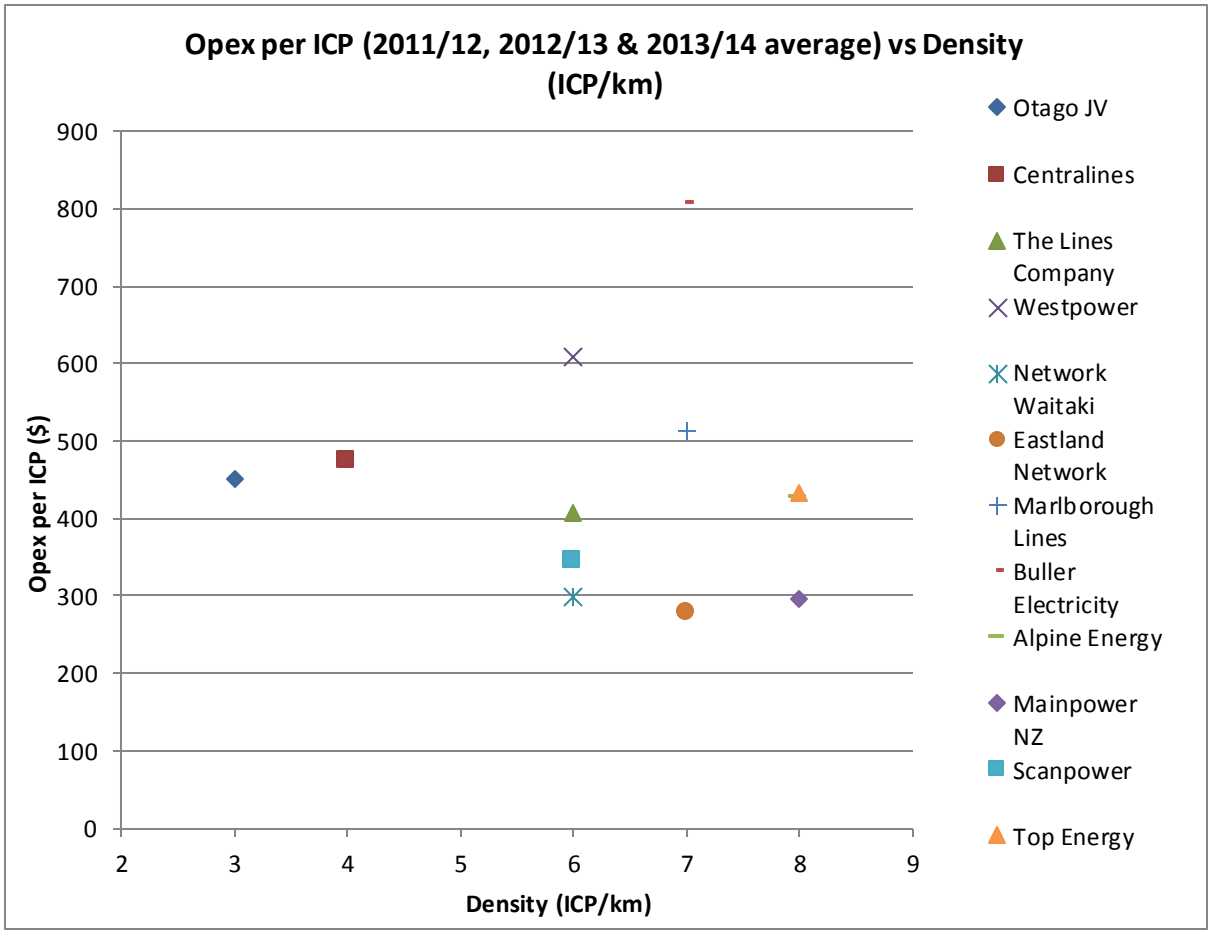
NWL has adopted this measure to enable an objective understanding of trends in the average level of investment required to service each connection point. This is also compared against peer EDBs to enable understanding of NWL's performance relative to its peers.

Tracking this statistic also links to the AMP objective of linking asset management processes to consumer and stakeholder preferences for supply reliability. Where an electricity distributor maintains a constant level of operational expenditure per connection point it is a good indication that there is an adequate level of maintenance being conducted in order to maintain overall system reliability.

The following graphs detail NWL's performance over time, and against peer EDBs.



Operational Expenditure per ICP Performance



Opex per ICP ratio for peer distribution companies

Relative to peer EDBs NWL clearly has had an average operating expenditure per ICP which is at the lower end of current expenditure rates, despite the low density of connection on the network. NWL also lacks the opportunity for economies of scale, given the relatively small number of connections. In summary, it is suggested NWL's operating expenditure decisions have proven to be prudent, given the performance levels achieved overall.

The following table details the target operational expenditure per connection point for the planning period.

Service Level Target	YE 2015 Target	YE 2016 Target	YE 2017 Target	YE 2018-25 Target
OPEX per ICP	$290.00	$290.00	$290.00	$290.00

Operational Expenditure per Connection Point Service Level Target

NWL plans to maintain current levels of operational expenditure throughout the planning period.

4.3.4 Quality of Supply

Statutory requirements with regard to harmonic and supply voltage levels on the network are complied with. By enforcing high standards at connection approval time, very few issues have materialised.

NWL budgets for, one site specific quality investigation and two compliance inspections per annum.

Power Factor Correction is the main Network Connection Standard compliance issue found in installations. This is managed as part of the installation metering compliance program. A new standalone standard on harmonics has been compiled and issued in 2010.

The target for customer voltage complaints where non-compliance is found has been set at less than 4 per annum. No adverse trends are evident. No pro-active monitoring is currently considered necessary. Complaints regarding radio interference are also showing no adverse trends. Four maintenance actions are budgeted for per annum.

Adverse trends are identified by budget variance.

4.4 Justification for Performance Indicators

4.4.1 Customer Oriented Service Levels

The Customer oriented service levels are justified because:

- they are reflective of customer stated requirements,
- NWL is one of the most reliable EDBs, and
- they provide an economic balance between live line maintenance and planned outages based on the value of lost load (VoLL).

NWL undertakes regular representative surveys to enable a better understanding of customer priorities. The most recent survey was done in February 2015. In that survey 400 mass market customers were interviewed by telephone. The survey respondents were selected randomly from NWL's full customer database. 70% of the respondents were Urban and 30% were Rural, which corresponds with NWL's actual Urban to Rural mix.

At the same time NWL conducted face to face interviews with 14 of its major consumers, picked at random from a sample of NWL's top 25 users by volume of electricity used. This

survey had representative respondents from large industrial, farming (mostly irrigation and dairy farming operations) and large commercial users.

Responses from both Urban and Rural consumers were largely the same and the key findings were:

- The vast majority of respondents who had experienced unexpected outages indicated that supply had been restored within an acceptable timeframe.
- 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.

In 2014, out of the 29 electricity distribution companies in New Zealand, NWL had the 7th lowest SAIDI index and 12th lowest SAIFI index, which compares very well with similar lower density networks. Contributing to these relatively good reliability indexes was NWL's strategy is to minimise outages by undertaking a significant portion of its planned work on live lines. However, the relatively high cost of live line work had to be offset against the value of lost load (VoLL) to the consumer to ensure that it was economically viable. Live line construction techniques are also limited and major construction work still required planned outages.

Given that: (1) customers are happy with the level of service and do not want to pay for a better level of service, (2) NWL is one of the more reliable lower density networks, and (3) live line maintenance is used to offset the effect of VoLL; NWL believes it's customer orientated service level targets are justified.

4.4.2 Asset Performance and Efficiency Targets

The Asset Performance and Efficiency Targets are justified as follows.

Loss Ratio:
The use of this service level is justified as it indicates, at a high level that asset selection and operation decisions have been appropriate, and whether the network is operating at an optimal level of efficiency in terms of losses, given physical constraints. The target levels chosen are consistent with the long run average past performance, which eliminates fluctuations due to reporting errors. The targets are also a low level for an EDB with low ICP density.

Distribution Transformer Capacity Utilisation:
The use of this service level is justified as it is indicative of the quality of network development planning which drives capital investment decisions.

The target levels chosen are consistent with the load demographics of the network, the quantity of controllable load, the high level of seasonal supplies, and past performance. The levels are also high compared with other EDBs of similar low ICP densities.

Operational Expenditure per Connection Point:

The use of this service level is justified as it enables an understanding as to whether operating expenditures are appropriate and efficient given the operating parameters of the company. This is especially so when comparisons with peer EDB's are made. The target levels chosen are consistent with the performance of peer EDBs.

5 Network Development Planning

Within NWL's area of supply network development has in the past decade been driven by load growth and change in the demographics of that load (i.e. the conversion of dry land sheep farming to dairying and the associated use of irrigation). Thus system growth has driven capital expenditure in recent years and large parts of the network that would have required replacement due to condition in several years' time have been replaced as part of this load growth.

NWL is not planning to reticulate new areas or to remove reticulation from less economic areas. It aims to retain and service the consumers it has, and connect new consumers as economically as it can. It is not planning to significantly increase or decrease service levels but maintain its industry position.

NWL has experienced a period of high growth and there are still a number of very large development projects that are in the planning or consent stage. NWL produces a Network Development Plan (NDP) that is based on recent growth trends and known potential developments. The NDP is updated on a 3 year cycle with the latest review being completed in 2013. Ultimately the NDP updating cycle will be coordinated with valuation updates and Asset Management Plan updates.

The 3 year NDP review cycle is based on the following assumptions:

- It takes NWL 3 years to plan, design, procure, and construct a major development.
- The trigger point for upgrade must therefore occur when there is only sufficient remaining excess capacity to service 3 years' load growth at existing trends and sustain security provisions
- If a major unexpected network development occurs, then this may trigger an earlier review of the NDP than the next 3 yearly one.

The purpose of a Development Plan is to provide the network's management with a benchmark against which they can measure/forecast network performance in a high growth environment. This provides some forward visibility on future risks and allows them to prepare a management strategy for addressing issues sufficiently in advance to select the most optimum course of action. Similarly the trigger points for undertaking development are identified and consequently are able to be monitored to reduce the probability of surprises.

The NDP identifies development issues/triggers, and establishes strategies, preferred tactics and actions to address probable growth.

5.1 Planning Criteria and Assumptions

NWL has developed planning criteria so that the network will meet the service level targets described in Section 4. The planning criteria are based on:

- Network Security
- Network Capacity
- Quality of Supply
- Network Reliability

5.1.1 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 used by NWL is detailed in the following table. Security is defined for various classes of supply based on load size and customer 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 NWL prioritises restoration of supply to the maximum number of customers, ahead of individual security issues.

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
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
B7	Sub-transmission feeder	<15	Restore in repair time	Restore in repair time	Restore in repair time
Distribution Feeders and Substations					

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
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

Network assets dedicated to a special industrial load will have a security level determined by customer requirements.

Assumes the use of interruptible irrigation load for up to 48 hours
Individual protection for each transformer and the 11KV bus tie run open normally or on transformer trip

Security Criteria

The Repair Times for different asset classes are:

- Repair Time for overhead lines 4 hours
- Repair Time for underground cables 6 hours
- Repair Time for distribution equipment 8 hours
- Repair Time for sub-transmission equipment 12 hours
- Repair Time for Transpower connection assets 16 hours

Load flow analysis is used to determine whether there is sufficient capacity on assets that support the faulted pieces of equipment to maintain the security criteria. The capacity of assets is discussed in the next section.

Faults are analysed to determine whether there are assets in parts of the network that are unlikely to be able to be restored in the repair times defined in the security criteria.

If any part of the network cannot meet the security criteria over the planning period then this signals the need for a solution, be it a network solution or a non-network one, such as distributed generation.

5.1.2 Network Capacity 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. The capacity of the network must be sufficient to deliver electricity during normal conditions and also during contingent events, when one or more assets are unavailable. Hence the network must be planned and built so that there is sufficient contingent capacity within it to meet the security criteria defined in the previous section.

The capacity of the different asset classes is defined as follows:

Asset Class Criteria	Basis for Rating	Standardisation
33 kV Overhead Conductor	New conductor is sized for the expected loading at the end of the planning period and is based on common industry sizes. The conductor size is selected for both electrical load and mechanical strength.	Typically, the conductors used are Dog and Jaguar, and Neon close to the coast.
33 kV Cables	New cables are sized for the expected loading at the end of the planning period and are based on common industry sizes. The conductor and screen size is selected for both load and fault current carrying capability. Terminations must have high impulse to withstand voltages and be of a design that minimises the risk of discharge between cores that cross each other in the termination area. All 33 kV cables must be protected by riser, or better, classes of arrestor. They should be rated at 27 kV to minimise network surge levels. This criterion is required to meet network quality targets.	
Zone Substation Transformers	Zone Substation Transformers are chosen to meet the security criteria for the planning period. This means supplying the existing load and providing contingent capacity for neighbouring substations. Within this constraint, for rural areas NWL endeavours to use its 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	A feeder loading criterion is adopted to maintain distribution network transfer capacity between zone substations and provide backup to feeders within zone substations. Where possible, maximum routine feeder	Maximum feeder loads are maintained within 67% of

Asset Class Criteria	Basis for Rating	Standardisation
	loads are maintained within 67% of the rating of the feeder. Hence if one feeder fails the load can be spread around neighbouring feeders.	the rating of the feeder.
11 kV Overhead Conductor	New conductor is sized for the expected loading at the end of the planning period and is based on common industry sizes. The conductor size is selected for both electrical load and mechanical strength. Typically, the conductors used are Mink, and Dog. Within 1 km of the coast all aluminium conductors are used. Everywhere else ACSR conductors are used.	Typical conductors used are Mink and Dog.
11 kV Backbone Cables	All new 11kV cable for feeder backbones is 185mm2 Al XLPE insulated cable, which has been assessed as suitable for the electrical load requirements and fault levels over the planning period.	185 mm2 Al XLPE.
11kV Spur Cables	New 11 kV spur cables are sized for the expected loading at the end of the planning period and are based on common industry sizes. The conductor and screen size is selected for both load and fault current carrying capability.	
LV Overhead Conductor	New conductor is sized for the expected loading at the end of the planning period and is based on common industry sizes. The conductor size is selected for both electrical load and mechanical strength.	Typically, the conductors used are AAC Weke and Kutu.
LV Cables	All new LV cables are either 120mm2 or 185mm2 Al XLPE insulated cables, dependent upon local LV distribution load characteristics for a given transformer area and assessed voltage regulation under peak loading conditions.	120 mm2 or 185 mm2 AL XLPE.
Distribution Transformers	These are selected such that the 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	Switchgear is selected to meet the expecting loading at the end of the planning period and have a maintenance requirement that is equivalent to or less onerous than current plant and be able to be maintained using skills available locally. NWL has a policy of avoiding SF6 gas wherever possible.	
Poles	Poles of adequate strength are used to comply with codes and be capable of withstanding the snow and ice loading experienced with the region. The line design software package, “Pole-n-Wires” is used to analyse forces and loadings to ensure the correct pole and stay options are selected.	

5.1.3 Quality of Supply Criteria

The main quality of supply factor used in the planning of the network development is voltage performance. This is because NWL is a low density network with long rural feeders where voltage drop is a problem, which must be taken into account in the planning process. On long rural feeders low voltage is generally the first sign of an emerging network capacity issue. Hence voltage is one of the most common drivers for network augmentation projects.

NWL designs 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 shall be no more than 2.5%
- The maximum voltage drop along 11 kV feeders shall be no more than 5.0%
- The maximum voltage drop along LV feeders shall be no more than 10.0%

Voltage compliance related projects are justified by the following benefits from improved voltage levels or improved voltage control:

- 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

5.1.4 Network Reliability Criteria

The achievement of network reliability targets as defined in Section 4 is enabled through targeted capital projects aimed at progressive improvement of critical sections of the network through either refurbishment or renewal works to make the network more resilient, or through capital projects aimed at enabling faster network restoration following a fault. Projects are assessed on their relative merits in terms of forecast contribution to a reduction in SAIDI and/or SAIFI, based upon the local fault history.

5.2 Strategies for Standardising Assets and Designs

As well as designing the capacity for the various asset classes above, NWL has adopted some general guidelines for the planning of its network in rural areas. Building to these guidelines has enabled NWL to meet its security and capacity criteria in a productively efficient manner.

Planning Guidelines for the Rural Network:

- 11kV feeders should be limited to 4 MVA distributed over 15 km – assuming 2 MVA of feeder load and 2 MVA of tie capacity.
- 33kV sub-transmission lines should be limited to 20 MVA distributed over a maximum distance of 35 km – assuming 7 MVA off-takes at approximately 10 km intervals.
- There should be no more than three 7 MVA substations per 33 kV line.
- 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.
- Rural substations will utilise 5/7 MVA 33/11 kV transformers and will be upgraded to a dual transformer sites when the load exceeds 5MVA, as more than two 11kV tie feeders with contingent capacity of 2MVA are needed for security.

NWL achieves cost efficiencies by having a design standard folder with standard designs for lines and line hardware. These designs are reviewed periodically and updated where deficiencies are identified or as new products are identified that are superior to existing ones.

NWL has also bought the PowerCo standards and as part of this contract we receive regular updates from PowerCo. NWL is in the process of incorporating these standards into its own standards system, on a case by case basis. This has two advantages:

- PowerCo has more resources to allocate to the updating of standards.
- It encourages standardisation across networks as many other networks have now bought, and are using, the PowerCo standards.

5.3 Strategies for Energy Efficiency

The main strategy NWL has for operating the network in a way that promotes energy efficiency is in the use of load control. This is described in Section 5.10.1

Another strategy that NWL is considering is the use of tariffs to incentivise more off peak energy use. This may not happen until smart meters are rolled out in the NWL area of supply.

5.4 Determining Capacity

The criteria for determining capacity of new equipment are described in Section 5.1.2.

5.5 Prioritising Network Development Projects

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.

Prioritisation of network developments is done by assessing each of the proposed network development 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 to Legal and Statutory requirements;
- Conformance to power supply quality standards;
- Conformance to network security standards;
- Conformance to network capacity requirements;
- Improvement in network reliability (customer service levels);
- 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 budget.

Following on from this initial prioritisation process, a Sanction for Expenditure (SFE) is prepared for all high priority, high cost projects.

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;
- any other benefits that will accrue from this project in terms of security, quality, consumer/community perception etc.

The NWL Board of Directors requires all requests for major capital funding to be supported by a SFE.

5.6 Demand Forecasts

Demand forecasts estimate the amount of power required in different parts of the region served by NWL. NWL uses its own internal spread sheet based model to estimate the future demand for the planning period.

5.6.1 Methodology

Demand forecasts are first made for each feeder and then combined using historical diversity factors to derive forecasts at the Zone Substation level and then again at the GXP level. The diversity factors are applied to account for the fact that the peak demand on each feeder will not occur at the same time, that is the peak load at the substation level will be less than the sum of the individual feeder peak loads. The diversity factors are updated periodically to account for the fact that they may change over time as new loads are added, or as the use of the existing loads change (for example irrigation use is changing as farmers seek to use it more efficiently. Similarly diversity factors are required between zone substations and GXPs, as the peak GXP demand will be less than the sum of the individual zone substation peak demands.

The factors used to derive the demand forecasts are:

- **Demand Records:** Daily half hour demand data for each feeder is obtained from the SCADA system. NWL uses data recorded since 2002 for forecasting purposes. Any abnormal data is then removed, such as when a feeder is being used to supply load normally supplied by another feeder during an outage (planned or forced).
- **Irrigation and Dairy Farm Load Growth:** In recent years the major growth in demand on the NWL network has been because of the increase in land being converted for dairying and the associated increase in irrigation. NWL consults with the major irrigation and farming representatives to obtain a forecast of the amount and timing of any large scale pumps to be installed. NWL also consults with these representatives on the area and type of land to be irrigated, and from this it estimates the amount of on farm pumping load and dairy shed load that will be installed.
- **Industrial and Large Commercial Growth:** NWL consults with its four major industrial customers regarding any future expansions and changes in demand use over the planning period. NWL also consults with known new industrial customers about their load requirements and timing.
- **Subdivisions:** NWL consults with the major developers of residential, commercial, and industrial subdivisions about the likelihood, size and timing of any subdivisions.
- **General Demographic and Economic Trends:** NWL keeps abreast of publicly available general demographic information and economic trends. NWL uses this information to flag potential issues for demand forecasts but does not use it directly in its demand forecast model. This is because the load growth in the region is being driven primarily

through land use change and consultation with the relevant parties is thought to provide a better basis for estimating demand (particularly in the short term).

- **Diversity Factor:** Diversity factor is the ratio of coincident demand (zone substation maximum demand) to non-coincident maximum demand (Σ feeder maximum demand). Maximum demand for different supply points (GXPs, zone substations or feeders) do not necessarily occur at the same time. This suggests that the zone substation maximum demand will be less than the sum of individual feeder maximum demands supplied from it. This also applies at the GXP level where the GXP maximum demand will be less than the sum of the individual zone substation maximum demands supplied from it. Diversity factors at GXPs and zone substation levels are calculated using historical data for each year. The average of historical diversity factors is applied at the appropriate level to forecast maximum demands at the zone substation and GXP levels.

For each feeder the underlying load growth in kW is obtained by averaging the last 5 to 10 years' peak demand growth, excluding major step loads increases. This value is then added for each year of the planning period to give the forecast of underlying demand on each feeder. NWL uses a linear kW value rather than applying a percentage load growth factor as the compounding effect of the latter is believed to over-estimate the demand in the latter part of the planning period.

Step loads due to major irrigation schemes, large industrial installations or expansions and any large subdivisions are then added into the forecast. For large irrigation schemes, additional on farm irrigation load is estimated from the size and type of land to be irrigated.

NWL applies historic kW per hectare ratios for the different land types. These developments are added to the underlying base load growth to give the peak demand on each feeder.

The peak demand on each zone substation is determined by summing the peak feeder loads of that substation and then applying a diversity factor. The peak demand on each GXP is calculated in a similar manner, by applying a diversity factor to the sum of the peak zone substation loads.

5.6.2 Demand Forecast Assumptions for Large Uncertain Developments

There is one large development where there is a degree of uncertainty. They are:

- Stage 2 of the North Otago Irrigation Scheme.

The uncertainty around the NOIC Stage 2 scheme is mainly around the timing of this development, rather than the size of the load (10 MW of primary pumping at Black Point plus on farm pumping and diary sheds) and whether or not it will proceed. The final size of the load increase for this development has a high degree of certainty as the size of the scheme is already known (~10,000 hectares). What is uncertain is when the project will proceed and then how quickly the irrigation allocation will be taken up. This development is included in NWL's demand forecast. NOIC have indicated that Stage 2 of the scheme is now likely to

proceed as a series of small increments rather than one big step change (as how Stage 1 occurred).

In the last AMP the Haka Irrigation Scheme was included as an uncertain development. The Haka Irrigation Company has now firmed up its plan and applied for a supply to meet its planned commissioning date of April 2015. This is driving some new developments as reported later in Section 5.

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

The existing distributed generation is intrinsically included in the demand forecast by its impact on the historic measured feeder peak demand.

To date there has only been a small amount of DG installed within the NWL area of supply. However, in the last 12 months the number of new DG connections has increased quite significantly from small residential consumers installing mainly roof top PV. While these DG connections are growing in number they are small in capacity, typically 3-5kW. NWL believes there impact on its network will be small for the duration of the planning period. NWL has investigated a number of DG options, but none of these schemes would provide secure base load generation. For these reasons no allowance has been made for DG in the demand forecast. DG is discussed in more detail in Section 5.9.

NWL has three portable 500 kW diesel generators which it uses to provide security in the event of a major equipment failure. At the time of writing, February 2015, Network Waitaki is using these generators when Transpower declares a grid emergency due to the lack of transmission capacity in to the Oamaru GXP. Section 5 describes what Network Waitaki is doing to relieve this transmission constraint. However, no allowance has been made for them in the demand forecast. These generators are not seen as being a long term economic alternative for providing transmission capacity. These embedded generators are discussed in more detail in Section 5.9.

5.6.4 The Impact of Demand Side Management on the Demand Forecast

NWL makes extensive use of its load management system to control water heating and other loads at consumers' installations. Load management is used to reduce network demand coincident with the Transpower Lower South Island regional peaks. This is done to reduce transmission charges, as Transpower's pricing methodology incentivises this. However, NWL's peak demand is in summer due mainly to irrigation and is therefore not coincident with the LSI peaks which are in winter. Hence NWL does not actively manage its summer peaks for this. However, it manages the summer load during drought periods to manage the transmission constraint into the Oamaru GXP.

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. NWL has also been involved in a variety of energy efficiency programmes. However, the availability of

controllable load has diminished in recent years due to the replacement of off peak night store heating with heat pumps that utilise peak period energy and are not suitable for controlled load applications. In addition the use of heat pumps to provide cooling during the summer months is exacerbating the already rapid growth of summer load.

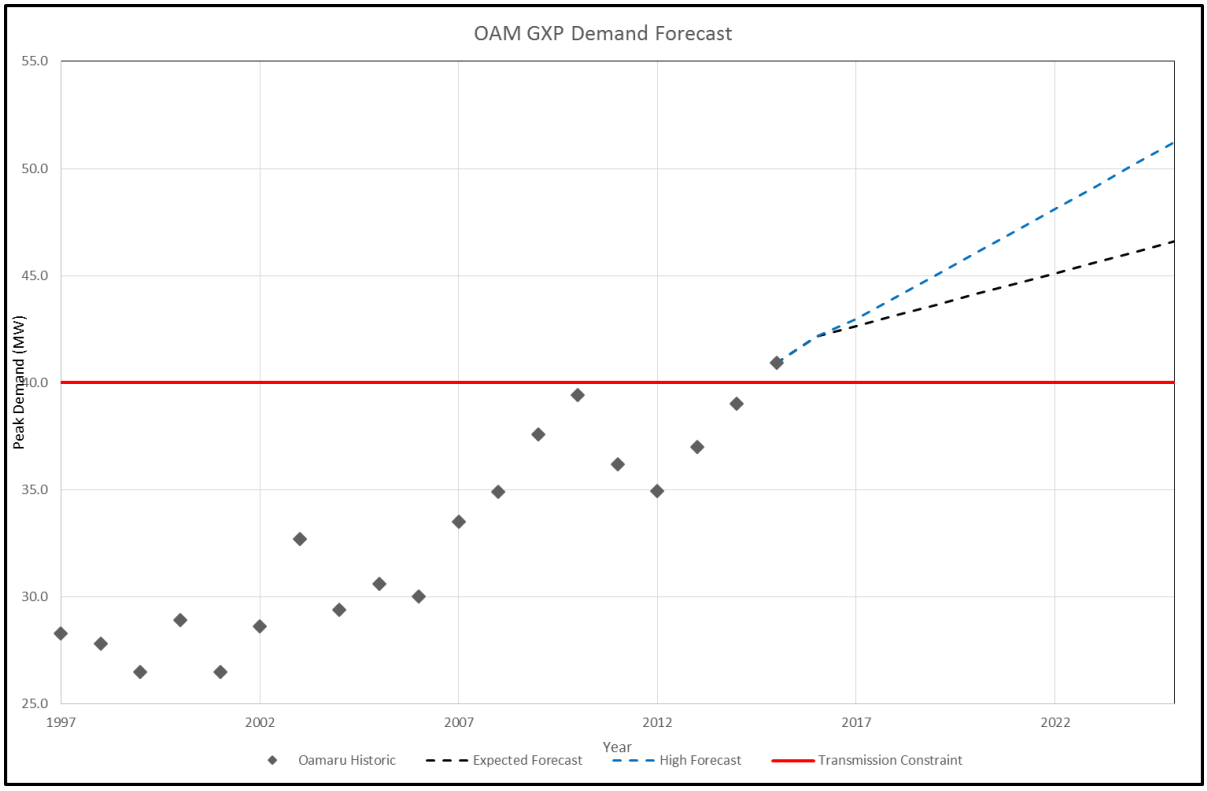
For these reasons the effect of demand side management on NWL's peak demand (in summer) is small. Hence, it is not included in the demand forecasts.

5.6.5 The Demand Forecasts

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 latest forecast includes two new scenarios, a NWL high growth scenario and a NWL expected growth scenario, as these represent the range of demand that could be seen in any year. The forecast done 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 has been refined in 2014 in time for this AMP. This may impact on the timing of some projects within the NDP. As explained in Section 5.6.2, NWL is no longer including the proposed Holicm Plant in our demand forecast.

The latest NWL demand forecasts are shown in the following chart and tables. Also shown on the chart are the Oamaru GXP summer ***N-1*** transmission constraint.

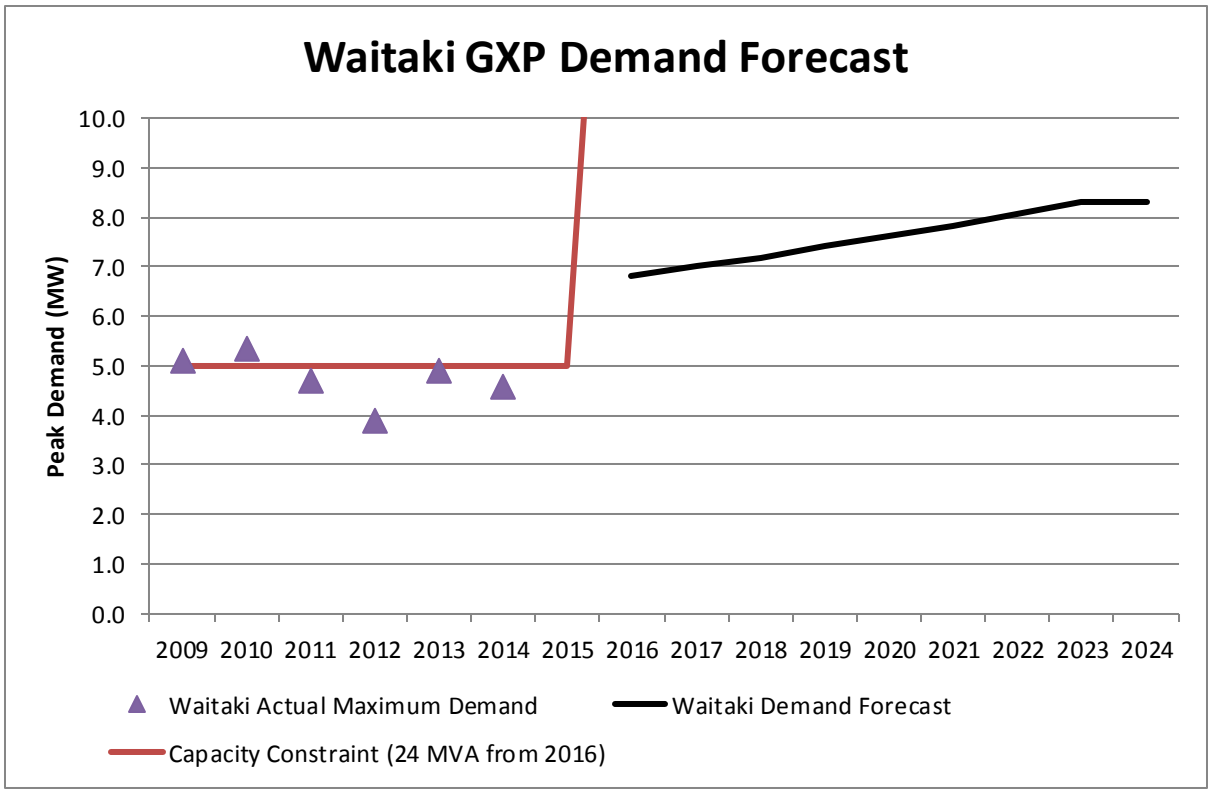


Oamaru GXP Demand Forecast and Capacity Constraints

Oamaru GXP Forecast (MW)	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Actual Demand	39.4	36.2	34.9	37.0	39.0	40.9										
Expected Demand Forecast						40.9	42.2	42.7	43.1	43.6	44.1	44.6	45.1	45.6	46.1	46.6
High Demand Forecast						40.9	42.2	43.0	44.0	45.0	46.1	47.1	48.1	49.2	50.2	51.2
Transmission Constraint	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40

The latest demand forecast for the Lake Waitaki GXP is shown in the chart below and transformer capacity constraint. The forecast now includes a step change in the 2016 year resulting from the new Haka Irrigation Scheme that will be commissioned in time for the 2015/16 irrigations season. It also shows the capacity constraint on the GXP being relieved in the 2016 year with the upgrading of the capacity of the GXP.

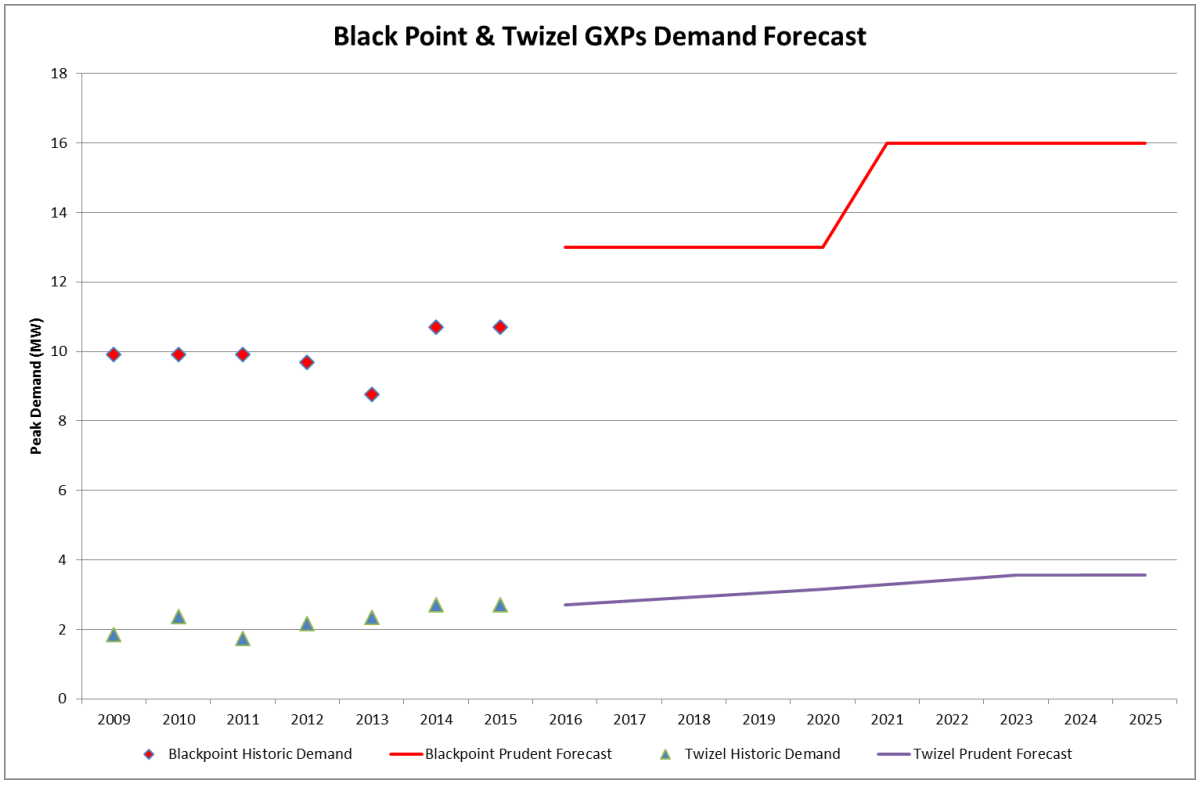
The starting demand level is lower than before as load at Omarama and Ohau has been shifted on to the Twizel GXP. This load will be shifted back on to the Waitaki GXP once the Waitaki GXP upgrade is completed (refer to Section 5.8.2).



Waitaki GXP Demand Forecast and Constraint

The demand forecast for the Black Point and Twizel GXPs is shown in the following chart. Neither of these two GXPs is constrained within the planning period. NOIC have advised they are installing an additional pump (~2.5 MW) at Black Point during the winter of 2015. Hence the maximum demand is forecast to lift from the present 10.6 MW to 13.1 MW during the 2016 financial year.

While the demand on the Twizel GXP is forecast to increase slightly during the planning period it is possible that following the upgrade of the Waitaki GXP that, for operational reasons, this load will be transferred on to Waitaki. If this happens, then the load measured on this GXP will decrease.



Black Point and Twizel Demand Forecasts

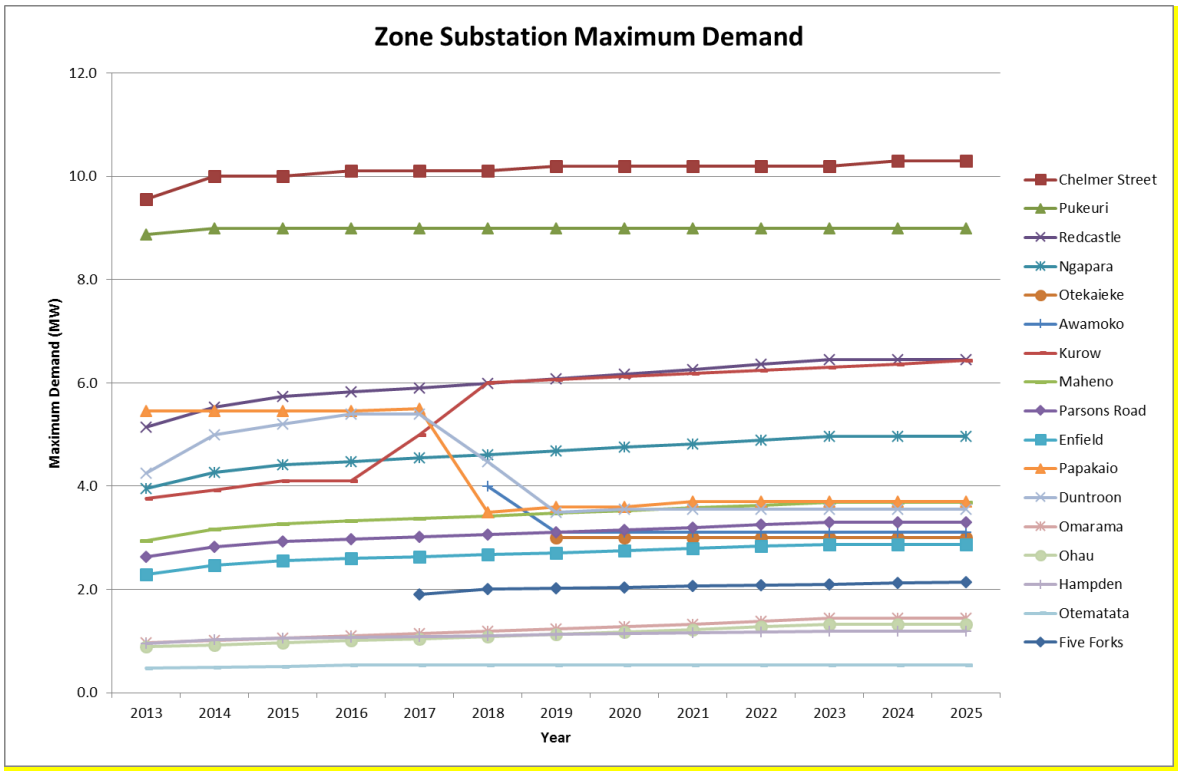
Zone Substation Demand Forecasts

The following table and graph shows the 10 year Zone Sub demand forecasts. Irrigation load is expected to continue to drive high growth.

NWL also forecasts load at the feeder level, but these are not shown in this Asset Management Plan. The feeder level forecasts drive the network development projects for specific assets, which are summarised in Section 5.8.

Maximum Demand (MW)	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Ohau	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.3	1.3
Omarama	1.0	1.0	1.1	1.1	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.4	1.4
Otematata	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Kurow	3.8	3.9	4.1	3.0	3.1	3.2	3.4	3.5	3.6	3.8	3.9	3.9	3.9
Otekaieke							3.0	3.0	3.0	3.0	3.0	3.0	3.0
Duntroon	4.3	5.0	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	4.0	4.3	4.4	4.5	4.5	4.6	4.7	4.8	4.8	4.9	5.0	5.0	5.0
Papakaio	5.5	5.5	5.5	5.5	5.5	3.5	3.6	3.6	3.7	3.7	3.7	3.7	3.7
Enfield	2.3	2.5	2.6	2.6	2.6	2.7	2.7	2.8	2.8	2.8	2.9	2.9	2.9
Parsons Road	2.6	2.8	2.9	3.0	3.0	3.1	3.1	3.2	3.2	3.2	3.3	3.3	3.3
Pukeuri	8.9	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Chelmer Street	9.6	10.0	10.0	10.1	10.1	10.1	10.2	10.2	10.2	10.2	10.2	10.3	10.3
Redcastle	5.1	5.5	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	2.9	3.2	3.3	3.3	3.4	3.4	3.5	3.5	3.6	3.6	3.7	3.7	3.7
Hampden	0.9	1.0	1.1	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.2

Zone Substation Maximum Demand Forecast



5.6.6 Constraints within the Planning Period

GXPs:

The Oamaru GXP has a voltage constraint that limits the demand at this substation to approximately 40 MW (it is a dynamic constraint which varies depending on system conditions). NWL managed the load to 39 MW during the last dry summer of 2009/10. At the time of writing in February 2015 NWL is experiencing another dry summer. Transpower has declared grid emergencies this month and during these events has instructed NWL to maintain load below 40 MW. In addition to load control measures, NWL has hired 1 MW of generation, in addition to its own 1 MW of generation, to help mitigate this transmission constraint during these national grid emergencies.

By the end of the planning period the Oamaru GXP load is forecast to exceed the transmission capacity supplying the GXP by between 7 MW to 11 MW. NWL plans to build 66 kV infrastructure over the course of the planning period to enable load to be shifted on to the Lake Waitaki GXP.

The Lake Waitaki GXP will be constrained in 2015 by the rating of the single supply transformer (5 MVA) once the new Haka Irrigation Scheme is operational in February 2015. This, along with the transmission constraint on the Oamaru GXP, is driving the upgrade of the Waitaki GXP, refer to Section 5.8.2.

The other two GXPs at Black Point and Twizel are not constrained over the planning period.

Zone Substations:

Pukeuri Substation: This substation falls within the class B1 of the security standard. There is limited ability to restore load should the single zone substation transformer fail, and the security criteria is not met.

Papakaio Substation: Within the planning period load growth on this substation will mean that there is insufficient contingent capacity to supply the load during outages.

Kurow Substation: Within the planning period load growth on this substation will mean that there is insufficient capacity to supply the load.

Duntroon Substation: Within the planning period load growth on this substation will mean that there is insufficient contingent capacity to supply the load during outages.

Feeders:

Five Forks Feeder: This feeder (fed from Enfield Substation) is expected to experience significant load growth if proposed irrigation uptake occurs. Within the planning period a new zone substation will be required in this area to meet the security and reliability criteria.

Kurow Feeder: Load growth near the far end of this feeder (in the Otekaieke area) will cause voltage constraints within the planning period. Short-term relief will be achieved by the installation of voltage regulators. However, within the planning period a new zone substation will be required, due to the distance from the nearest substations.

5.7 Significant Development Options Available

This section describes at a high level the types of options that NWL considers for relieving constraints within its network. The various option types are summarized in the following table.

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	No – a prudent operator would not dictate to consumers in this manner.		
	Cycle loads to reduce overall peak demand	Yes – as a short term measure non-critical loads could be cycled until a permanent solution is put in place.		NWL has installed ripple relays on all irrigation pumps greater than 30 kVA to manage this load until the transmission constraints into the network are fixed.
	Install special protection schemes to shed load for contingent events	Possibly – as a short term measure. However, this would reduce reliability to some customers and customers have indicated that they		

Class of option	Description	Prudency	Efficiency	Remarks
		do not want lower levels of reliability. Also, these measures do not align with the company's mission statement.		
Network	Supply from upgraded 11kV with no subtransmission upgrades	No - a prudent operator would not allow utilisation of specific asset classes to be exceeded	No – not dynamically efficient. There is a point when the load in an area warrants higher voltage circuits.	

5.8 Network Development Program

The following section summarises the development plan derived via NWL's Network Development Planning process.

5.8.1 Transpower 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; NWL's 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 Pont 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.

5.8.2 GXP Development

Oamaru GXP - In addition to the upgrade of the Transpower Interconnection assets, the supply into the Oamaru GXP will also require upgrading within the planning period. The following options (and combinations of these) have been assessed:

- Thermally upgrade the conductors on the two single circuit lines supplying Oamaru.
- Build a new substation at Glenavy.
- Build a new 110 kV line between Transpowers' Livingstone and Oamaru Substations. Transpower will not consider this option if the Holcim Development does not proceed.
- Install a 30MVAr capacitor bank at Oamaru to remove the voltage constraint.
- Build a new GXP at Livingstone Substation.
- Upgrade the capacity of the existing Lake Waitaki GXP
- Build a new 33kV GXP at the existing Black Point site.
- Build 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.

In a previous AMP it was reported that an investigation into the various options had been done that concluded that the best long term option was to build a new GXP supplied from the 220 kV grid at Livingstone. This option would effectively enable any new load to be supplied from this GXP.

Since then Transpower has completed a Solution Study Report that included design sufficient for pricing this option. The end result was that the price for this option ended up being too high, and it would have increased costs to consumers that would be unacceptable.

NWL has now commenced on the design of an option to upgrade the capacity at the Lake Waitaki GXP and to build a new 66 kV line down the valley that would initially operate at 33 kV. This development will enable load to be shifted from the Oamaru GXP on to Waitaki GXP. This estimated cost to upgrade the GXP to a dual transformer 24 MVA GXP has been estimated at $3 million and is significantly less than the Livingstone option.

Waitaki GXP – The Waitaki GXP is an ***N*** security GXP with one 5 MVA transformer. The transformer is supplied from the Waitaki Power Station 11kV Generator bus. During planned maintenance of the transformer or when switching the transformer from one generator bus to the other the load normally supplied from this GXP must be switched on to the Twizel GXP.

The GXP will not be able to meet the forecast load within the planning period, as more irrigation developments occur. In October 2013 The Haka Irrigation Company applied to connect a new 2.8 MVA irrigation scheme, which will initially operate at 2.3 MVA. The scheme is now scheduled to be commissioned in February 2015. This single development will result in the peak load exceeding the capacity of the existing Waitaki GXP. It will not be possible to

shift sufficient load off Waitaki and on to the Twizel GXP given the size of the load, the distance, and the subtransmission voltage (33 kV) involved.

As discussed above, NWL has concluded that an upgrade of the Waitaki GXP is the best option for meeting load growth east of this GXP by enabling load to be shifted off the transmission constrained (voltage constrained) Oamaru GXP. This along with the Haka Irrigation Scheme means that the upgrade of this GXP needs to be done as soon as practical.

NWL is a developing a dual transformer 24 MVA GXP supplied from the Waitaki 11 KV generator buses. The GXP will be upgraded in two stages with one transformer in Stage 1 and the second one in Stage 2. The timing of Stage 2 shall be dependent on load growth. Transpower have agreed with this proposal. It has also been agreed that NWL will design and build the works. Design is underway and major items of equipment have been procured. Stage 1 of this project is scheduled to be completed in September 2015. An additional benefit on completion of Stage 1 will be that NWL will be able to shift the entire load supplied from the Twizel GXP on to the Waitaki GXP, which will reduce the NWL portion of transmission costs for the Twizel GXP.

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 the NWL load within the planning period. However, to reduce the NWL portion of the transmission costs for this GXP NWL will shift the entire load on to the Waitaki GXP on completion of the Waitaki GXP upgrade.

Black Point GXP - The Black Point GXP is dedicated to the NOIC Irrigation Scheme, which was commissioned in 2006. NOIC has contracts in place to guarantee its required capacity at this site.

Expansion of Black Point to supply the NWL network was investigated as an alternative to the options to upgrade the capacity into the Oamaru GXP. While this option is cheap, it was found that there is insufficient capacity in the 110 kV network to make this a practical long term option. Transpower have indicated that upgrading the capacity of the 110 kV lines is not economic and would be unlikely to get regulatory approval.

5.8.3 Sub-transmission Development

The 33kV sub-transmission network that emanates from the NWL 33kV Switching Station at Weston 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.

The subtransmission developments described in the previous AMP were based on a new 66 kV GXP at Livingstone that would initially operate at 33 kV. For the reasons described in the previous section this option has been abandoned and instead the Waitaki GXP will be upgraded to provide more capacity and security.

However, the subtransmission strategy remains the same, which is to build a new 66 kV line between Kurow and Duntroon Substations, which will initially operate at 33 kV, and then build a 66 kV ring between Duntroon, Ngapara, and a new Awamoko Substation.

Since the last AMP, NWL has changed the proposed order of the individual projects that form this strategy. In the 2016 year the 66 kV line between Kurow and Duntroon Substations will be completed (no change from the last AMP), enabling up to 5 MW of load to be shifted off the Oamaru GXP and onto the Waitaki GXP. This will resolve the transmission constraint into the Oamaru GXP until 2019 under the high growth demand forecast and 2022 under the expected forecast.

The following table lists the sub-transmission projects:

Project	Driver	FYE	Budgeted Cost k$
66kV Line –Kurow – Duntroon Stage 2	System Growth	2016	2,200
Kurow Zone Substation Stage 2	System Growth	2016	920
33kV Line Weston – Five Forks	System Growth	2017	1,500
Five Forks Zone Substation	System Growth	2017	1,700
66kV Line Ngapara - Awamoko	System Growth	2018	1,680
Awamoko Zone Substation	System Growth	2018	1,700
Otekaieke Zone Substation	System Growth	2019	1,700
66kV Line Duntroon Awamoko	System Growth	2020	2,320
Reinsulate Ngapara – Duntroon Line for 66 kV operation	System Growth	2020	350
66/33 transformers at Kurow and Duntroon Substations	System Growth	2020	1,680
66/33 transformers at Awamoko and Ngapara Substations	System Growth	2020	1,680
Upgrade Pukeuri Substation to Dual Transformers	Reliability, Safety, & Environment	2021	1,075

Table of Sub-transmission Projects

66kV Line Kurow – Duntroon

This project involves building a 66 kV line down the valley between Kurow and Duntroon zone substations that will initially operate at 33 kV. This line will initially enable the load supplied from Duntroon Substation to be transferred from the transmission constrained Oamaru GXP onto the upgraded Waitaki GXP.

In time, this line plus others will be converted for 66 kV operation, which will enable more load to be transferred off the Oamaru GXP and on to Waitaki.

In the first few years of the 10 year planning period, there is forecasted to be irrigation driven load growth in the area between Kurow and Black Point (east of Duntroon), and the lower Waitaki Plains area.

This project is scheduled for the 2015/16 financial year.

Kurow Substation Upgrade Stage 2

The Kurow Substation has been upgraded in the last financial year with the installation of a network spare 10/15 MVA transformer, in addition to the existing two 2 MVA transformers. This was done to provide sufficient capacity for the new Haka irrigation scheme that was scheduled to be commissioned in 2014, but now scheduled for February/March 2015. The nearest substation is 30 km away and cannot supply the forecast load on Kurow if the 15 MVA transformer were to fail. For this reason a 10/12 MVA transformer (ex Redcastle) will be installed in place of the two 2 MVA transformers to provide full N-1 capacity at this site. The two 2 MVA transformers which have an unusual vector group (Dzn0) will then be free to be reused elsewhere on the network, such as for large farm supplies or at the remote Otematata Substation which does not tie at 11 kV to other zone substations.

New Five Forks Substation

In September 2014 the North Otago Irrigation Company (NOIC) issued a prospectus for farmers in the Kakanui Valley and environs to take up shares in a proposed extension of their irrigation scheme. The uptake was better than predicted and this extension will now proceed. While the details of the pump stations and hence ultimate load have not been finalised (NWL expects to be discussing this with NOIC in February/March 2015), based on preliminary discussions with NOIC a new substation in the Five Forks area will be required for the summer of 2016/17 to supply this new load.

33kV Five Forks Line

This 15km line will be required to supply the new Five Forks Substation described above. An alternative option which is in the early stages of being investigated is to supply the Five Forks Substation from two new lines, one from each of the existing Enfield and Maheno Substations. This latter configuration would create a subtransmission ring which would provide more security and simplify maintenance on any section of the ring.

Awamoko Substation and 66 kV Ngapara – Awamoko Line

The load on each of the Papakaio and Duntroon single transformer 7 MVA substations now exceeds 5 MW at peak times. There is not much spare capacity on these two substations. Also, 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. For these reasons NWL will build a new substation in the Awamoko – Peebles area and a 66 kV line to it from Ngapara that will initially operate at 33 kV. This substation will reduce the demand on the Papakaio and Duntroon Substations as well as provide contingent capacity for these two substations, especially for the failure of one of these zone substation transformers. The 66 kV line supplying it is ultimately 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.

Otekaieke Zone Substation

The distance between the Kurow and Duntroon substations is 30 km. The load between these substations is forecasted to grow due to new irrigation developments and existing border dyke irrigation converting to spray. At least one new substation will be required between Kurow and Duntroon during the planning period. The exact number and location will be resolved before the publication of the next AMP. In the meantime the AMP allows for one being built in the 2019 year, nominally in the Otekaieke area.

Reinsulate the Ngapara – Duntroon Line for 66kV Operation

This project, in conjunction with 66/33 kV autotransformers at Kurow, Duntroon, and Ngapara substations will enable Ngapara Substation to be supplied from the Waitaki GXP. 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.

66 kV Line Duntroon - Awamoko

This project along with the new substation at Awamoko will service the load growth in the Lower Waitaki plains area. This project will enable the new Awamoko Substation to be supplied from the upgraded Waitaki GXP.

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, which in turn will enable the Oamaru GXP to operate within the present transmission constraints.

Upgrade Pukeuri Substation to Dual Transformers

Pukeuri Substation supplies NWL's second largest customer, Alliance Pukeuri Freezing Works, on one 33/11 kV 10/12 MVA transformer. The substation load is approximately 8MVA.

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.

NWL has 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.

5.8.4 Distribution Development

Development of the distribution network has been driven by load growth and new connections in the past decade. This growth is a result of dairy conversions and the associated irrigation. 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 age replacement work. Commentary on this work can be found in the Life Cycle Management Section 6 of this document.

The following table lists the major distribution development projects:

Project	Driver	FYE	Budgeted Cost k$
Arc Flash Protection (One Substation per year)	Reliability, Safety, & Environment	2014-	~60 p.a.
Pole Replacements	Asset Replacement & Renewal	2014 -	500 p.a.
Optic Fibre Rollout to Oamaru Zone Substations	Reliability, Safety, and Environment	2015	250
Develop two new feeders out of Pukeuri Substation	Reliability, Safety, and Environment	2016	150
Rebuild Five Forks Feeder along Kakanui Valley Road	System Growth	2017	245
Upgrade and extend Windsor Feeder to Peaks Rd	System Growth	2017	205
Rebuild Tapui/Fuchsia Creek 11kV	Asset Replacement & Renewal	2017	450
Radio Link Upgrade	Reliability, Safety, & Environment	2018	603
Extend Five Forks Feeder to Peaks Rd	Reliability, Safety, & Environment	2019	160
Upgrade and extend Ngapara Feeder to Peaks Rd	Reliability, Safety, & Environment	2019	270
11kV Feeder Extension Arundel St. – Foyle St.	Reliability, Safety, & Environment	2019	300

Arc Flash Protection

This project involves installing arc flash protection on the indoor zone substation circuit breakers, doing one zone substation per year. This project along with the inert gas fire system that is being installed this year at all of the urban substations will limit the damage caused by the high impact low probability event of an indoor switchgear fault.

Pole Replacements

This project involves replacing existing poles that are found by inspection to be unsafe or unfit for purpose. The bulk of the 11 kV overhead network was installed between 1960 and 1987. There is now a large population of timber poles greater than 25 years old. Underground inspections are identifying an increasing number of poles that are rotten, especially below ground level. This project will replace these poles as they are found as part of the annual line inspection programme. The budget for this project is $500,000 per year.

Red tag pole replacements are now a lead safety indicator that is reported monthly to the Board.

Optic Fibre Rollout to the Oamaru Zone Substations

NWL owns a section of trunk fibre that goes past or near some of its zone substations. This project involves rolling out fibre to Weston, Chelmer, Redcastle, Pukeuri, Papakaio, and Hampden Substations over a two year period. This project will enable:

- A communications path for the zone substation information units that are being installed. These devices will provide time synchronised data from the protection relays (and potentially other devices in future) across the various sites using GPS clocked time synchronisation.
- An alternative communications path for substation remote control and data monitoring. 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.
- A back haul communications path for advanced meters.
- The potential for 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.

Develop Two New Feeders out of Pukeuri Substation

The existing feeders supplying the load in the environs of Pukeuri have a large number of customers fed from them, and there is little available capacity to supply the load following outages. This does not meet the reliability and security criteria respectively. Developing two new feeders from the Pukeuri Substation will fix both these issues.

Rebuild the Five Forks Feeder along Kakanui Valley Road

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 (a mixture of Swan and Silmalec) 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:

- Ensure the short term load growth can be supplied.
- Enable the Five Forks feeder to be interconnected to the Ngapara feeder at a later date by building 2.5 km of new line, which will increase security to both feeders.
- When the load growth warrants building a new zone substation in the Five Forks area, the proposed tie to the Ngapara feeder could be used to provide contingent capacity for the outage of either the new zone substation or the existing Enfield Substation.

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.

Rebuild the Tapui/Fuchsia Creek 11 kV lines

This project involves rebuilding the lines in the Fuchsia Creek area. The full extent of the work required has not been finalised. The budgeted figure of $450,000 is based on a full rebuild of the line. There is the possibility that when the work is fully scoped, that less work will be required.

Radio Link Upgrade

This project involves replacing the existing analogue radio system with digital radios. There is little remaining capacity on the existing radio system. This project in conjunction with the fibre rollout will have similar benefits to those discussed under the fibre rollout project, plus it will enable the monitoring and control of more remote rural devices such as reclosers and voltage regulators. This project will commence in 2016 and go through until 2018.

Extend the Five Forks Feeder to Peaks Road

This project involves extending the Five Forks Feeder (supplied from Enfield Substation) from Tunnel Road to Peaks Road. This project will provide increased reliability and security as described in the above project.

Upgrade and Extend the Ngapara Feeder to Peaks Road

This project involves upgrading and extending the Ngapara Feeder (from Enfield Substation) down Peaks Road. This project will increase reliability and security to the customers in the Windsor/Victoria Hills Road area. This project in conjunction with the other projects described above which also reinforce feeders into this area, will provide increased reliability

and security between three existing feeders, two existing substations and the new Five Forks Substation once it is built.

11 kV Feeder Extension Arundel St. – Foyle St.

This project involves extending the Woollen Mills Feeder (supplied from Redcastle Substation) from Arundel Street to Foyle Street. This purpose of this project is to improve reliability and security to a section of the commercial area at the North end of Oamaru. The project will provide an additional power source into Foyle Street. It will also provide another path for transferring load between the two main urban substations, Chelmer and Redcastle substations.

5.8.5 Other Non-Network Developments

Load Control Scheme

NWL has installed ripple relays on irrigation pump loads greater than 30 kVA to enable irrigation load to be shed when the capacity at the Oamaru GXP is exceeded. NWL views this as a short term project to provide security to the load supplied from this GXP, until the transmission capacity issues are resolved.

5.8.6 Capital Expenditure Plan

Capital expenditure forecasts for the planning period can be found in the following table.

FORECAST EXPENDITURE ($000)											
Capital	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**
Consumer connection	505	520	505	505	505	405	405	305	235	235	235
System growth	5,419	4,905	1,900	880	3,017	430	1,760	1,760	1,210	1,210	1,210
Asset replacement and renewal	946	1,174	1,495	1,085	1,085	1,085	1,085	1,085	1,085	1,085	1,085
Asset relocations	0	0	0	0	0	0	0	0	0	0	0
Reliability, safety and environment	1,893	903	837	490	1,119	807	822	162	162	162	162
Expenditure on network assets	**$ 8,762**	**$ 7,502**	**$ 4,737**	**$ 2,960**	**$ 5,726**	**$ 2,727**	**$ 4,072**	**$ 3,312**	**$ 2,692**	**$ 2,692**	**$ 2,692**
Non-network assets	1,246	2,512	4,620	2,160	1,494	1,465					
Expenditure assets	**$ 10,008**	**$ 10,014**	**$ 9,357**	**$ 5,120**	**$ 7,220**	**$ 4,192**	**$ 4,072**	**$ 3,312**	**$ 2,692**	**$ 2,692**	**$ 2,692**

5.9 Embedded Generation Policies

5.9.1 Embedded Generation

Distributed Generation (DG) is 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. Its output is generally able to be totally

consumed within the distribution network and therefore export only occurs in rare circumstances where the summated output of several DG schemes may exceed the minimum base load presented to the GXP.

NWL's approach to DG is based on the following key principles:

- Distributed generation will be able to connect to NWL's electricity distribution network on fair and equitable terms which do not discriminate between different DG schemes.
- NWL will make the terms under which DG can connect and operate as clear and straight forward as possible, within the limitations of the relevant legislation and NWL's mission to operate a safe, reliable, and efficient distribution system.

5.9.2 The History of DG in NWL's Area of Supply

As at 15 February 2015, there were twenty six DG schemes connected on to the NWL network. There are two mini hydro schemes of 30 kW and 20 kW. The rest of the schemes are primarily 3-5 kW roof top PV schemes. This demonstrates in a real way, NWL's commitment to the establishment of consumer driven DG within its network.

NWL has also investigated other DG opportunities. These include small scale wind farms, hydro integrated with irrigation development, and solar water heating integrated with a CBD district heating scheme as a demand side energy efficiency innovation. Progress to date includes resource mapping, feasibility studies for specific opportunities, the development of a Landowner Agreement, and associated policies for royalty payments and land use. Two EECA grants have been obtained to facilitate feasibility studies. These first time projects are also subject to a number of RMA, Water Plan and District Plan consenting issues that have not been tested before. None of the options being investigated would provide secure base load generation and other options were not economically viable. and hence could not be regarded as alternative solutions to network development at this point in time.

5.9.3 Policies for Connecting Distributed Generation

In the context of the philosophy discussed in Section 5.6.3, 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 customers under the customer section of the NWL website. NWL also uses the EEA produced 'Technical Guidelines on Connection of Generation'.

The first of NWL's three policy documents details the regulatory requirements for the connection of distributed generation. The other two documents outline NWL's specific requirements, and include the necessary application forms, for connecting DG. One of these documents outlines the requirements for small DG schemes with capacities less than 10 kW, the other for schemes greater than 10 kW.

These policy documents specify the general procedures for applying for, installing, operating, and maintaining DG. Specific requirements of the policy documents include:

- Health and safety requirements
- Technical requirements
- Operating requirements
- Commercial requirements
- Other regulatory requirements relating to district or regional consents
- Generation density limitations on the network
- Change of ownership / occupancy requirements
- Confidentiality of information relating to the DG scheme
- Costs and Fees
- The connection process – a step by step guide including the timeframes for each step and each party

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.

5.9.4 The Effect of Distributed Generation on Network Development Planning

NWL considers 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. Secondly, DG is considered as an alternative to conventional network solutions for each project in the network development plan.

5.10 Non-Network Solutions

5.10.1 Demand Reduction

NWL makes extensive use of its 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. NWL has just completed a project to install 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 utilise peak period energy and are not suitable for a controlled load applications. In addition the use of heat pumps to provide cooling during the summer months is exacerbating the already rapid growth of summer load.

5.10.2 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).

6 Lifecycle Asset Management Planning

6.1 Key Drivers and Assumptions

NWL's life cycle expenditure falls into four categories:

- Routine and Corrective Maintenance
- Asset Replacement and Renewal Maintenance
- Service Interruptions and Emergencies
- Capital Replacement

Routine and Corrective Maintenance and Inspection

NWL operates a time based inspection and preventative maintenance programme, where all assets are regularly inspected to identify defects that require repair. The frequency of inspections varies for each of the different asset classes as per the following table.

Asset Class	Inspection Regime	Frequency
33 kV Subtransmission Lines (including pole mounted switchgear)	Ground Patrols Climbing Patrols	Yearly 3 Yearly
Distribution Lines (including pole mounted switchgear)	Ground Patrols	5 Yearly
Distribution Transformers	Ground Patrols MDI Readings Earth Testing	5 Yearly Yearly 5 Yearly
Ground Mounted Switchgear	Partial Discharge Testing	3 Yearly
Voltage Regulators	Ground Patrols	5 Yearly
Substations	General Inspection of Buildings, Grounds, and Equipment	Quarterly
Zone Substation Transformers	Dissolved Gas Analysis OLTC Overhaul Oil Processing	Yearly 1 to 2 per year 1 per year
Indoor 11 kV Switchboards	Partial Discharge Testing Trip Testing on older equipment (>25 years old)	Yearly Yearly
SCADA and Communications	Inspection and Testing	Yearly
Vegetation management	Subtransmission Lines Distribution Lines	2 Yearly 2 Yearly

The results of the routine inspection and tests are assessed for each asset on the basis of safety, criticality, serviceability, performance, economic viability, and the environmental consequences of failure to justify the maintenance expenditure.

In the 2017 year Network Waitaki will introduce the inspection of LV service fuse pillars.

Asset Replacement and Renewal Maintenance

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.

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 3 months.

All other condition based defects are logged on a paper based system. This system is in the process of being replaced with a computer based asset management system. Once this system is in place it will enable better analysis of asset condition trends across both individual assets and classes of assets.

The paper based condition assessments are analysed and maintenance is then scheduled based on the priority assigned during the inspections plus any follow up investigations resulting from the analysis of the initial assessments.

Service Interruptions and Emergencies

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.

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. The other major drivers for replacement which may override the most economic course of action are where, the risk and consequences of failure of an asset warrant replacement, and where the performance of the asset is likely to be poor following repairs.

The actual level of asset replacement is determined by age and condition assessment, with greater emphasis on condition. However, for planning purposes NWL determines the expected level of asset renewal in each specific asset group by the population age profile. This analysis is based on assessment of asset survival with ageing compared to installation profile. This provides an accurate average life expectancy (which can vary from ODV standard life), the rate at which the population declines (the deviation from average life expectancy), and the residual quantity that remains as a result of maintenance extending life.

Asset economic performance decline is not linear with age. New assets tend to have very low maintenance requirements. This performance roll off normally displays as a pronounced knee in the survival curve as maintenance becomes less economically attractive compared to replacement, and correspondingly, the probability of failure of any individual asset increases exponentially.

Detail of the maintenance by asset class, plus any current issues, is described in the following subsections.

6.1.1 Routine inspection and corrective maintenance

This section describes the routine inspections and corrective maintenance required by asset class. Expenditure forecasts are presented in Section 6.4.

6.1.2 33kV Subtransmission Lines

The 33 kV subtransmission assets are critical assets in that a component failure on this network can have a significant impact on system reliability as measured by the SAIDI and SAIFI indices, as large numbers of customers will be affected. Hence these assets are subject to more frequent inspections than the lower voltage distribution assets. 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.

Following a 33 kV line fault, the affected line segment gets a day time ground patrol following faults where a cause was not identified during the fault restoration process.

A pole top climbing patrol is undertaken on a 3 year cycle. These inspections are used to identify the need for below ground and pole strength testing which in turn determine the need for replacement.

NWL has recently commenced using a wood pole scanner as part of its below ground inspection regime, in addition to traditional methods such aural/hammer tests. Increased budget has been provisioned to establish pole scanning and residual strength recording of the 33kV lines.

NWL has also stopped the installation of all timber softwood poles, and hard wood poles in most situations, in favour of pre-stressed concrete poles. When used, new timber poles are scanned after purchase to flag poles that do not meet specification.

Maintenance Plan Inputs:

Ground Patrols	1187 units
Ground Patrols (after faults)	250
Climbing Patrols	402
Pole Replacements	12

6.1.3 Zone Substation Transformers

The need for maintenance on zone substation transformers and their tap changers is determined by trend monitoring of Dissolved Gas Analysis.

Maintenance Plan Inputs:

Annual DGA sampling	All Zone Transformers
Tap Changer Overhaul	2 per year
Oil Processing	1 per year

NWL has carried out a number of tests of the four IMP 33/11 kV transformers on its network. While we have two more tests to do, our inspections to date of the tap changers have found excessive corrosion of the contacts and the four tap changers are programmed to be replaced over the next two financial years. The radiators on these transformers are also rusting excessively, internally as well externally. The radiators will also be replaced over the next two financial years.

6.1.4 Indoor Substation Switchboards

Partial Discharge Testing is employed on an annual basis to determine the need for circuit breaker 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 tripping dependent on load being broken. This is unplanned reactive maintenance.

Maintenance Plan Inputs:

Partial Discharge Testing (PDT)	All Substations
Circuit Breaker (CB) maintenance	20 per year

6.1.5 11kV Overhead Lines

All NWL 11kV distribution lines and consumers 11kV service 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 and for line retightening 2 years after the line is built.

Approximately 18% of NWL's total annual maintenance budget is currently spent on tree trimming (all lines, not just 11kV). 29% of this budget secures contracted management personnel dedicated to the task.

A program of formal service line handover to landowners has been completed. This involved undertaking an inspection, ensuring assets were in sufficient condition to stay compliant for at least 5 years, and providing drawings of ownership demarcations.

Maintenance Plan Inputs:

Ground Patrols	5182 pole units
Ground Patrols (after faults)	600
Pole Replacements	120

6.1.6 Distribution Substations

NWL manages the other assets associated with distribution substations as an integral part of the transformer installation. If an LV switchboard is required this is located in the LV cubicle of the minisub style enclosure that is standard for ground mounted transformers. HV switchgear is managed as a distinct category of asset.

Maintenance Plan Inputs:

Maintenance actions are restricted to:

- 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 5 year cycle (for regulatory compliance purposes).

6.1.7 11kV Oil Filled Ground Mount Switchgear and RMUs

The 11 kV ground mount 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, NWL has commenced a programme for all oil filled ground mount switchgear greater than five years old; to test and replace the oil, clean out any contaminants and sludge in the tank, check the mechanism, and test the resistance of the contacts and fuses. NWL has also issued a policy of not operating these units live until this work is completed. This work is scheduled to be completed in the 2016 year. This will have a detrimental impact on the switching capability of the network, and may also impact on the SAIDI figures.

6.1.8 LV Distribution Lines and Cables

LV faults generally only affect a few consumers and therefore do not impact overall performance so heavily. Decommissioning of the water heating pilot control system has been completed. LV fault stats are not required to be disclosed for regulatory purposes but they are kept on the Faults data base.

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.

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.

Maintenance Plan Inputs:

Ground Patrols	851 units
Pole Replacements	15
Underground Inspections	5

6.1.9 SCADA and Communications

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

6.1.10 Load Control Plant

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

6.2 Asset Replacement and Renewal

6.2.1 Policies and Processes

Assets that aren't upgraded for capacity or enhanced service requirements will eventually reach an age where their continued performance drops below service thresholds and they will need to be replaced, although that deterioration can be delayed by appropriate maintenance. With critical assets the objective is to predict their failure and replace them before supply disruption occurs. Less critical assets, such as service fuses, may be left to fail

while in service if this is the most economic course of action. However, budgeting still requires an assessment of the expected quantity of failures per year.

Whether an asset is replaced or has its life extended with some form of refurbishment is also a matter of economic analysis.

The maintenance regime applied to assets not only impacts on longevity but may also be required to ensure that assets provide acceptable performance through to the end of their economic life. The level of maintenance and the cost-benefit is dependent on the asset type and its criticality to the overall performance of the network.

NWL determines the expected level of asset renewal in each specific asset group by the population age profile. This analysis is based on assessment of asset survival with ageing compared to installation profile. This provides an accurate average life expectancy (which can vary from ODV standard life), the rate at which the population declines (the deviation from average life expectancy), and the residual quantity that remains as a result of maintenance extending life.

Asset economic performance decline is not linear with age. New assets tend to have very low maintenance requirements. This performance roll off normally displays as a pronounced knee in the survival curve as maintenance becomes less economically attractive compared to replacement, and correspondingly, the probability of failure of any individual asset increases exponentially.

Once the expected quantity of replacement or maintenance has been determined for an asset population, condition assessment programmes are used to target the specific assets that need attention and the time frame in which this will need to occur.

A further consideration that is included in the preparation of work programmes is efficiency of total asset renewal verses spot replacement of components e.g. the rebuild of an entire line versus the spot replacement of substandard poles. At some threshold it is more cost effective to bring total renewal forward.

NWL's current program of capacity and security upgrades associated with load growth and development is forecast to decline by 2020. However, this is dependent on the timing of major irrigation and industrial developments. Accordingly fewer assets will be renewed as a consequence of capacity upgrades, and existing asset populations will be closer to the knee point in their performance curve. NWL therefore plans to shift its capital expenditure program from growth related upgrades to steady state levels of asset renewal.

These programs will target asset populations that have peaky installation profiles and are close to the end of their economic service life. That is, their replacement will be smoothed out over a longer period than their original installation. Further targeting will apply other objectives, e.g., eliminating certain components with inferior performance.

6.3 Replacement and Renewal Projects

This section summarises the major upcoming replacement and renewal projects currently underway or planned for first five years of the planning period. The financial budget for all asset replacement and renewal work is included in Section 6.4.

Pole Replacements
NWL is replacing poles where their condition compromises their integrity, poses a safety risk to staff, contractors, or the public, or where it is not economic to repair the pole. Typical examples of these conditions include rotten timber poles (in particular below ground), and spalling concrete poles.

Distribution Transformer Replacements
NWL has a large portion of older distribution transformers. These typically have a low failure rate. Hence, NWL is replacing these older distribution transformers on failure or in association with other planned work.

IMP transformer tap changer and radiators
While the age of the four IMP transformers on the network is not very old, the conditions of the tap changers and radiators have been found to be defective. The tap changers and radiators are planned to be replaced in the 2015 and 2016 years.

Tapui and Fuchsia Creek Rebuild
The condition of the Five Forks Feeder in the Tapui and Fuchsia creek areas has been identified as being more economic to replace than to repair. The rebuild of these sections is planned for 2016. More analysis is required to determine the extent of the work required, and to firm up the cost estimates.

6.4 Total Maintenance and Asset Renewal Expenditure Forecast

The following tables show the life cycle expenditure for maintenance driven work as per the Commerce Commission categories.

Expenditure Type	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Routine & corrective maintenance	513,275	521,479	534,479	530,479	538,479	530,479	538,479	530,479	534,479	526,479	534,479
Asset replacement & renewal Maintenance	968,000	860,021	860,021	860,021	860,021	860,021	860,021	860,021	860,021	860,021	860,021
Vegetation Management	250,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000
Service Interruptions & emergencies	257,090	227,800	227,800	227,800	227,800	227,800	227,800	227,800	227,800	227,800	227,800
Subtotal - Operational Expenditure	**1,988,365**	**1,903,300**	**1,916,300**	**1,912,300**	**1,920,300**	**1,912,300**	**1,920,300**	**1,912,300**	**1,916,300**	**1,908,300**	**1,916,300**
Capital Asset Renewal	945,956	1,174,000	1,495,000	1,085,000	1,085,000	1,085,000	1,085,000	1,085,000	1,085,000	1,085,000	1,085,000
Total Maintenance Driven Expenditure	**2,934,321**	**3,077,300**	**3,411,300**	**2,997,300**	**3,005,300**	**2,997,300**	**3,005,300**	**2,997,300**	**3,001,300**	**2,993,300**	**3,001,300**

Maintenance as per Commerce Commission Category for Life Cycle Expenditure

Routine and Corrective Maintenance	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Subtransmission lines	54,500	44,045	44,045	44,045	44,045	44,045	44,045	44,045	44,045	44,045	44,045
Zone substations	127,000	144,829	144,829	144,829	144,829	144,829	144,829	144,829	144,829	144,829	144,829
Zone Sub. Transformers	48,000	48,000	56,000	52,000	60,000	52,000	60,000	52,000	56,000	48,000	56,000
Switchgear	53,500	52,012	52,012	52,012	52,012	52,012	52,012	52,012	52,012	52,012	52,012
Distribution transformers	50,000	44,490	44,490	44,490	44,490	44,490	44,490	44,490	44,490	44,490	44,490
11kV distribution lines and cables	120,500	85,306	85,306	85,306	85,306	85,306	85,306	85,306	85,306	85,306	85,306
LV distribution lines and cables	4,275	11,363	11,363	11,363	11,363	11,363	11,363	11,363	11,363	11,363	11,363
Service connections	19,000	54,935	59,935	59,935	59,935	59,935	59,935	59,935	59,935	59,935	59,935
SCADA & communications	26,500	26,500	26,500	26,500	26,500	26,500	26,500	26,500	26,500	26,500	26,500
Load management	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Sub Total	**513,275**	**521,479**	**534,479**	**530,479**	**538,479**	**530,479**	**538,479**	**530,479**	**534,479**	**526,479**	**534,479**

Routine and Corrective Maintenance and Inspection by Asset Class for the 10 year planning period

Vegetation Management	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Sub Total	**250,000**	**294,000**	**294,000**	**294,000**	**294,000**	**294,000**	**294,000**	**294,000**	**294,000**	**294,000**	**294,000**

Vegetation Management for the 10 year planning period

Asset Replacement & Renewal Maintenance	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Subtransmission lines	68,000	62,286	62,286	62,286	62,286	62,286	62,286	62,286	62,286	62,286	62,286
Zone Sub. Transformers	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000	270,000
Distribution transformers	30,000	29,449	29,449	29,449	29,449	29,449	29,449	29,449	29,449	29,449	29,449
11kV distribution lines and cables	445,000	320,327	320,327	320,327	320,327	320,327	320,327	320,327	320,327	320,327	320,327
LV distribution lines and cables	150,000	133,469	133,469	133,469	133,469	133,469	133,469	133,469	133,469	133,469	133,469
Service connections	5,000	4,449	4,449	4,449	4,449	4,449	4,449	4,449	4,449	4,449	4,449
Sub Total	**968,000**	**819,980**	**819,980**	**819,980**	**819,980**	**819,980**	**819,980**	**819,980**	**819,980**	**819,980**	**819,980**

Renewal Maintenance by Asset Class for the 10 year planning period

Capital - Asset Replacement & Renewal	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Subtransmission lines	50,000	60,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Zone substations	0	24,000	0	0	0	0	0	0	0	0	0
Distribution Switchgear	80,000	90,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
Distribution transformers	192,000	150,000	180,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000	120,000
11kV distribution lines and cables	581,956	770,000	1,100,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000	750,000
LV distribution lines and cables	30,000	80,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000
Load management	12,000	0	0	0	0	0	0	0	0	0	0
Sub Total	**945,956**	**1,174,000**	**1,495,000**	**1,085,000**	**1,085,000**	**1,085,000**	**1,085,000**	**1,085,000**	**1,085,000**	**1,085,000**	**1,085,000**

Asset Replacement by Asset Class for the 10 year planning period

7 Non-network Development, Maintenance and Renewal

7.1 A Description of Non-network Assets

IT systems

Network Waitaki's IT systems are based around 3 key platforms:

1. TechnologyOne integrated platform that will be used for all asset management, works management and financial reporting (which includes standard modules for payroll, stores, accounts etc). The system is being installed at the time of writing with a "go-live" date planned for 1 April 2015. It performs a number of functions including Financials, Payroll, Contracting, Works Orders, Fleet Management, Billing, Project Management, Reporting and Business Intelligence.
2. Intergraph G Technology GIS which is used as the primary data repository for electricity distribution asset data.
3. Microsoft CRM database for managing ICP data including registry obligations, billing history etc.

Asset (hardware) book value, as at 31st March 2014 was approximately, $58,000 and at 31st March 2015 is forecast to be $152,000.

Asset (software) book value, as at 31st March 2014 was approximately $326,000 and at 31st March 2015 is forecast to be $750,000.

7.2 Development, Maintenance and Renewal Policies for Non-network Assets

IT systems

Network Waitaki has the following replacement policies for IT systems:

- 3 years for desk-top PCs
- 3 years for lap-tops and tablets
- 2 years for cellphones
- Printers, copiers etc, on a 4 year lease.
- Major IT systems upgrades such as TechnologyOne, G/Technology GIS are usually annually.
- Maintenance is minimal for this type of asset with maintenance expenditure relating to the costs associated with service level agreements for the major IT systems.

Network Waitaki has a 5 year plan in place to replace and/or renew all of the companys major IT assets. These items are listed below.

- TechnologyOne Enterprise Asset Management System (OneEnergy)
- New Data Centre
- PABX Replacement
- GIS Upgrade
- Data Storage
- Network Switch Replacement
- Data Cabling and Fibre upgrade
- Server Replacement
- UPS Replacement

7.3 Capital Expenditure Projects for Non-network Assets

Network Waitaki's non-network capex forecasts are as follows ($000 real): These include asset renewal expenditure.

Category	2015	2016	2017	2018	2019	2020
TechnologyOne Enterprise Asset Management System (OneEnergy)	910	250	100	200	100	100
New Data Centre	0	0	400	0	0	0
PABX Replacement	0	55	0	0	0	0
Data Storage	0	0	50	50	0	0
GIS Upgrade	50	30	0	0	200	0

7.4 Maintenance and Renewal Projects for Non-network Assets

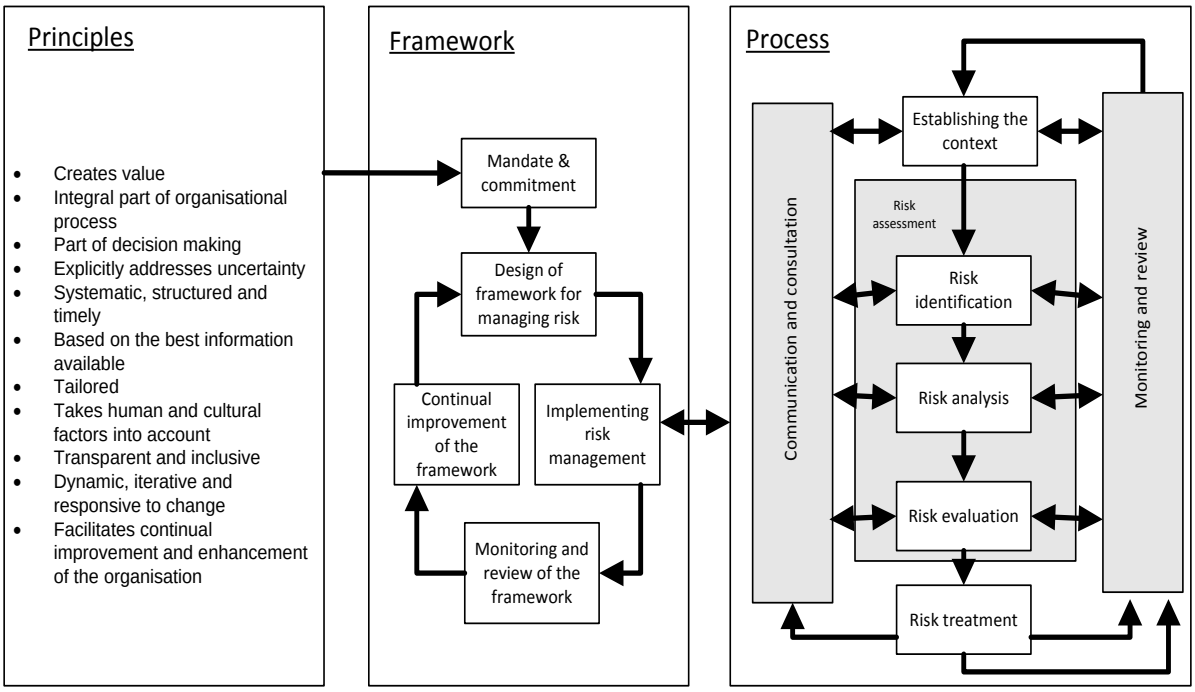
Network Waitaki's non-network maintenance forecasts are as follows ($000):

Category	2015	2016	2017	2018	2019	2020
Network Switch Replacement/Data cabling/Fibre Upgrade	35	30	45	35	35	35
Server Replacement	10	20	50	50	60	60
Desktop and Laptop Replacement	35	30	45	50	40	50
Tablets Renewal/Replacement	5	15	15	15	15	15
Cellphones Replacement	5	20	15	20	15	20
UPS Replacement			50			

8 Risk Management

8.1 Risk Methods & Conclusions

NWL adopts a systematic network risk management process, based on ISO 31000 - Risk Management Standard, to identify and record all significant and known risks to the network. The Standard sets out the following high-level risk management framework:



Identified risks are analysed in a risk model, which is a matrix of probability and weighted impact, to determine priority and establish the expenditure level that can be reasonably applied to eliminating or mitigating risk.

Risk is managed at the executive management level of the company i.e. CEO, Finance Manager, Network Manager, and Operations Manager. During 2011 NWL updated its risk management procedures which resulted in a review of documents resulting in the amendment of the following documents that were prepared in 2006:

- Physical Risk Assessment
- Asset Recovery Plan
- Emergency Preparedness Plan
- Business Continuity Plan

These documents are the responsibility of the Operations and Finance Managers and are reviewed on a bi-annual basis. Any risks identified are prioritised using a standard risk/consequence matrix and the top 40 risks are included in the Risk Assessment Plan along with their associated mitigation measures and recommended actions.

The primary risk faced by all EDB's is that of causing harm to members of the public, staff, and contractors who may come into contact with electrical equipment. A large percentage of NWL's ground mounted equipment is housed in earthed metal cabinets that can become alive during system faults. In addition, unauthorised access to equipment can expose the intruder to hazardous voltages, poorly designed fences around zone substations can act as climbing frames providing easy access to the compound.

NWL has a large number of ground mounted metal clad boxes that contain both low voltage and high voltage equipment. NWL policy for new ground mounted equipment requires the installation of equipotential earth loops to control step and touch potentials. However, there are a large number of installations that predate these standards and these are being identified and subjected to a risk assessment to identify if remedial action is required. The use of metal clad low voltage service fuse boxes and distribution boxes has also been discontinued, and all remaining metal clad boxes are being documented and subjected to a 5 year earth test. LV switchgear housed within transformer cabinets or distribution boxes have exposed connections which present a hazard if the front cover is removed. These sites are also being documented and subject to a risk assessment to ascertain if any remedial action is required. The results from these investigations have not impacted on the last review of the Network Risk Assessment document but it is anticipated that some of these installations will pose an unacceptable level of risk and some remedial action will be required.

In early 2012 the EEA issued a safety notice concerning the failure of an oil filled ground mounted switch on another EDB's network which resulted in the operator getting sprayed with hot oil. Following discussions with the manufacturer and a risk assessment, NWL issued a policy that these switches are not to be operated live if they have not been serviced in the last five years. NWL is now carrying out the following maintenance on these units. The oil is tested for its insulation properties and the results recorded. The oil is drained and the inside of the tank inspected for sludge build up in the bottom of the tank, and the mechanism is inspected for any signs of arcing, corrosion, or abnormal wear and tear. The tank and mechanism are cleaned, if and where required, and the oil replaced. For fused switches, the resistance of the fuses is checked and the fuses replaced if they do not meet specification.

Of the units tested so far, NWL has found them to be in good order with no sludge or any abnormal wear of the mechanism. However, for the older units the insulation level of the oil is low, and for this reason this maintenance regime has been extended to all oil filled ground mounted switches where the oil can breathe to the air.

Documented risks also include ice loading due to extreme cold, flooding, subsidence, vehicle impact, landslip, aircraft interference and wind-borne debris. The nature of these risks generally results in their elimination not being practical or economic. Therefore capacity to respond to their impact is the main management tactic.

A number of the identified risks are associated with adverse weather conditions, seismic disturbances, or third party actions. These are discussed in the following section on high impact low probability events.

Solutions for mitigating risks have been identified and contingency plans for events are covered in the Asset Failure and Emergency Preparedness Plans that are also reviewed bi-annually. NWL also maintains an Emergency Response Plan as part of its site of Health and Safety Management documents that documents responses to a wide range of emergency situations.

NWL applies a variety of solutions to manage network orientated risks:

- **Physical Solutions:** Based on standards and quality systems. A stock of critical spares is kept at various locations both within Oamaru and in the upper Waitaki Valley.
- **Contractual:** Contracts provide for minimum resourcing, backup, and fault response
- **Financial:** Contracts with customers and suppliers define liability and performance penalties
- **Insurance:** Limited insurance exists for zone substations and the Oamaru offices. The remainder of the assets are self-insured by NWL.
- **Response Plans:** Contingency plans for responding to major incidents have been prepared and were well tested during the 2006 snow storm. NWL staff and Contractors are provided with copies of the Emergency Preparedness Plan which documents the responses that will be expected from staff and contractors to a specific type of emergency.

8.2 HILP Exposures and Assessments

NWL engaged an independent consultant to carry out risk management studies in 2006 and again in 2010. This work identified the areas in the network that would be exposed in the event of a number of high impact low probability (HILP) events. These events and response plans for them are documented in the companies risk management documents. These included a large earthquake on the alpine fault, a tsunami, storm events (snow, wind, and rain), and a dam failure at Lake Pukaki.

Seismic disturbances such as earthquakes or Tsunami are seen as high consequence but low probability events. An earthquake of between 8.6 and 9.2 magnitude on the Alpine fault would be seen as a 6.2 magnitude earthquake in Oamaru. Given the age and limestone construction of many of the buildings within the Oamaru CBD the level of devastation would be relatively high. However this is predicted as being a 1 in 500 year event and no mitigation measures are warranted. However, NWL has installed seismic restraints on all of its zone substation transformers.

A Tsunami that was 3m or more above the median tide level would have a similar impact to a major earthquake. Oamaru is located on the coast and a Tsunami of this magnitude would

inundate the CBD and most of the surrounding residential areas. NWL's main office and both of the main urban substations could also be subject to flooding. The NWL Emergency Response plan requires the relocation of its operations to the Cape Wanbrow radio repeater station to facilitate full communication and control, in the event of a Tsunami.

The 2006 snowstorm affected areas that were not designated as snow prone areas and resulted in widespread damage and a number of consumers being without power for several days. This event provided a lot of actual information on the resilience of the network. The main strategies for preparing for these type of storm events include maintaining emergency stock of critical items of equipment, maintaining fully fuelled fleet of vehicles at the end of each day, fostering good relations with suppliers and maintaining knowledge of their ability to supply equipment, fostering good relations with other (larger) EDBs, and using local helicopter operators to take contractors to fly the network following an event to sped up the time to get an assessment of the damage. This worked well in the 2006 snow storm event. After these types of events NWL reviews its response to the event and the resilience of its network. This may result in changes to design standards or the list of preferred equipment the company uses.

Severe wind storms appear to be occurring on a more frequent basis, with damage to lines mainly being the result of falling trees or wind-blown debris. Trees that are within falling distance of the lines but are not within the notification zone are not covered by the Tree Management Legislation and are simply a fact of life that all Distributors must live with. One side benefit of the move to dairy farming has been the removal of many old Macrocarpa shelter belts.

While not a problem to date on our network, NWL is aware of situations on other networks where centre pivot irrigators have been picked up in wind storms and caused damage to lines. NWL will consider the need for an advertising campaign advising farmers of methods to restrain their irrigators during storms.

8.3 Risk Mitigation Policies and Practices

8.3.1 Network Capacity

It is NWL policy to provide sufficient capacity to meet customer demands, while maintaining its security of supply criteria and operational flexibility. This policy mitigates against the risk of asset failure due to overloading. To this end, the design of any network expansion or development must take into consideration the projected load growth for the area. In addition, all such upgrading or development work must meet with the NWL capital investment criteria, or be funded wholly or in part by the customer. Security of supply criteria may at times be compromised while network development work is in progress.

8.3.2 Operational Security

It is NWL practice to ensure that the security of the network is sufficient to meet the service levels described in Section 4.2. To achieve this capital investment for network security is evaluated based on the:

- Estimated cost to customers of energy not supplied
- Assessed probability of occurrence and the expected duration of specific events
- Options for reducing the likelihood and/or consequence including network reinforcement, fault reducing strategies (maintenance and replacement) and faster fault response

This practice mitigates against the risk of greater outage duration and frequency, and hence against the risk of not meeting the agreed reliability targets (SAIDI and SAIFI).

8.3.3 Catastrophic Physical Risks

Because external events may impact on whole sub-stations or extended areas of the network, major loss is associated with the catastrophic risks of earthquake, tsunami, landslide, floods or storms.

While significant damage-causing earthquakes have not been recorded in the Oamaru area in living memory the area is exposed to the effect of movement on the South Island Alpine fault. Seismic restraints have been installed on all zone transformers.

Two pole distribution transformer structures in urban areas have been identified as a significant risk, and a program has been undertaken to replace all of these structures with ground mounted transformers. This has been completed for Oamaru and continues in the rural townships.

8.3.4 Transpower Supply Risks

The major Transpower risk identified is the Waitaki River crossing east of SH1, where both 110kV transmission circuits are supported by a single tower located in the river bed. Mitigation therefore consists of Transpower's own contingency plans for this eventuality.

In response to a request by NWL to test its contingency plan, Transpower ran a similated response. The river crossing was re-established in 18 hours via construction of a temporary line across the Waitaki Bridge with poles footed into sand-filled shipping containers.
A second river crossing installed for the Black Point GXP should reduce risk further. It is however noted that this crossing suffered a major failure during its first exposure to snow loading, when NWL's diesel generator was facilitated to maintain critcal supply. As a consequence Transpower has reviewed its design.

8.3.5 Environmental

It is NWL policy to act in an environmentally responsible manner as required under legislation. Contingency plans for environmentally adverse events are documented in the Emergency Preparedness Plan as required by the RMA. The main environmental risks faced by EDB's are:

- Oil containment
- SF_6 (toxic gases are produced when this gas is in direct contact with electric arcs)
- Noise.

Oil is widely used as an insulating and cooling medium in distribution equipment, and replacement of this oil-filled equipment with non-oil-filled types is not anticipated in the short or medium term particularly for transformers. Control of this hazard is maintained through oil containment provisions at zone substations and the routine inspection of all oil filled distributed equipment. The District Plan regulates oil management activity. Oil spill response procedures have been developed and oil spill kits are available at all zone substations, and are carried on contracting line trucks likely to be involved in fault response or maintenance of oil-filled equipment.

NWL does not support the use of SF_6 as an insulating medium in 11kV and 33kV equipment. A number of SF_6 11kV and 33kV reclosers are currently in service on the network but all new equipment will be specified with vacuum as the insulating medium.

Noise complaints associated with zone transformers are occasionally received and investigated by the local Council. NWL are in the process of replacing the noisy transformers at the urban Redcastle Substation.

8.3.6 Health and Safety

Occupational health and safety is addressed through application of the business Health and Safety Management Plan and through the authorisation process for contractors operating on the network. HV operating safety procedures conform to industry developed rules. The identification and management of hazards to employees, contractors, and the public is performed as part of the condition assessment process, for all network assets.

NWL has recently implemented a Public Safety Management System where all hazards and risks to the public are documented, along with the actions taken to resolve them (eliminate, isolate, or minimise the hazard). This system has been accredited as per the regulations and is also audited annually and separately by an accredited external auditor and internal staff member.

NWL investigates significant incidents and takes action as appropriate. NWL also has a public safety advertising campaign where we advise the public and targeted groups of safety issues.

8.4 Emergency Response Plans

8.4.1 Emergency Response and Contingency Plans

As discussed above NWL has a suite of risk management documents, one of which is the emergency preparedness plan. Table 8.4.1(a) summarises the risk assessment carried out for a large earthquake. Table 8.4.1(b) summarises how this event shall be managed. There is a similar risk assessment and management plan for each of the major identified risks in the plan, including large earthquake, 1 in 100 year flood of the Waitaki River, Tsunami, snow storm, and dam break at Lake Pukaki.

Similarly NWL has another document in the suite for the failure of critical assets. It has tables for assessment and management of the risks similar to those shown in the emergency preparedness plan tables. The consequences of these asset failures are not as significant as those high impact events described in the emergency preparedness plan.

As part of the Public Safety Management System regulatory requirements, there is the requirement to periodically test emergence response plans. NWL commenced testing their plans annually starting in 2013/14 year. While this requirement focuses on the safety aspects, NWL will use this to test all aspects of the emergency response plans and not just those relating to safety.

A 24 hour service to respond to normal fault situations is provided by authorised line contractors, who are backed up by the Control Room Operator during normal business hours, and at other times by a duty engineer. The duty engineer carries a lap top computer, which can be used as a mobile control room to remotely operate field and substation equipment. This service is available to retailers, and to individual customers.

The NWL standard, covering the strategy applied to supply restoration, is provided in Appendix H.

Identification	Analysis	Evaluation (risk exposure)						
		Transpower assets		NWL subtransmission		NWL distribution and connections		
		Towers	GXP's	Substations	Lines	Lines	Distribution substations	Service mains
An earthquake of between Richter magnitude 8.6 and 9.2 and of 2 minutes duration on the Alpine fault which is expected to manifest as a magnitude 6.2 in Oamaru. This was included in the March 2006 project, and is considered to be still valid for inclusion in the July 2010 project (although it would be described in Modified Mercalli ratings rather than Richter).	• Possible toppling of 1 or more 110/33kV GXP transformers. • Possible toppling of 1 or more 33/11kV transformers, or cracked bushings. • Severe damage to about 100 spans of line. • About 10% of overhead service mains broken. • Varying damage to about 20% of pole-mounted transformers.	Medium risk for all assets in the area.	Medium risk for all assets in the area.	Medium risk for all assets in the area.	High risk for all assets in the area.	High risk for all assets in the area.	High risk for all assets in the area.	High risk for all assets in the area.

	• About 15 cable breaks.							

Table 8.4.1(a) Risk Assessment summary for a large earthquake (from NWL Emergency Preparedness Plan)

Identified risk	Treatment	
	Emergency responses	Resources
An earthquake of between Richter magnitude 8.6 and 9.2 and of 2 minutes duration on the Alpine fault which is expected to manifest as a magnitude 6.2 in Oamaru. This was included in the March 2006 project, and is considered to be still valid for inclusion in the July 2010 project (although it would be described in Modified Mercalli ratings rather than Richter).	Priority 1 Make the areas are safe, minimise danger to the public. Isolate effected area by manual switching of ABS's, begin restoration of remaining intact areas. Priority 2 Assess spares and resourcing requirements. Mobilise supply of additional spares, especially zone substation transformer bushings and cable joints. Begin dismantling damaged subtransmission poles and lines. Priority 3 Replace broken subtransmission poles and lines, consider temporary arrangements. Repair damage at zone substation, consider temporary repairs. Priority 4 Repair broken distribution lines and substations, giving priority to critical community facilities. Repair broken service mains. Priority 5 Restore ABS's to original configuration. Modify this plan and other contingency procedures if required. Replace all spares and components used.	Fully equipped control room, including back-up control room with up-to-date switching maps. Full complement of line staff, supplemented by line gangs and fault men from other areas. Common radio channels with all vehicles and control room. Ready access to about 100 poles, located at various locations including on the far side of major bridges that could be damaged. Ready access to about 15 sets of 11kV cable jointing kits. Ready access to about 100 spare distribution transformers, or sufficient spare parts. Ready access to about 10,000m of overhead conductor. Ready access to about 20 lengths of underground cable. Food.

Table 8.4.1(b) Risk Management strategy for a major earthquake

8.4.2 Civil Defence Emergency Management

Regional Councils were required to establish CDEM groups by 1 June 2003. As a lifeline utility, the company participates in the development of CDMA plans, and provides technical advice as requested. In addition, the company has developed emergency response plans for dealing with widespread abnormal situations created by either equipment failure or natural causes. NWL also participates in regular role play scenarios and other exercises organized by the local CD organisation.

8.5 Insurance Cover

NWL is a Consumer Trust owned company with a level of duty to its stakeholders and consumers. NWL undertakes its responsibility to maintain capacity, security of supply, and value for its stakeholders.

For this purpose a range of insurances are utilised to mitigate financial risk whether an event is small and localised or major and wide ranging. To ensure such cover is cost effective, realistic excesses are placed on each coverage to reduce premiums. Insurance of Electricity Distribution assets is limited to buildings and equipment within secure compounds. Overhead and underground networks are not insured.

In the event of a major disaster, the focus of NWL will be ensuring the network is safe and all consumers are re-connected to the network as soon as possible. With insurances in place to ensure no on-going financial loss is incurred the financial survival of NWL will be less risky and all energies can be directed to getting electricity back to our consumers.

In addition to several liability and indemnity insurances, NWL purchases specific insurance for:

- Material damage and business interruption
- Marine cargo
- Motor vehicle
- Contract works

NWL is also, through a self-insuring group made up of utility companies throughout Australasia, covered under a Utility Industry Liability Programme which is the most cost effective way of being able to achieve large scale insurance with a number of different underwriters. This programme is underwritten by AEGIS Energy Syndicate, AEG – USA, QBE Casualty Syndicate and CV Starr Syndicate.

The major coverages provided to NWL include:

General Liability, Products Liability, Completed Operations, Bushfire/Forest and Rural Fires Act, Automobile, Non Owned Aircraft, EMFs, Failure to Supply (Financial loss to TPs), Bailees Liability and Professional Indemnity. The limits for these coverages are $20,000,000.

Self-insurance is limited to the excesses payable for coverage.

9 Evaluation of Performance

9.1 Physical Performance Compared to Plan

For the 2013/14 disclosure year the physical performance compared to that planned was as follows:

All major system growth capital projects were successfully completed as planned. These included:

- The extension of the Earthquakes feeder through to Eastern Road
- The Kurow Substation protection upgrade
- The commencement of the Kurow Substation Upgrade
- The installation of an 11 kV three phase set of voltage boosters on the Herbert feeder.
- The installation of distribution transformers to supply new rural connections or to replace existing urban units where there has been an increase in demand.

The major projects completed under the category Reliability, Safety, and Environment included:

- The rebuild and extension of the 11 kV line down Teschemakers Road
- The installation of automated tie switches and air break switches on rural feeders.
- The replacement of one two pole transformer structure with a ground mounted transformer.

The major projects completed under the category Asset Replacement and Renewal were:

- The Tees Street undergrounding
- Pole replacements

The only Asset replacement and Renewal project that was not completed was:

- The replacement of four IMP zone substation transformer tap changers. This was due to a problem with the design to fit the replacement units to the transformers. This project will now move into the following two financial years.

The Customer Connection and Asset Relocations capital projects are driven by requests from third parties (mainly customers). All requested work performed under these categories was completed successfully.

The maintenance expenditure was overall in line with budget.

9.2 Financial Performance Compared to Plan

The following table shows the actual capital expenditure compared with the previous forecast for the 2013/14 year.

2013/14 EXPENDITURE ($000)			
CAPITAL	**ACTUAL**	**PREVIOUS FORECAST**	**VARIANCE**
Customer Connection	760	405	88%
System Growth	1,606	1,291	24%
Reliability, Safety, and Environment			
Quality of Supply	854	1,506	-43%
Legislative and regulatory	41	50	-18%
Other, RSE	21	-	-
Asset Replacement and Renewal	905	1,516	-40%
Asset Relocations	0	50	-100%
Non-network capex	1,007	190	430%
Total	5,194	5,008	4%

The following table shows the Operating and Maintenance expenditure compared with the previous forecast for the 2013/14 year.

2013/14 EXPENDITURE ($000) OPERATION AND MAINTENANCE	ACTUAL	PREVIOUS FORECAST	VARIANCE
Service interruptions and emergencies	227	260	-13%
Vegetation management	308	250	23%
Routine and corrective maintenance	502	441	14%
Asset replacement and renewal maintenance	626	770	-19%
Network Opex	**1,663**	**1,722**	**3%**
System operations and network support	1,357	1,510	-10%
Business Support	727	882	-18%
Non-network Opex	**2,084**	**2,392**	**-13%**
Operational Expenditure Total	**3,747**	**4,114**	**-9%**

The reasons for the variations in the actual expenditure compared with the previous forecast are outlined for each category.

Capital Expenditure – Customer Connection
Actual expenditure was significantly more than forecast as NWL has no control over the demand for customer connections to its network. The previous AMP forecast an expected level of capital expenditure relating to customer connections based on historical trends and economic data available at the time of preparing the plan. The variance in costs reflects the difference in consumer demand for new connections and the assumptions made in the AMP.

Capital Expenditure – System Growth
The actual expenditure was greater than forecast due to a large new irrigation connection that required significant work outside that forecasted to increase the supply capacity at Kurow Substation.

Capital Expenditure – Reliability, Safety and the Environment
Actual expenditure was considerably less than forecast mainly due to the Pukeuri Substation Upgrade not proceeding as the Network Waitaki Limited Board did not approve this work as they required more information from Management to justify this work, and also because of a reprioritisation of work on new connections and system growth.

Capital Expenditure – Asset Replacement and Renewal

Actual expenditure was less than forecast as priority was given to consumer connections and system growth. Next to safety related work, Network Waitaki Limited places the highest priority on to consumer driven work. With the ongoing conversion of dry land farming operations to dairying there will be years where the consumer driven work requires Network Waitaki Limited to reduce its expenditure in other areas.

Capital Expenditure – Asset Relocations

Asset relocations are mainly driven by requests from third parties. Actual expenditure in this category was zero as there were no requests for relocations. Network Waitaki Limited budgeted for a job related to work being done by a third party. The third party decided not to proceed with that work, hence Network Waitaki Limited deferred this expenditure.

Non-network Capital Expenditure

Actual expenditure vastly exceeded forecast expenditure due mainly to the company taking the opportunity to purchase the neighbouring business premises to its main Chelmer Street office and yard. This opportunity was not anticipated when the forecast was prepared. The expenditure on computer hardware and software also exceeded the forecast.

Operational Expenditure – Service Interruptions and Emergency Maintenance

Actual expenditure was less than forecast reflecting a downward trend in recent years that is consistent with improved reported reliability. Network Waitaki has analysed its budgets and modified them to reflect this new trend for future years.

Operational Expenditure – Vegetation Management

Actual expenditure was greater than forecast, primarily due to the opportunity that arose to complete one major tree felling job. The rest of the vegetation work was in line with forecast.

Operational Expenditure – Routine and Corrective Maintenance

Actual expenditure was greater than forecast due to additional paper sampling tests done on zone substation transformers (because of inconsistent results) and more load controller maintenance than forecasted.

Operational Expenditure – Asset Replacement and Renewal Maintenance

Actual expenditure was less than forecast due to 11 kV line renewal work not being completed due to contracting resources being less than anticipated.

System operations and network support

Actual expenditure was in line with forecast.

Business Support

Actual expenditure was less than forecast due to the cost of labour being over estimated.

9.3 Service Level Performance Compared to Plan

The performance of the customer oriented service levels against their target levels for the 2013/14 year is shown in the table below:

Customer Service Levels	SAIDI			SAIFI		
2013/14	Actual	Actual (Normalised)	Target	Actual	Actual (Normalised)	Target
Planned	7.69	7.69	19.50	0.04	0.04	0.14
Faults	87.44	73.68	97.00	1.61	1.27	1.40
Total	95.23	81.37	116.50	1.64	1.31	1.54

The SAIDI and SAIFI normalised levels for both planned and unplanned outages were better than the target levels. This reflects the tight control that operational staff exercise over the Release Request process for planned outages. It also reflects the benefits of utilising live line techniques to either avoid the necessity for a planned outage, or to minimise the impact of an outage. The low SAIDI level reflects Network Waitaki's strategy of targeting supply restoration to customers when considering various competing capital and maintenance projects.

More historical information on the customer oriented service levels performance and the strategies NWL plans to use going forward to maintain or improve these service levels can be found in Section 4.2.1.

9.3.1 Asset Performance Service Levels

The performance of the asset oriented service levels against their target levels for the 2013/14 year is shown in the table below:

2013/14	Loss Ratio	Transformer Utilisation	Opex / ICP
Actual	2.4%	30.0%	$309
Target	< 6%	> 27%	< $317.20
	Achieved	Achieved	Achieved

All asset performance service levels were better than their target levels.

More historical information on the asset oriented service levels performance and the strategies NWL plans to use going forward to maintain or improve these service levels can be found in Section 4.

9.3.2 Power Quality

While there are occasional voltage complaints from predominantly rural consumers, very few of these have been found to be substantiated. Many of these problems stem from the equipment installed, typically 415V rated motors and from setting range used in voltage comparison relays.

Neighbouring distribution companies have been experiencing problems with harmonic disturbance, the primary cause of which appears to be variable speed motor starters. NWL arranged for studies to be undertaken by Canterbury University to ascertain the levels of harmonics on its network. The ensuing report highlighted some areas with power quality issues which may deteriorate if not kept in check.

NWL has adopted industry best practice methodology via IEEE 519-1992 and NZECP36: 1993 to ensure all new customer connections are compliant.

9.3.3 Power Quality Improvements

Power factor checks are being undertaken at large installations on substation feeder lines that have a poor power factor. The NWL connection standard, which forms part of its agreement with Retailers, has requirements regarding power factor and harmonic disturbance limits. Retailers will be notified of any sites where remedial action is required.

A number of 11kV voltage regulators are employed to support voltage at the extremities of the various feeder lines. As new substations are developed and new loads are added, the necessity for these devices in their current locations needs to be reviewed. NWL has made some progress in modelling its network, using Etap software but this needs to be completed to comprehensively establish areas where voltage support may be necessary.

NWL has been advised by Transpower that the Oamaru GXP power factor has been below the regulatory 0.95 on a couple of occasions. NWL has installed a total of 6MVAr capacitor banks installed on its 11kV network. These banks of 3MVAr each were installed at Duntroon in 2011/2012 and Chelmer in 2013/14. The power factor is now very good, typically 0.975 or higher.

9.4 Summary of AMMAT Assessment

NWL assesses the maturity of its asset management practices using the prescribed Asset Management Maturity Assessment Tool (AMMAT).

The key finding of that assessment was that NWL's asset management practices are mature with most elements scoring 3 out of 4. Five elements scored less than 3, with one of these scoring the lowest mark of 0. These five elements along with proposed actions are shown in

the following table. Since that assessment NWL has written Asset Management Policy and strategy documents. Hence in this assessment Question 3 has been reassessed from 0 to 2, the other aspects scoring 2 or less are being addressed as part of a project to install a new Asset and Works Management system that will integrate with the company's financial accounts. This project is now well advance with a go live scheduled for early in the 2015/16 financial year.

No.	Question	Score	Reason for score	Proposed Action
3	To what extent has an asset management policy been documented, authorised and communicated?	3	There is no written Asset Management Policy. However other documents such as the SCI have provided sufficient guidance to ensure that NWL's asset management practices have a strong and consistent direction.	NWL now has 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.
63	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	NWL is in the process of developing and implementing controls to ensure that asset data is accurate and consistent.	Complete development of the controls, and ensure their on-going use and regular improvement.
64	How has the organisation ensured its asset management information system is relevant to its needs?	2	NWL is in the process of better aligning its data repositories to its asset management activity by migrating asset management data from an Access databases to Asset and Works system.	Complete the migration from Access to Asset and Works system, and consider undertaking a wide-ranging Knowledge and Information Systems strategic review based on NWL's expected strategic direction, existing knowledge repositories and existing and emerging technologies.
105	What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))?	2	NWL does not yet have an asset management system audit process in place that covers its entire system. It is however noted that the Safety Management System audit has covered some of the asset management activities.	Develop an audit program (possibly based on the audit work already done for the Safety Management System) that will eventually cover all the asset management activities and will audit those activities on a regular recurring basis.
115	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	NWL seeks information on new asset management practices and techniques from the wider industry (such as the EEA and from conferences and journals), but this tends to be reactive and incremental.	Develop a strategy for improving NWL's asset management activity, starting from these recommendations and setting out where each activity might be improved and the methods by which it might be improved.

9.5 Gap Analysis and Remedial Actions

The following table summarises the gaps identified in the service level performance (Section 9.3) and the asset maturity assessment (Section 9.4), along with proposed remedial actions. More detail of these gaps and actions can be found in the relevant section.

Gap in Service Level or Asset Maturity KPI	Proposed Remedial Action
Asset management data accuracy and relevance may not meet the required standard in the short-term while the information is being migrated to a new Asset and Works Management System.	NWL is aware that its old systems are no longer fit for purpose. Hence a new system is being developed which will provide better control of the data. As part of this work the relevance of the data being captured is being reassessed. Once completed the gap in performance will be closed.
An audit of AM processes occurs only in part and by default as part of the SMS audit process.	Develop a specific audit for AM processes. This may be by extending the existing SMS process.

10 Capability to Deliver

10.1 Confirmation AMP can be Achieved

The mechanisms that NWL uses to ensure that the AMP work programme for the current financial year can be achieved involve:

- formal monthly reporting on the physical progress of the works programme against project milestone dates
- formal monthly reporting on the financial progress of the works programme against budgets (monthly and year to date)
- formal monthly reporting on the progress of the service levels against targets and historical monthly trends
- weekly meeting between the engineering staff and the internal contracting company
- monthly staff and management meetings where project progress, budgets, and service levels are fixed items on the agenda
- informal meetings involving the engineering staff
- monthly review of internal contractors resources to meet the AMP work programme and any external work opportunities
- regular review of available (external) contractor resources to complete the substation development and maintenance programmes, as the internal contracting company does not have technicians to do this work

Close monitoring of the physical and financial status of the works programme enables the timely and efficient reallocation of resources, or the contracting in of additional resources where economical and practical, to either get the programme back on track or to ensure that the higher priority work is completed at the expense of lower priority work.

NWL does a lot of its line work using live line techniques. One of the drivers for this is to keep the planned outages down. Conversely by monitoring the reliability service levels, NWL can choose to do less work live if the reliability indices are favourable and when by doing so it will enable work to be completed more quickly or cheaply.

After safety related work, NWL places the highest priority on completing new customer connections work. This work is variable from year to year, and when there is a lot of this type of work it can impact on the ability to complete the work programme. This is mitigated by prioritizing the work and deferring the work which has the lowest impact on the ability to meet demand (capacity) with the appropriate level of redundancy (security). In the medium to long term, once the bulk of the land suitable for irrigation has been irrigated and when the less environmentally friendly and efficient forms of irrigation (e.g. border dykes) have been

converted to spray irrigation the level of new connections should return to the lower levels of previous times.

The mechanisms that NWL uses to ensure that the AMP work programme over the medium and longer term can be delivered upon involve:

- planning the work programme so that the project man-hour and dollar budgets are, where practical, spread evenly over successive years
- regular reviews of the demand forecast, and whether the level of demand driven work needs to be raised or lowered
- regular reviews of the condition of the assets, and whether there are any significant trends developing within asset classes that need addressing
- regular checking for any common mode failures with any specific equipment items
- monitoring any long term trends in service levels. Adverse trends may indicate insufficient expenditure or poor allocation of expenditure (spending the right amount but on the wrong things). Overly favourable trends could indicate too much expenditure in a certain area.
- annual review of the internal contractor's resources to match recruitment and training requirements with projected future work programmes
- regular review and forecast of future revenue streams to ensure there are sufficient funds to develop and maintain the network. This involves annual reviews of tariffs, discounts returned to consumers, and capital connection levies.

NWL typically sets itself a challenging capital works programme for the resources it has available to it. This promotes efficiency, but has resulted in the works programme not being fully delivered on in recent years. NWL mitigates this by deferring projects which have longer term benefits versus those that have immediate impact on reliability or security. Overall, service levels and customer satisfaction, as measured by regular customer surveys and meetings with larger customers, remain high. NWL will continue to monitor these factors to gauge whether the staff levels and size of the work programme are appropriate, and whether more consultants or contractors should be used.

10.2 Organisational Structure

NWL's organisation structure is shown in Section 2.5. The engineering staff charged with designing and managing the capital and maintenance work report to the Operations Manager who is responsible for the delivery of the programme. The engineering staff, including management, also operates the network on a weekly roster basis.

The Operations Manager reports to the Network Manager who also has other groups reporting to him who are responsible for the network planning and the supporting services such as maintaining the Asset Management information systems and data that resides within

them. This structure ensures that there is a coordinated approach to the planning, development, maintenance, and operation of the network.

NWL also encourages team work where people skills are used across formal staff defined roles to make efficient use of the diverse range of skills within the company.

NWL's "Policy on Delegation and Authorisation" sets out the level of delegated authority of all staff, including the level of financial expenditure each staff member is authorised for. The policy also makes it very clear that "*NWL has 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 on what each staff member can do with regards the implementation of projects that make up the AMP.

Within the constraints of this policy the engineers have the ability to incur expenditure for projects up to the amount approved by the Board in the annual budget, which is generally as per the AMP. Note the budget may change between the writing of the AMP and the start of the AMP if new information becomes known.

Appendices

Appendix A

Summary of Assets (Based on 31/03/04 ODV)

Category		RC	%	Quantity
33kV Lines	$	7,948,864	8.28%	138km
11kV Lines	$	44,122,483	45.99%	1,575km
LV Lines	$	10,212,070	10.64%	219km
Zone Substations	$	7,433,499	7.75%	11
Distribution Transformers	$	11,489,800	11.98%	2,272
Distribution Substations	$	3,476,000	3.62%	2,272
11kV Switchgear	$	9,018,750	9.40%	3,160
LV Switchgear	$	501,646	0.52%	200
LMS / SCADA	$	784,728	0.82%	967
Service Connections	$	958,570	1.00%	11,929
Total	$	95,946,410		

Note: RC = Replacement Cost

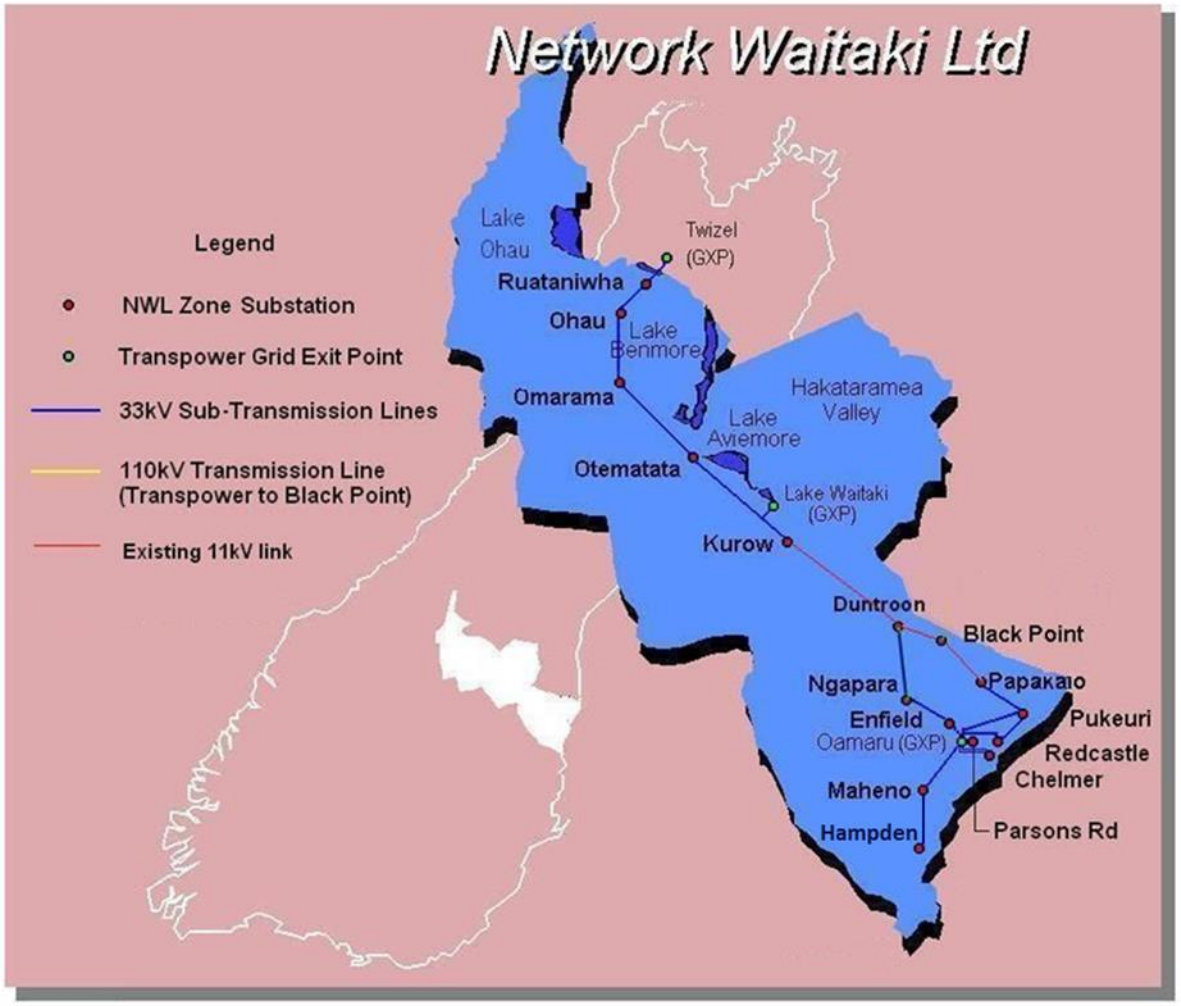
Appendix B

Summary of Optimised Assets (Based on 31/03/04 ODV Draft Handbook)

Asset Description	Optimisation	Change in ODRC
Sub-transmission Lines		
Chelmer St No 1 33kV Sub-transmission Line	Change from Heavy to Light Conductor	$ 22,928
Chelmer St No 2 33kV Sub-transmission Line	Change from Heavy to Light Conductor	$ 21,762
Redcastle 33kV Sub-transmission Line	Change from Heavy to Light Conductor	$ 21,840
Maheno 33kV Sub-transmission Line	Change from Heavy to Light Conductor	$ 63,580
Zone Substation Buildings & Compounds		
Chelmer St		$ 151
Redcastle		$ 1,783
Pukeuri		$ 1,370
Parsons Rd		$ 1,359
Maheno		$ 261
Ngapara		$ 1,397
Kurow		$ 4,699
Otematata		$ 5,193
Omarama		$ 4,048
Ohau		$ 5,064
11kV Distribution Lines		
Ardgowan 11kV feeder	Change from medium to light conductor	$ 16,510
Otematata 11kV feeder	Change from medium to light conductor	$ 2,645
Distribution Transformers	Optimise to achieve 30% utilisation	$ 251,115

Appendix C

Area of Supply



Appendix D

Security Standard

Introduction

This document presents the standards relating to security of supply applied to NWL's electricity distribution network.

This includes the standard of security NWL will seek when contracting for the provision of transmission services.

The Standard is based on the "Guidelines for Security of Supply in New Zealand Electricity Networks" published by the Electricity Engineers Association of NZ.

Objectives

1. To provide system planners with a set of targets that adherence to will ensure compliance with good industry practice with regard to efficient supply and an appropriate level of customer service.

2. To provide regulators, customers, and energy retailers with a performance benchmark against which assessment of the appropriateness of investments are made.

3. To ensure that departure from national guidelines are clearly understood, justified, and documented.

4. To ensure that security provision is consistent and effectively coordinated across the network.

5. To identify existing gaps in existing security provision or its coordination.

6. To record the policy framework around which decisions regarding the management of security risk are based.

7. To manage risk and ensure compliance with regard to contracted positions with retailers and customer rights under the Consumer Guarantees Act.

Definitions

Security is a measure of the relative firmness with which the supply's capacity can be maintained in various contingent events on the network. It is defined in the EEA Guidelines as:

"The inherent ability of a network to meet the customer demand for energy delivery without interruption"

It is not to be confused with reliability. However reliability can impact the inherent level of security that a given set of provisions can deliver. Reliability is defined as:

"The actual performance of the network in terms of the amount of interruption actually experienced by the customer"

Security is quantified both in terms of interruption to supply and the impact on the load being served. It therefore considers size of the load, economic impact on network users, probability and potential duration of contingent events.

This Standard excludes the following circumstances, which are outside the scope of physical network design adhering to good industry practice, as they are largely external issues not easily managed at network level:

- Emergency situations arising from extreme climatic conditions or natural disasters.
- Lack of availability of electrical energy for supply into the network.
- Lack of transmission system stability.
- Failure of the bulk electricity system to maintain prescribed frequency and voltage.
- Short term interruptions of less than a minute.

Discussion of Issues and Concepts

Fit of National Guidelines to NWL's Size

NWL is a relatively small network. This presents several issues with regard to the appropriateness of the EEA Guidelines:

- Only at locations close to the Oamaru GXP does load reach the size where compliance with industry standards requires security provisions to prevent interruption of supply. Known as an "n-1" security level.

- At customer level, what would be considered small loads at national level, have the potential to be significant in terms of NWL's total system load. These loads may therefore have an elevated status in terms of their importance to the local economy.

- NWL has a network in good condition with a high level of reliability. This has been achieved at a cost in terms of network investment which is an alternative strategy for servicing customers compared to directly investing in security. In rural networks where interconnection and duplication of assets is not economic this can be a justified strategy.

- NWL's network is able to be repaired relatively quickly because of its predominance of overhead HV asset. The network is designed for "live line" working practices and this greatly adds to the options available when seeking to restore supply quickly.

- Industrial load is not dominant, with many parts of the network having no load of significance with respect to short term loss of supply creating a high economic impact to region. Further domestic installations lack the dependence on electricity that would be expected in cities with high rise apartment buildings, open fire bans, etc.

Accordingly the EEA Guidelines have been applied as the minimum standard. NWL's Security Standard has been further elevated and developed at lower levels of capacity or class of supply.

At these levels the focus is on ability to restore supply rather than prevent interruption.

Methods of Providing Security

For NWL the primary tactic for delivering security in the distribution network will be the speed with which supply can be restored. This is an issue of network design standards, automation, and practice.

Large customers with specific requirements for uninterruptible supply require specific security provisions. These can be provided on a User Pays basis without the need for the general levels of security on the network to be elevated to levels not required by others users as this would unnecessarily increase their cost of supply.

Appropriate methods available for improving the subtransmission and distribution system security for NWL include:

- Network interconnection preferably at the lowest voltage that the required capacity can be effectively and economically supported. If one circuit fails then the ability to supply from an alternative route while the faulted section is repaired is the preferred tactic. If possible it is preferable to backup 11kV asset via LV reticulation. In this scenario both 11kV and LV assets are being secured.

- Reducing the area and size of load affected by an outage through network configuration/segmentation or increasing the ability to sectionalise down to the minimum number of connections. This can be achieved by deployment of air break switches, reclosing and sectionaliser circuit breakers.

- Ensuring that assets required for supporting extra load during contingent events have sufficient excess capacity available for that purpose.

- If customers installations and businesses are tolerant to limited duration periods of lower service standards such reduced capacity, low voltage, etc. then seeking agreement on such terms is more efficient than investing simply to comply with a global standard. The proviso is to have a documented agreement to manage liability issues.

- Designing the network for live line working practices greatly increases the options for prioritising restoration ahead of permanent repair.

- An appropriate level of technology allows automatic fault clearance/restoration, aids timely fault location and also reduces the time involved in manual switching required to restore supply.

- Critical items of equipment which are expensive and have long procurement lead times can have security risks reduced by maintaining an appropriate inventory level of Strategic Spares.

- Configuring critical equipment for quick change. For example replacing pitch filled terminations on zone transformers with air box terminations.

- Mobile standby plants, such as diesel gensets, combined with quick connect facilities can be applied to security objectives. These have the advantage of greatly increasing flexibility in network operation for management of a number network issues, but this needs to be weighted up against cost and environmental considerations.

A strategy for addressing a security would consider the merits of all these options. Some policy guidelines on practice and standard design are therefore included as part of this Security Standard.

Deterministic versus Probabilistic Standards

There are two common methods of expressing and analysing security: deterministic and probabilistic. Neither approach provides all the answers by itself.

Therefore the Security Standard table is used initially to measure compliance in a deterministic way.

If there is a non-compliance, then the probabilistic method is used to establish justification for any investments decisions.

In the deterministic approach security standards are expressed as absolute criteria, not subject uncertainty, such as capacity, duration, and level of asset redundancy. Deterministic methods assume the worst case and therefore are viewed as being prone to cause over investment. They are sometimes referred to as the "redundancy" method because they lead to decisions to build duplicated supplies.

In the probabilistic case the network planner quantifies risk in terms of reliability and when risk exceeds the standard assesses the options in terms of reduction of risk. This more commonly used where remedy with physical line solutions are very costly such as for transmission asset.

NWL's approach is therefore to list the standard as a set of deterministic measures but assess the merits of potential remedy of any breaches via a probabilistic quantification of the risks. The assumptions on which this assessment is made therefore form part of this standard.

To prevent sensitivity issues with the deterministic thresholds **it is this Standards approach to only consider security constraints that exist for more than 10% of the year. This is a policy decision.**

By identifying and forecasting security constraints and then publicly notifying them in the Asset Management Plan, two service improvements are delivered.

Firstly network users are informed of what level of service is provided allowing them to seek change if this inadequate for their needs. This manages liability issues for NWL and contributes to compliance with the Consumer Guarantees Act.

Secondly investment opportunities are communicated reducing NWL to the status of provider of last resort and therefore likely to stand scrutiny with regard to monopolistic overbuilding, inefficient investment, etc.

Appropriate Levels of Customer Service

Traditionally network companies have tended to assume a given standard of security and apply it to all consumers whether or not they required it. This is neither an efficient management practice nor customer focused.

In considering the customers security requirements NWL will address the following:

- Security needs to be coordinated across the entire supply chain as service delivery is constrained by the weakest point. Where large industrial load is involved there is little merit in providing a secure network connection that exceeds the security standards the customer has considered as adequate for

their installation. The customer has made a management decision based on risk to their business.

- A proviso to this is where the customer has specifically requested and pays for a higher level of service.

- On a much larger network major customers are likely to be less significant in terms of total system load. In such cases their installations would be sheltered by the security provided at network level. On NWL's network they are a little more exposed to being the sole user.

- In quantifying risk the difference in economic impact is accounted for between domestic and non-domestic customers. NWL's business is linked to the strength of the local economy. This is recognised in the value of unserved energy applied during analysis.

- Where customers have some tolerance to reduced service standards during contingent events establishing an agreement with them can permit deviation from the Standard. For example, some networks apply this via financial recognition for customers who can switch fuels from say electricity to gas during times of constraint.

- Where load control forms part of the terms and conditions of supply calculation of firm capacity requirements may exclude this load.

- Some customers have special requirements such as hospitals, dairy sheds, etc. Specific network provided enhanced standards are a matter of policy that is not catered for in this standard but are considered on a case by case basis.

Customer Impact

Security Standards are coordinated with reliability service standards (driven by outage performance) by considering not only the size of load affected but also the number of individual connections i.e. security provisions also contribute to improving outage statistics which are also a driver of asset management.

Contingent Ratings

Most electrical equipment has some overload capability. For example, a distribution transformer manufactured to BS 171 is designed to deliver a 120% of its rated capacity for an 8 hour duration. It is normal industry practice to utilise this limited duty rating during contingent events. However it is necessary to de-rate equipment for operating conditions such as ambient temperature, age, etc. This is particularly important for HV cables.

Regulatory Issues

Where existing security provision exceeds requirements justified by company policies and standards optimisation is applied in the company's ODV valuation. In this way

rigorous application of standards based on the good industry practice will drive economic efficiency into NWL's business.

Security Level Thresholds

The deterministic security thresholds applied by NWL are detailed in the appendix to this document. They are listed by class of supply based on the Group Peak Demand and/or Customer Impact.

Group Peak Demand is defined as the 10% duration peak aggregate diversified demand (i.e. present for a cumulative total of 876 hours per year) at the location in the network under consideration.

Customer impact is simply the number of customers interrupted by a contingent event.

Security Level refers to number of contingent events that can occur before an outage is experienced. "n level" security indicates every single event causes an outage. "n-1" indicates that 2 faults are required to cause an outage.

Contingent Capacity is the percentage of Group Peak Demand required to be provisioned in adjacent assets (collectively) expected to support the faulted asset.

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 NWL prioritises restoration of supply to the maximum number of customers, ahead of individual security issues, to minimise disclosed outage statistics.

The following assumptions are applied to analysis:

Repair Time target for overhead lines	4 hours
Repair Time target for underground lines	6 hours
Repair Time target for distribution equipment	8 hours
Repair Time target for sub-transmission equipment	12 hours
Repair Time target for Transpower connection assets	16 hours

(note: NWL must ensure Transpower delivery of this target)

Response Time (NWL's CAIDI Target)	60 minutes

Where these targets are not believed to be attainable then this is signalling the need for network enhancement.

Quantification of Risk

This Standard assesses of risk in terms of the EEA Guidelines. Assumptions with regard to probabilities and value are aligned with the risk management guidelines given in EEA industry standard.

Risk ($) = probability of failure x cost of unserved energy

A 10 year NPV calculation of Risk Value will be applied as the cost hurdle for upgrades attributed solely to network funded security improvement.

Assumed Equipment Failure Rates

220kV Pole Lines	0.012/circuit km/year
110kV Pole Lines	0.022/circuit km/year
66kV Pole Lines	0.030/circuit km/year
33kV Pole Lines	0.060/circuit km/year
11kV Pole Lines	0.140/circuit km/year
66kV Cables	0.010/circuit km/year
33kV Cables	0.040/circuit km/year
11kV Cables	0.040/circuit km/year
Power Transformers	0.002/unit/year
Distribution Transformers	0.005/unit/year
11kV Outdoor Switchgear	0.002/unit/year
11kV Indoor Switchgear	0.0015/unit/year

These failure rates are based on the Electricity Engineers' Association guidelines for security of supply.

Assumed Economic Cost of Unserved Energy by NWL

Standard Domestic Supply	$2/kWh
Irrigation Supply	$3/kWh
Standard Non Domestic Supply	$5/kWh
Tourism Business Supply	$6/kWh
Individual Supplies > 0.5GWh p.a.	$7/kWh

Individual Supplies > 1GWh p.a.	$8/kWh
Supplies with specific contracted security provisions	$10/kWh

Risks greater than these levels are deemed better managed through customer insurance and contracted terms.

Excess Capacity Standard for Contingency Support

NWL uses a "Dog" conductor standard for its main 11kV distribution lines. This conductor has nominal capacity rating of 6MW.

Where one circuit is available for backup of an adjacent line then 3MW should be reserved for that purpose i.e. the circuit should not be expected to carry a normal load greater than 3MW.

Where two circuits are available for backup of an adjacent line then 2MW should be reserved on each of those circuits for that purpose i.e. the circuit should not be expected to carry a normal load greater than 4MW.

If a circuit is to be loaded beyond 3MW in any circumstance then confirmation of the adequacy of connectors and jumpers is to be formally investigated, documented, upgraded as required, and where possible physically proven.

If a distribution transformer is interconnected via LV distribution to two adjacent equally sized transformers then it can be loaded in normal configuration to 80% of its rated capacity.

If it is only interconnected to only one other transformer then it should be constrained to 60%. This assumes the LV cables have adequate capacity to carry the load.

Power transformers can also utilise the 120% limited duration overload. Forced cooling can further increase this rating. However as these assets are often not duplicated, shared spare units and quick change capability is the preferred tactic.

Process for Applying the Security Standard

1. Undertake gap analysis against standard for every significant change in normal network loading conditions.
2. Calculate the Risk Value per above guidelines.
3. Identify solutions that reduce the gap and costs within the Risk Value.
4. Where applicable discuss options with customers.
5. Record agreements, decisions and planned actions.

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
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
B7	Sub-transmission feeder	<15	Restore in repair time	Restore in repair time	Restore in repair time
Distribution Feeders and Substations					

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
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

Appendix E

Outage Management

Introduction

This document presents an overview of Network Waitaki's strategy for managing restoration of supply during wider area multiple fault events. The Emergency Preparedness Plan provides details such as contact lists, resource schedules, etc. and Contingency Plans cover specific issues such as major items of equipment, backup provisions like generators, etc.

The same priorities and processes apply to smaller outage events.

Such large events result from natural disasters, such as earthquakes and floods, and extreme weather events such as wind storms and snow storms.

There are 3 main phases requiring management:

1. Damage minimisation as the event passes through the network.
2. Damage assessment and resource mobilisation.
3. Power supply restoration and repair.

Outage Management Strategy

Damage Minimisation

A weather event, such as a wind storm, usually has a point of maximum intensity that passes through the network. This typically lasts 4-6 hours.

Actions to be considered include:

- Safety of work crews, including operating constraints of plant (e.g. EPV's) in high winds
- Automatic re-closing equipment may be disabled to prevent reliving of damaged network without prior checks on human and property safety
- Power may be switched off to prevent damage by conductor clashing, particularly in areas of network where HV circuits may clash with LV circuits
- Pre-emptive dispatch of crews to areas where access may become isolated
- Establishment of the fault call centre

Damage Assessment

As a minimum safety requirement no attempt at livening any part of the network will be undertaken without a visual patrol of the assets to be livened.

This may prevent assessment starting until daylight hours or physical access can be achieved and weather conditions are safe for staff (temperature and wind chill in particular).

Where access is an issue the use of helicopter patrols may be a possibility.

Lines unable to be patrolled will be disconnected or cut away.

Assessment of whether to effect a temporary or permanent repair should be made at this time.

Note that in long duration events, battery backup for telecommunication installations can fail before consumers are motivated to check that they haven't been overlooked. Therefore consumers phoning in to report outage cannot be relied on as a full indication of the status of the network.

The response phase is faster if data is collated first, priorities are assigned and resources are coordinated so that there is a systematic progression from site to site.

Sourcing of specialist equipment/resources, delivery of materials, and requests for assistance from neighbouring line companies are undertaken at this time. Note that contingency planning should assume that any external resources will not be available as neighbouring companies are likely to have experienced the same event and physical access may be blocked.

Work on Network Waitaki's network can only be undertaken by competent electrical workers with the approvals specific to its network. It is therefore important that all resources with those skills are kept focussed on work at the top of the pole where they are needed. All supporting activity such as switching, materials delivery, fetch and carry tasks, etc. should be resourced with others.

Assessment of communication systems needs to be assessed before crews are dispatched.

Briefings with other infrastructure agencies, such as the Council, Telecom, Contractors, etc. are made.

Briefing the media and electricity retailers on the situation should be made as soon and as often as useful information is at hand. This can be disruptive to the response effort if not strictly limited.

In the event of a Civil Defence Emergency, Network Waitaki has specific obligations. Note that Civil Defence can commandeer any resources that Network Waitaki has not already dispatched.

Relieving, accommodating, and feeding crews will need to be considered for prolonged events.

Response

Response Priorities

The following priorities are applied in restoration of supply:

1. The overriding priority is to "make safe". This includes assisting the Emergency Services such as the Police and Fire Service with attending vehicle accidents, fires, trees, loose roofing iron, etc. Note: when attending these incidents the Emergency Services have control of the site and everyone there.

2. Physical hazards such as oil leaks, eminent high risk structure collapse, etc. also take priority over power restoration.

3. Generation and transmission restoration has priority over distribution. These systems may need to be significantly reconfigured to accommodate black starting and islanded operation. This may require Network Waitaki to bring on load in increments.

4. Network Waitaki's communication systems, which provide communication with maintenance crews and operators in the field, and the remote control of circuit breakers and other remote switchgear shall be treated with high priority. These systems are vital links in keeping the repair crews safe and the network controllers informed of the status of the network and with ability to take control actions. This work is done by different people to those who repair the power network infrastructure. Hence, this can be done in parallel with the main power network repairs.

5. The restoration of power to the vital services listed below is treated with high priority. However, before power can be restored to these services, it is necessary that the network upstream of their point of supply is restored. Hence, by the very hierarchical nature of the power network, power restoration will prioritise the subtransmission assets (including crucial urban substations), followed by critical 11 kV feeders. The vital services that are given a high priority include:

- Medical facilities
- Communications infrastructure
- Water supply
- Sewage disposal
- Supermarkets
- Petrol stations

6. Faults affecting the largest number of connections are attended to first. These are generally sub-transmission faults and faults affecting entire 11kV feeders particularly in urban areas. These assets also have greatest level of contingency provision so restoration may be able to be achieved by temporary

reconfiguration of the network. Note that restoration prioritises the HV network only. LV faults even when they affect large numbers of connections are not counted in outage performance statistics.

7. After restoration of 11kV supply in urban areas, rural 11kV faults are attended to in order of getting supply restored to most number connections in the shortest time possible. Faults that affect fewer connections but are able to be more quickly repaired, may therefore take priority in rural areas. Note that Network Waitaki fault response only extends to the connection point with its network and does not include service lines (even when they are HV) to individuals. Outage statistics stop being counted once 90% of the connections affected by a fault have had power restored. Hence remote connections may be abandoned in favour of other higher priorities.

8. LV Distribution (predominantly located in urban areas) is the next priority. Again this excludes the service lives to individual connections. Also excluded are ancillary services such as hot water control, street lighting, etc. Any LV asset that has clashed with HV assets will necessitate each connected installation to be tested by an electrical inspector before it can be livened. Service fuses will be pulled and the connection left until suitable resources are at hand.

9. Community institutions such as rest homes and schools follow.

10. Major connections, prioritised on the revenue they represent to Network Waitaki and the level of employment they represent in the community, are targeted to minimise economic disruption. The CBD is treated as a collective in this regard.

11. The tourism infrastructure is considered next with regard to continuity of business which feeds and accommodates significant number of travellers. This will be particularly important when the District has been isolated or large numbers of external contractors are brought into the District for effecting repairs.

12. Dairy sheds, chicken sheds, and any other connections with an animal welfare issue is the next priority.

13. Restoration of supply to occupied residences has priority amongst the remaining connections.

14. After restoration is complete permanent repairs are addressed. This will start with a detailed network inspection to identify minor damage such as broken binders, cracked/leaning poles, etc.

Response Process

The same basic process applies to all faults:

1. Visual inspection for safety issues.

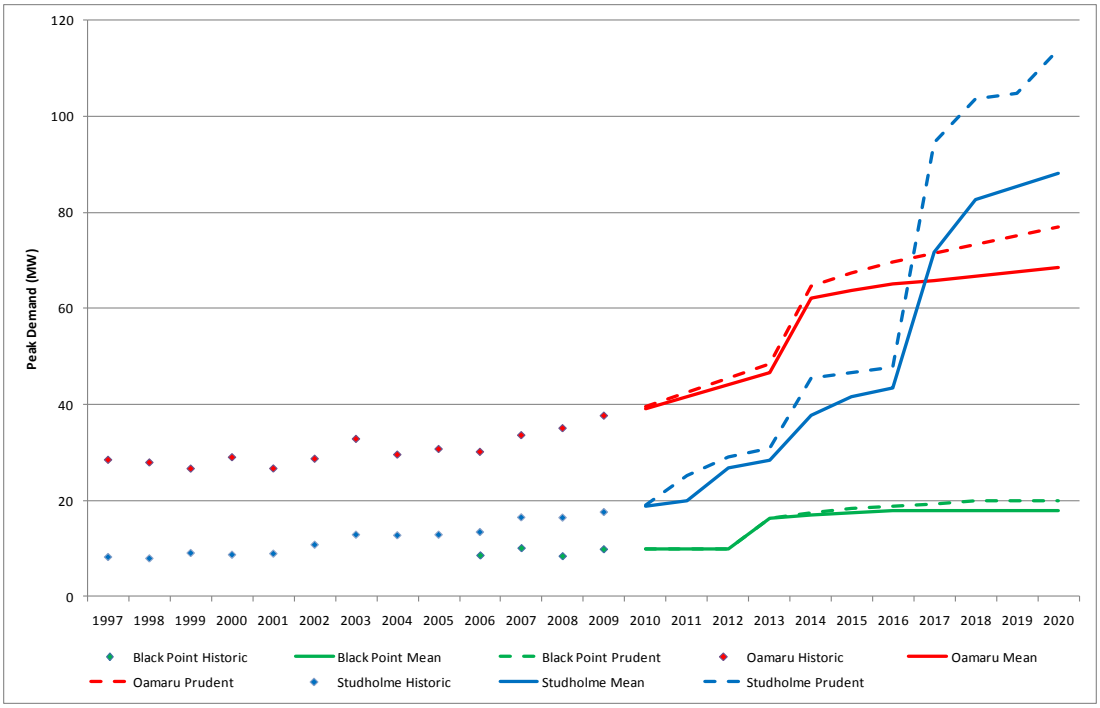
2. Fault location via sectional livening.

3. Isolate faulty assets.

4. Reconfigure the network if possible to bypass/back feed fault and restore power to remainder of feeder.
5. Make the work zone safe.
6. Undertake the repair which may be a temporary fix.
7. Reliven.
8. Restore the network configuration to normal and undertake permanent repairs.
9. Follow up with debriefing, additional condition assessment programmes, system/design improvements, etc.

Appendix F – COVEC Load Forecast

Lower Waitaki Region



2010 Prudent Peak Demand Forecasts

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Black Point	9.9	9.9	9.9	16.4	17.4	18.4	18.9	19.4	19.9	19.9	19.9
Oamaru	39.6	42.6	45.5	48.4	64.6	67.4	69.6	71.4	73.3	75.1	77.0
Studholme	19.0	25.2	29.1	30.9	45.4	46.7	47.9	94.5	103.7	104.8	113.9
Undiversified	68.3	76.7	83.4	94.4	124.8	129.1	132.8	179.0	189.4	191.7	201.6
Diversified	63.9	71.4	78.3	88.1	116.9	120.9	124.4	168.5	178.4	180.7	190.1

2010 Mean Peak Demand Forecasts

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Black Point	9.9	9.9	9.9	16.4	16.9	17.4	17.9	17.9	17.9	17.9	17.9
Oamaru	39.0	41.6	44.1	46.5	62.2	63.8	65.0	65.8	66.7	67.5	68.4
Studholme	18.8	20.0	26.7	28.3	37.7	41.6	43.5	71.6	82.6	85.4	88.2
Undiversified	67.7	71.5	80.6	91.2	116.7	122.8	126.3	155.3	167.1	170.8	174.5
Diversified	63.3	66.9	75.6	85.0	109.2	115.0	118.3	146.0	157.2	160.7	164.3

Historic Annual Load Growth Rates

Grid Exit Point	Electricity Demand	Units	1997-2009		1997-2001		2001-2005		2005-2009	
			Units	Percent	Units	Percent	Units	Percent	Units	Percent
Oamaru	Energy	GWh	3.9	2.2%	0.3	0.2%	3.9	2.3%	7.1	3.7%
	Peak	MW	0.7	2.4%	-0.3	-0.9%	0.9	3.0%	1.9	5.7%
Studholme *	Energy	GWh	3.1	5.3%	1.9	4.0%	1.5	2.7%	7.5	10.6%
	Peak	MW	0.8	7.0%	0.2	2.5%	1.0	8.4%	1.2	8.1%
Waitaki Region	Energy	GWh	8.5	3.6%	2.1	1.0%	5.4	2.4%	19.9	7.3%
	Undiversified Peak	MW	2.5	5.5%	0.0	-0.1%	1.9	4.6%	5.1	9.1%
	Diversified Peak	MW	2.2	5.1%	0.0	0.1%	1.9	4.6%	5.0	9.5%
New Zealand	Energy	GWh	525.9	1.5%	563.2	1.7%	755.6	2.1%	76.1	0.2%
	Diversified Peak	MW	90.2	1.5%	73.1	1.3%	89.7	1.5%	37.9	0.6%

* - Note that the Studholme GXP does not form part Network Waitaki GXPs.

In previous years, Covec has provided prudent and mean peak demand forecasts for the Waitaki Region. As new and revised information on potential projects are received, the peak load forecasts are updated to incorporate the latest information.

Therefore this Waitaki Region Electricity Demand Forecast 2010 supersedes the 2008 and 2009 load forecasts.

Appendix G – Transpower Draft Load Forecast

Lower Waitaki Region (as at 1 September 2011)

Total Network Waitaki

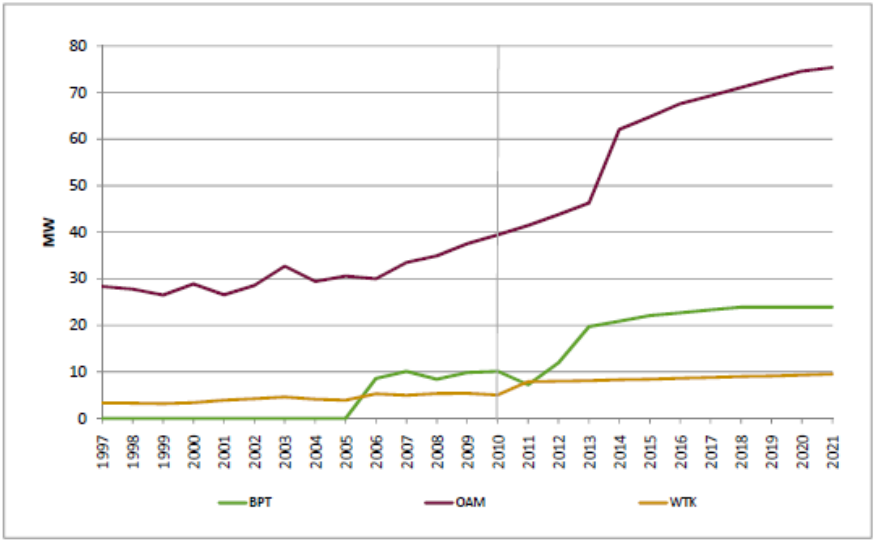
Annual Planning Report 2012

Draft Forecast

TRANSPOWER

Customer: **Network Waitaki Ltd** Individual GXP forecasts: **3**

Individual GXP - Historical Peak Demand and Prudent Peak Forecasts



Individual GXP forecasts available

BPT	Blackpoint
OAM	Oamaru
WTK	Waitaki

Oamaru

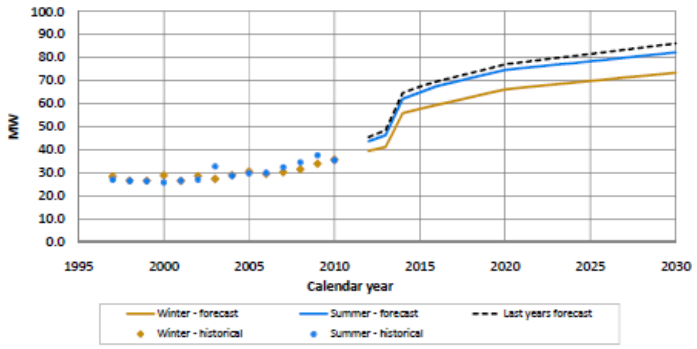
Annual Planning Report 2012

Draft Forecast

TRANSPOWER

Customer:	Network Waitaki Ltd	2010 peak - actual	39.4 MW Shoulder
Grid Exit Point:	Oamaru		
GXP Code:	OAM		

GXP Peak Electricity Demand



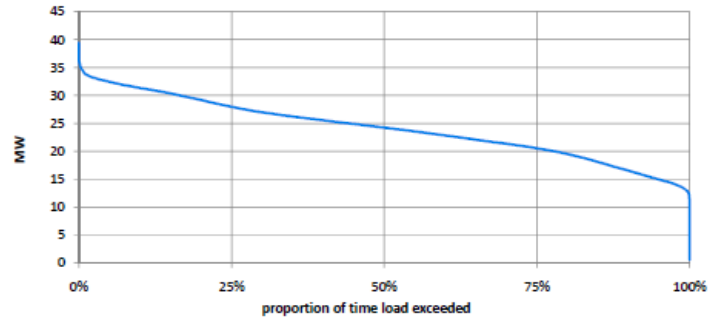
Peak Demand - Prudent Forecast (MW)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Winter	39.5	41.2	55.9	57.7	59.4	61.1	62.8	64.5	66.2	67.0
Shoulder	43.8	46.1	61.4	63.7	66.0	67.7	69.5	71.3	73.1	73.9
Summer	43.6	46.3	62.1	64.8	67.6	69.3	71.1	72.9	74.6	75.4
last year's forecast	*45.5*	*48.4*	*64.6*	*67.4*	*69.6*	*71.4*	*73.3*	*75.1*	*77.0*	*77.9*
	Growth rates p.a.		**2000-2010**	**4.1%**		**2010-2012**	**5.4%**		**2012-2030**	**3.5%**

Expected GXP demand step changes - Identified through the APR 2011 forecast process

timing	~ amount	description
2014	+13 at Oamaru	Holcim move - WPT to OAM
Assume linear	10.0 MW	Load increase at OAM - Minor loads associated with Holcim
2017	35.0 MW	New load at new St Andrews GXP - Hunter Downs irrigation, tranche 1

Load Duration Curve - 2010



Notes: Oamaru

Transpower customers are urged to provide feedback on the data and forecasts presented here. Submissions can be made via the online feedback form or emailed to demandforecasting@transpower.co.nz

Waitaki

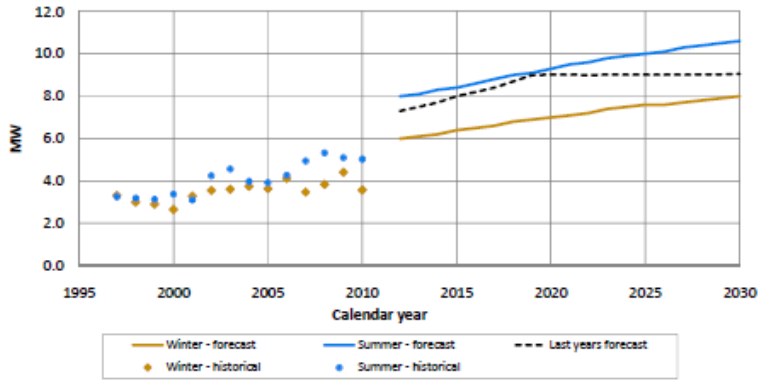
Annual Planning Report 2012

Draft Forecast

TRANSPOWER

Customer:	Network Waitaki Ltd	2010 peak - actual	5.0 MW Summer
Grid Exit Point:	Waitaki		
GXP Code:	WTK		

GXP Peak Electricity Demand



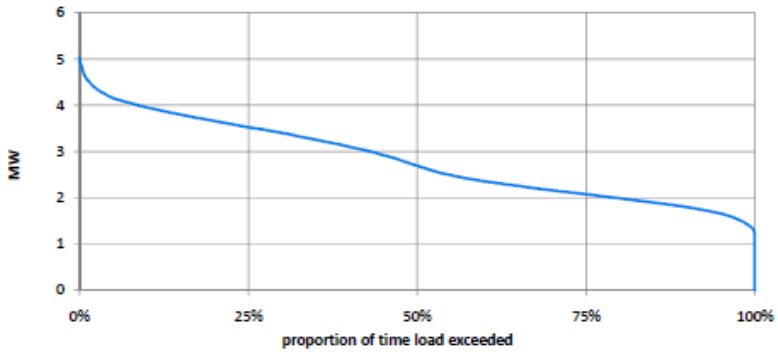
Peak Demand - Prudent Forecast (MW)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Winter	6.0	6.1	6.2	6.4	6.5	6.6	6.8	6.9	7.0	7.1
Shoulder	7.6	7.8	8.0	8.1	8.3	8.4	8.6	8.8	9.0	9.1
Summer	8.0	8.1	8.3	8.4	8.6	8.8	9.0	9.1	9.3	9.5
last year's forecast	*7.3*	*7.5*	*7.7*	*8.0*	*8.2*	*8.4*	*8.7*	*9.0*	*9.0*	*9.0*

Growth rates p.a.	2000-2010	4.1%	2010-2012	26.1%	2012-2030	1.6%

Expected GXP demand step changes - No step changes identified in APR2011

Load Duration Curve - 2010



Notes: Waitaki

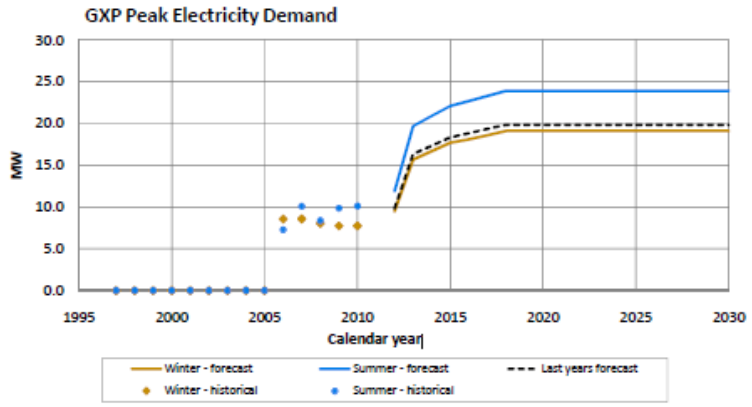
Transpower customers are urged to provide feedback on the data and forecasts presented here. Submissions can be made via the online feedback form or emailed to demandforecasting@transpower.co.nz

Black Point

Annual Planning Report 2012 TRANSPOWER

Draft Forecast

Customer:	Network Waitaki Ltd	2010 peak - actual	10.1 MW Summer
Grid Exit Point:	Blackpoint		
GXP Code:	BPT		



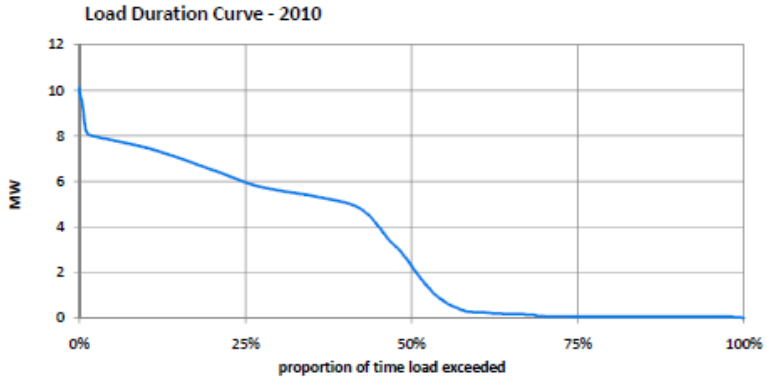
Peak Demand - Prudent Forecast (MW)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Winter	9.5	15.7	16.7	17.7	18.1	18.6	19.1	19.1	19.1	19.1
Shoulder	10.7	17.7	18.8	19.9	20.4	21.0	21.5	21.5	21.5	21.5
Summer	11.9	19.7	20.9	22.1	22.7	23.3	23.9	23.9	23.9	23.9
last year's forecast	*9.9*	*16.4*	*17.4*	*18.4*	*18.9*	*19.4*	*19.9*	*19.9*	*19.9*	*19.9*

Growth rates p.a. 2000-2010 - 2010-2012 8.5% 2012-2030 4.0%

Expected GXP demand step changes - Identified through the APR 2011 forecast process

timing	~ amount	description
2013	7.0 MW	New load at BPT - NOIC irrigation



Notes: Blackpoint

Transpower customers are urged to provide feedback on the data and forecasts presented here. Submissions can be made via the online feedback form or emailed to demandforecasting@transpower.co.nz

Appendix H – EDB Information Disclosure Requirements Schedules 11 - 13

Company Name	**Network Waitaki Limited**
AMP Planning Period	**1 April 2015 – 31 March 2025**

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			*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 15**	**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**
9	**11a(i): Expenditure on Assets Forecast**		**$000 (in nominal dollars)**										
10		Consumer connection	505	520	515	525	536	439	448	345	271	277	283
11		System growth	5,419	4,905	3,465	4,432	4,432	1,719	1,949	1,990	1,397	1,426	1,456
12		Asset replacement and renewal	946	1,174	1,523	1,129	1,153	1,177	1,201	1,227	1,252	1,279	1,306
13		Asset relocations	-	-	-	-	-	-	-	-	-	-	-
14		Reliability, safety and environment:											
15		Quality of supply	1,843	853	802	458	1,136	821	855	127	129	132	135
16		Legislative and regulatory	50	50	51	52	53	54	55	57	58	59	60
17		Other reliability, safety and environment	-	-	-	-	-	-	-	-	-	-	-
18		**Total reliability, safety and environment**	1,893	903	853	510	1,189	875	910	183	187	191	195
19		**Expenditure on network assets**	8,762	7,502	6,356	6,596	7,309	4,210	4,509	3,744	3,107	3,173	3,239
20		Non-network assets	1,246	2,512	4,708	2,247	1,587	1,589	-	-	-	-	-
21		**Expenditure on assets**	10,008	10,014	11,063	8,843	8,896	5,799	4,509	3,744	3,107	3,173	3,239
22													
23	*plus*	Cost of financing	631	540	458	475	526	303	325	270	224	228	233
24	*less*	Value of capital contributions	1,349	1,000	968	988	1,009	1,030	1,017	1,149	1,327	1,564	1,881
25	*plus*	Value of vested assets	-	-	-	-	-	-	-	-	-	-	-
26													
27		**Capital expenditure forecast**	9,290	9,554	10,553	8,330	8,413	5,072	3,817	2,865	2,005	1,838	1,591
28													
29		Value of commissioned assets	5,911	6,079	6,715	5,300	5,353	3,227	2,429	1,823	1,275	1,169	1,012

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
30	for year ended	**31 Mar 15**	**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**
32		**$000 (in constant prices)**										
33	Consumer connection	505	520	505	505	505	405	405	305	235	235	235
34	System growth	5,419	4,905	3,400	4,260	4,172	1,585	1,760	1,760	1,210	1,210	1,210
35	Asset replacement and renewal	946	1,174	1,495	1,085	1,085	1,085	1,085	1,085	1,085	1,085	1,085
36	Asset relocations	-	-	-	-	-	-	-	-	-	-	-
37	Reliability, safety and environment:											
38	Quality of supply	1,843	853	787	440	1,069	757	772	112	112	112	112
39	Legislative and regulatory	50	50	50	50	50	50	50	50	50	50	50
40	Other reliability, safety and environment	-	-	-	-	-	-	-	-	-	-	-
41	**Total reliability, safety and environment**	1,893	903	837	490	1,119	807	822	162	162	162	162
42	**Expenditure on network assets**	8,762	7,502	6,237	6,340	6,881	3,882	4,072	3,312	2,692	2,692	2,692
43	Non-network assets	1,246	2,512	4,620	2,160	1,494	1,465					
44	**Expenditure on assets**	10,008	10,014	10,857	8,500	8,375	5,347	4,072	3,312	2,692	2,692	2,692
45												
46	**Subcomponents of expenditure on assets (where known)**											
47	Energy efficiency and demand side management, reduction of energy losses	-	-	-	-	-	-	-	-	-	-	-
48	Overhead to underground conversion	-	-	-	-	-	-	-	-	-	-	-
49	Research and development	-	-	-	-	-	-	-	-	-	-	-

		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 15	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
Difference between nominal and constant price forecasts	**$000**											
Consumer connection		-	-	10	20	31	34	43	40	36	42	48
System growth		-	-	65	172	260	134	189	230	187	216	246
Asset replacement and renewal		-	-	28	44	68	92	116	142	167	194	221
Asset relocations		-	-	-	-	-	-	-	-	-	-	-
Reliability, safety and environment:												
Quality of supply		-	-	15	18	67	64	83	15	17	20	23
Legislative and regulatory		-	-	1	2	3	4	5	7	8	9	10
Other reliability, safety and environment		-	-	-	-	-	-	-	-	-	-	-
Total reliability, safety and environment		-	-	16	20	70	68	88	21	25	29	33
Expenditure on network assets		-	-	119	256	428	328	437	432	415	481	547
Non-network assets		-	-	88	87	93	124	-	-	-	-	-
Expenditure on assets		-	-	206	343	521	452	437	432	415	481	547

	Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
for year ended	31 Mar 15	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20
11a(ii): Consumer Connection						
*Consumer types defined by EDB**	**$000 (in constant prices)**					
Small: residential and commercial to 15kVA (inc DLU with >15kVA connections)	51	52	51	51	51	41
Medium: residential and commercial 16kVA to 50kVA	303	312	303	303	303	243
Large: commercial and industrial 51kVA and above	152	156	152	152	152	122
Independent Contract Consumers ("IND")	-	-	-	-	-	-
[EDB consumer type]						
**include additional rows if needed*						
Consumer connection expenditure	505	520	505	505	505	405
less Capital contributions funding consumer connection						
Consumer connection less capital contributions	505	520	505	505	505	405

	Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
for year ended	31 Mar 15	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20
11a(iii): System Growth						
Subtransmission	2,175	2,245	1,500	1,680	1,155	1,505
Zone substations	30	1,110	1,700	1,700	1,700	-
Distribution and LV lines	559	470	120	-	437	-
Distribution and LV cables	75	-	-	-	-	-
Distribution substations and transformers	80	80	80	80	80	80
Distribution switchgear	-	-	-	-	-	-
Other network assets	2,500	1,000	-	800	800	-
System growth expenditure	5,419	4,905	3,400	4,260	4,172	1,585
less Capital contributions funding system growth						
System growth less capital contributions	5,419	4,905	3,400	4,260	4,172	1,585

	Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
for year ended	31 Mar 15	31 Mar 16	31 Mar 17	31 Mar 18	31 Mar 19	31 Mar 20
11a(iv): Asset Replacement and Renewal	**$000 (in constant prices)**					
Subtransmission	50	60	50	50	50	50
Zone substations	-	24	-	-	-	-
Distribution and LV lines	612	850	1,225	875	875	875
Distribution and LV cables	-	-	-	-	-	-
Distribution substations and transformers	192	150	180	120	120	120
Distribution switchgear	80	90	40	40	40	40
Other network assets	12	-	-	-	-	-
Asset replacement and renewal expenditure	946	1,174	1,495	1,085	1,085	1,085
less Capital contributions funding asset replacement and renewal						
Asset replacement and renewal less capital contributions	946	1,174	1,495	1,085	1,085	1,085

11a(v):Asset Relocations

	*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]						
	[Description of material project or programme]						
	*include additional rows if needed						
	All other asset relocations projects or programmes						
	Asset relocations expenditure	-	-	-	-	-	-
less	Capital contributions funding asset relocations	-	-	-	-	-	-
	Asset relocations less capital contributions	-	-	-	-	-	-

11a(vi):Quality of Supply

	*Project or programme**						
	New Recloser on Solway Feeder	-	25	-	-	-	-
	Fibre Rollout	110	70	-	-	-	-
	Move 3Mvar Capacitor to Chelmer (incl. new CB)	27	-	-	-	-	-
	Replace Ohau 11kV oil switches with Halo RMU	-	65	-	-	-	-
	Retrofit RPS Switchgear covers for safer racking in/out	-	15	-	-	-	-
	TWZ/Kurow/Parsons Ripple isolation Project	-	45	-	-	-	-
	Peplace 1 X 551 relay and unsafe protection panel	-	28	28	28	28	28
	1 x Trimble GPS Unit	-	15	-	-	-	-
	2 x Linak SD2 RMU remote actuators	-	12	-	-	-	-
	Rural switch gear, install fault indicators, and other minor prot.	30	30	30	30	30	-
	Purchase and Install Reclosers/Sectionalisers/Tie Switches	85	45	35	35	35	35
	Replace Reclosers R650 and R654 and reuse elsewhere	-	60	-	-	-	-
	UG Ducting HV LV Fibre (General)	25	15	25	25	25	25
	Ferry Road Feeder - Upgrade from Mink to Dog	-	270	-	-	-	-
	Upgrade Pukeuri to Dual Transformer config - Stage 1	425	-	-	-	-	425
	Differential Zone Transformer Protection	18	18	12	-	-	-
	Zone Substation Info. System & Protn. (Two Subs per year)	30	30	30	-	-	-
	Arc Flash Protection (Weston 33, Chelmer, Redcastle)	60	60	40	40	40	60
	PV Trial	-	50	-	-	-	-
	Pukeuri Feasility Study, GeoTech Study, and Design	50	-	-	-	-	30
	Duplicate 33kV DC-DC Power Supply	8	-	8	-	-	-
	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 ABSs	48	-	24	24	24	24
	Line differential Protection Weston - Chelmer	-	-	135	-	-	-
	Radio Link Upgrade	-	-	-	258	130	65
	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	-
	Replace 1 x rural 2 pole Transformer Structures	35	-	-	-	-	-
	New Island Stream Feeder & Replace two cable pot heads - MHO	12	-	-	-	-	-
	Urban Reinforcement/Replacement LV	50	-	-	-	-	-
	Two new 10/15 Transformers for Redcastle	830	-	-	-	-	-
	*include additional rows if needed						
	All other quality of supply projects or programmes	-	-	-	-	-	-
	Quality of supply expenditure	1,843	853	787	440	1,069	757
less	Capital contributions funding quality of supply						
	Quality of supply less capital contributions	1,843	853	787	440	1,069	757

11a(vii): Legislative and Regulatory

	*Project or programme**						
	Upgrade non compliant Distribution Boxes	50	50	50	50	50	50
	[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 legislative and regulatory projects or programmes						
	Legislative and regulatory expenditure	50	50	50	50	50	50
less	Capital contributions funding legislative and regulatory						
	Legislative and regulatory less capital contributions	50	50	50	50	50	50

	Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
for year ended	**31 Mar 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**

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 reliability, safety and environment projects or programmes						
	Other reliability, safety and environment expenditure	-	-	-	-	-	-
less	Capital contributions funding other reliability, safety and environment	-	-	-	-	-	-
	Other reliability, safety and environment less capital contributions	-	-	-	-	-	-

11a(ix): Non-Network Assets

	Routine expenditure						
	*Project or programme**						
	Meters & Relays	21	1,275	3,300	700	100	100
	Other Non-network	125	700	550	1,040	879	985
	Network Switch Replacement/Data Cabling/Fibre Upgrade	35	30	45	35	35	35
	Server Replacement	10	20	50	50	60	60
	Desktop and Laptop Replacement	35	30	45	50	40	50
	Tablets Renewal/Replacement	5	15	15	15	15	15
	Cellphones Replacement	5	20	15	20	15	20
	UPS Replacement	-	-	50	-	-	-
	*include additional rows if needed						
	All other routine expenditure projects or programmes						
	Routine expenditure	236	2,090	4,070	1,910	1,144	1,265
	Atypical expenditure						
	*Project or programme**						
	Asset & Works Management System (OneEnergy)	910	250	100	200	100	100
	Data Storage	-	-	50	50	-	-
	Office Refurbishment	50	87				
	PABX Replacement	-	55	-	-	-	-
	New Datacentre	-	-	400	-	50	100
	GIS Upgrade	50	30	-	-	200	-
	*include additional rows if needed						
	All other atypical projects or programmes						
	Atypical expenditure	1,010	422	550	250	350	200
	Non-network assets expenditure	1,246	2,512	4,620	2,160	1,494	1,465

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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												
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 15**	**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**
9	**Operational Expenditure Forecast**	**$000 (in nominal dollars)**										
10	Service interruptions and emergencies	257	228	232	237	242	247	252	258	263	268	274
11	Vegetation management	250	294	300	306	312	319	326	332	339	346	354
12	Routine and corrective maintenance and inspection	513	562	585	594	615	619	641	645	663	668	691
13	Asset replacement and renewal	968	820	836	853	871	889	908	927	947	966	987
14	**Network Opex**	1,988	1,903	1,953	1,990	2,040	2,074	2,126	2,162	2,212	2,249	2,306
15	System operations and network support	1,935	1,935	1,972	2,013	2,055	2,099	2,143	2,188	2,234	2,281	2,328
16	Business support	935	935	953	973	993	1,014	1,035	1,057	1,079	1,102	1,125
17	**Non-network opex**	2,870	2,870	2,925	2,986	3,049	3,113	3,178	3,245	3,313	3,382	3,454
18	**Operational expenditure**	4,858	4,773	4,877	4,976	5,088	5,187	5,304	5,407	5,525	5,632	5,759

19		*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
20	for year ended	**31 Mar 15**	**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**
21		**$000 (in constant prices)**										
22	Service interruptions and emergencies	257	228	228	228	228	228	228	228	228	228	228
23	Vegetation management	250	294	294	294	294	294	294	294	294	294	294
24	Routine and corrective maintenance and inspection	513	562	575	571	579	571	579	571	575	567	575
25	Asset replacement and renewal	968	820	820	820	820	820	820	820	820	820	820
26	**Network Opex**	1,988	1,903	1,916	1,912	1,920	1,912	1,920	1,912	1,916	1,908	1,916
27	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
28	Business support	935	935	935	935	935	935	935	935	935	935	935
29	**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
30	**Operational expenditure**	4,858	4,773	4,786	4,782	4,790	4,782	4,790	4,782	4,786	4,778	4,786
31	**Subcomponents of operational expenditure (where known)**											
32	Energy efficiency and demand side management, reduction of											
33	energy losses	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
34	Direct billing*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
35	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
36	Insurance	96	96	96	96	96	96	96	96	96	96	96
37	** Direct billing expenditure by suppliers that direct bill the majority of their consumers*											
38												
39		*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
40	for year ended	**31 Mar 15**	**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**
41	**Difference between nominal and real forecasts**	**$000**										
42	Service interruptions and emergencies	-	-	4	9	14	19	24	30	35	41	46
43	Vegetation management	-	-	6	12	18	25	32	38	45	52	60
44	Routine and corrective maintenance and inspection	-	-	11	23	36	48	62	75	89	101	117
45	Asset replacement and renewal	-	-	16	33	51	69	88	107	127	146	167
46	**Network Opex**	-	-	36	77	120	162	206	250	296	341	390
47	System operations and network support	-	-	37	78	120	164	208	253	299	346	393
48	Business support	-	-	18	38	58	79	100	122	144	167	190
49	**Non-network opex**	-	-	55	116	179	243	308	375	443	512	584
50	**Operational expenditure**	-	-	91	193	298	404	514	624	739	853	973

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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			100.00%			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.			100.00%			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.			100.00%			3	
34	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (pole mounted)	No.			100.00%			3	

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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
45	HV	Zone Substation Transformer	Zone Substation Transformers	No.			76.19%	23.81%		3	
46	HV	Distribution Line	Distribution OH Open Wire Conductor	km	5.00%		95.00%			3	5.00%
47	HV	Distribution Line	Distribution OH Aerial Cable Conductor	km						N/A	
48	HV	Distribution Line	SWER conductor	km						N/A	
49	HV	Distribution Cable	Distribution UG XLPE or PVC	km			100.00%			3	
50	HV	Distribution Cable	Distribution UG PILC	km		1.00%	99.00%			3	1.00%
51	HV	Distribution Cable	Distribution Submarine Cable	km						N/A	
52	HV	Distribution switchgear	3.3/6.6/11/22kV CB (pole mounted) - reclosers and sectionalisers	No.		5.00%	95.00%			3	5.00%
53	HV	Distribution switchgear	3.3/6.6/11/22kV CB (Indoor)	No.						N/A	
54	HV	Distribution switchgear	3.3/6.6/11/22kV Switches and fuses (pole mounted)	No.	1.00%	4.00%	95.00%			3	5.00%
55	HV	Distribution switchgear	3.3/6.6/11/22kV Switch (ground mounted) - except RMU	No.						3	
56	HV	Distribution switchgear	3.3/6.6/11/22kV RMU	No.		5.00%	95.00%			3	5.00%
57	HV	Distribution Transformer	Pole Mounted Transformer	No.	2.00%	3.00%	95.00%			3	5.00%
58	HV	Distribution Transformer	Ground Mounted Transformer	No.	1.00%	1.00%	98.00%			3	2.00%
59	HV	Distribution Transformer	Voltage regulators	No.			67.00%	33.00%		3	
60	HV	Distribution Substations	Ground Mounted Substation Housing	No.			100.00%			2	
61	LV	LV Line	LV OH Conductor	km		2.00%	98.00%			2	2.00%
62	LV	LV Cable	LV UG Cable	km			100.00%			3	
63	LV	LV Streetlighting	LV OH/UG Streetlight circuit	km		2.00%	98.00%			3	2.00%
64	LV	Connections	OH/UG consumer service connections	No.		2.00%	98.00%			3	2.00%
65	All	Protection	Protection relays (electromechanical, solid state and numeric)	No.			100.00%			3	
66	All	SCADA and communications	SCADA and communications equipment operating as a single system	Lot			100.00%			3	
67	All	Capacitor Banks	Capacitors including controls	No.				100.00%		3	
68	All	Load Control	Centralised plant	Lot	33.00%		33.00%	34.00%		3	33.00%
69	All	Load Control	Relays	No.		20.00%		80.00%		3	
70	All	Civils	Cable Tunnels	km						N/A	

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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
Ohau	1	-	N-1 Switched	2	-	-	-	Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
Omarama	1	3	N-1	2	40%	3	33%	No constraint within +5 years	
Otematata	1	-	N-1 Switched	-	-	-	-	Transformer	Generator can supply load if Transformer fails
Kurow	3	4	N-1 Switched	1	65%	12	50%	No constraint within +5 years	
Duntroon	6	-	N-1 Switched	4	-	-	-	Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
Ngapara	4	7	N-1	4	53%	7	60%	No constraint within +5 years	
Enfield	3	-	N-1 Switched	4	-	-	-	Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
Parsons	3	-	N-1 Switched		-	-	-	Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
Papakaio	6	-	N	4	-	-	-	Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
Pukeuri	9	-	N	4	-	10	90%	No constraint within +5 years	
Redcastle	5	15	N-1	8	30%	15	50%	No constraint within +5 years	
Chelmer	10	28	N-1	8	34%	28	36%	No constraint within +5 years	
Maheno	3	-	N-1 Switched	4	-	-	-	Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
Hampden	1	-	N-1 Switched	4	-	-	-	Transformer	Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
Otekaieke	-	-	N/A	-	-	-	-	Transformer	Future Substation. Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
Awamoko	-	-	N/A	-	-	-	-	Transformer	Future Substation. Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
Five Forks	-	-	N/A	-	-	-	-	Transformer	Future Substation. Only 1 transformer. NWL security standard is to have switched contingent capacity for rural substation.
[Zone Substation_18]					-			[Select one]	
[Zone Substation_19]					-			[Select one]	
[Zone Substation_20]					-			[Select one]	

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

12b(ii): Transformer Capacity

	(MVA)
Distribution transformer capacity (EDB owned)	170
Distribution transformer capacity (Non-EDB owned)	3
Total distribution transformer capacity	173
Zone substation transformer capacity	185

Company Name	**Network Waitaki Limited**
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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 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**
	*Consumer types defined by EDB**						
	Small: residential and commercial to 15kVA (inc DLU with >15kVA connections)	10,550	10,600	10,630	10,660	10,690	10,720
	Medium: residential and commercial 16kVA to 50kVA	1,465	1,535	1,545	1,555	1,565	1,575
	Large: commercial and industrial 51kVA and above	490	530	540	550	560	570
	Independent Contract Consumers ("IND")	29	29	29	29	29	29
	[EDB consumer type]						
	Connections total	12,534	12,694	12,744	12,794	12,844	12,894
	**include additional rows if needed*						
	Distributed generation						
	Number of connections	26	50	70	100	140	200
	Installed connection capacity of distributed generation (MVA)	0	0	0	0	1	1

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 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**
	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	292	295	298	301	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	292	295	298	301	301	301
less	Total energy delivered to ICPs	275	277	280	283	283	283
	Losses	18	18	18	18	18	18
	Load factor	59%	57%	56%	56%	55%	54%
	Loss ratio	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%

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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								
8			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
9		for year ended	**31 Mar 15**	**31 Mar 16**	**31 Mar 17**	**31 Mar 18**	**31 Mar 19**	**31 Mar 20**
10	**SAIDI**							
11	Class B (planned interruptions on the network)		13.2	29.1	29.1	29.1	29.1	29.1
12	Class C (unplanned interruptions on the network)		36.8	87.4	87.4	87.4	87.4	87.4
13	**SAIFI**							
14	Class B (planned interruptions on the network)		0.07	0.15	0.15	0.15	0.15	0.15
15	Class C (unplanned interruptions on the network)		1.00	1.39	1.39	1.39	1.39	1.39

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Asset Management Standard Applied	

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	NWL now has 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	Include this update in the latest AMMAT disclosure.	Inspect 2014 AMP, Inspect 2013 SCI, Inspect Sub-Transmission Development Strategy, Inspect consumer survey reports.	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 2014 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 NWL's specific circumstances. These plans reflect the expected lives, unique characteristics and recommended maintenance intervals for assets.	Inspect Maintenance Standards, review 2014 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).

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Asset Management Standard Applied	

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	

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 widely available to all staff, the Board, the Trust, the Contractor, and the Public. In particular the Contractor understands the bigger picture of NWL's works programs as well as each individual job as it is involved in setting NWL's budget.	Discuss with M Dernehl, K Tierney and D McGee.	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 March 2014 AMP sets out the responsibilities of the various managers at Section 2.5. NWL also holds regular engineering meetings to ensure that future work is correctly allocated.	Inspect 2014 AMP, Discuss with staff. Inspect Delegated Financial Authorities.	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	NWL is well resourced for its current stable Asset Management regime. It also recognises that specific detail design, construction and purchasing expertise may be required over the next 6 to 8 years, and is confident that that expertise exists in-house or can be readily contracted in. NWL's budgets are robustly compiled on an annual cycle, and are subject to Board approval and must also comply with the SCI.	Discuss with M Dernehl and K Tierney. Discuss with J de Bruin	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	NWL has a comprehensive suite of Business Continuity Plans that cover asset failure, natural disasters and interruption to key processes. These were developed in 2006 and revised in 2010 following a major flood on the lower Waitaki River, and again in 2013. These plans embody linkages to 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, whilst a large-scale inter-organisational training exercise was recently held. These plans have been developed as part of a wider risk management framework based on ISO 31000 that considers a range of mitigation measures.	Discuss with staff. Inspect 2014 AMP, review 2006,2010, and 2013 BCP's	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	NWL has a broad management structure that covers the regulatory, commercial, engineering and operational aspects of asset life cycles. Each manager has been specifically appointed to a role based on competencies, and has defined levels of authority as per the Financial Delegations Policy. 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.	Discuss with J de Bruin, Inspect Staff Structure, Inspect Delegated Financial Authorities.	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	NWL has a robust financial planning process that includes projecting prices to sufficiently fund the works program. NWL Contracting has identified the age and competencies of its current workforce and is looking to recruit trainees. Because NWL Contracting's manager is part of the NWL management team, there is no time lag in communicating competency requirements.	Discuss with J de Bruin and D McGee.	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, the CEO presents the Board's latest thinking and directions to all staff at a single combined meeting. This meeting is supported by regular meetings amongst all staff to determine details of the works programs.	Discuss with M Dernehl and K Tierney	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	NWL has a Contractor Approval Procedure, of which several contractors have been approved and authorised to work on NWL's system. Evidence that this Procedure is working is the recent rejection of an application for an approved contractor to sub-contract work until that sub-contractor obtains suitable competencies. All approved contractors are provided with all network Standards, Procedures etc, and their work is subject to inspections and completion audits. NWL may also require supervision of close approach work. NWL also requires internal peer review of major engineering projects and studies.	Discuss with M Dernehl and K Tierney	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	NWL is a small company and employs managers with Asset management experience. NWL has recently increased its staffing levels to expand its AM expertise. NWL has position descriptions for key AM roles and dedicated HR and IT personnel.	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	NWL is a small company and employees managers with Asset management experience. NWL has recently increased its staffing levels to expand its AM expertise. The NWL has position descriptions for key AM roles and dedicated HR and IT personnel.	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	There is a high level of communication between NWL and NWL Contracting, as follows. The Manager of NWL Contracting is part of the NWL management team. NWL Contracting are provided with key documents such as the AMP, works programs, drawings, required standards etc. There is on-going daily communication around routine matters such as switching and fault restoration. Feedback from NWL Contracting occurs continuously, both formally as provided for in the Standards, and informally. Other specialist contractors also have input into NWL's work scoping and delivery.	Discuss with M Dernehl, K Tierney, D McGee.	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. These are subject to a document management system akin to ISO 9000. NWL also has a Safety management System in place, which requires a high level of document control. These documents are regularly revised and amended.	Discuss with M Dernehl and K Tierney	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	NWL is aware of the information required for each Asset Management activity. This includes asset type, location, capacity, age, condition, physical and electrical loadings, public safety etc. All captured data is held in the GIS and CRM systems. NWL believes that the integrity of its data is sufficiently accurate for compiling robust forecasts, and that any additional data quality would be of little use. Data is captured by routine visual inspections, earth testing, inspection and physical testing of suspect poles etc in line with either statutory requirements or industry best-practice. Processes exist for including data from external sources such as public, contractors etc to be integrated	Discuss with M Dernehl and K Tierney	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	NWL's main control mechanism for ensuring the accuracy or integrity of asset data is that on-going inspections, switching and pre-work site preparation confirm that asset data is accurate. There are 2 data repositories (the GIS and the CRM). NWL recognises that these 2 separate repositories could result in data divergence because the GIS is more commonly used for operational purposes, however there is no strong evidence that this divergence has reached a problematic level. The characteristics of these 2 repositories tends to preclude using them for the wrong purpose eg. it would be virtually impossible to compile a switching plan from the CRM.	Discuss with M Dernehl, K Tierney and G Lloyd.	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	NWL is confident that its data is of sufficient volume and quality for making forecasts. However a major driver of the migration from an Access database to an integrated Asset and Works Management System is the need for increased reporting functionality to meet statutory reporting demands. The need for this increased reporting functionality became apparent over the last few years as disclosure requirements have become more complex.	Discuss with M Dernehl, K Tierney and G Lloyd.	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	NWL's risk management process is clearly documented in the 2014 AMP, and uses ISO 31000. An assessment of the largest physical risks posed to the sub-transmission network was undertaken in 2006, 2010 and again in 2013. NWL has a legislative compliance matrix, which is reported to the Board each quarter.	Inspect 2014 AMP, Inspect 2006, 2010, and 2013 risk studies.	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	NWL definitely understands the need to assess risk, and has undertaken 2 sub-transmission risk assessments, and compiled and revised a suite of Business Continuity Plans. There are several initiatives in place to mitigate a range of asset failure and commercial risks, including migrating away from soft-wood poles, and considering a 66kV sub-transmission overlay.	Discuss with G Lloyd, review 2006, 2010, and 2013 risk assessments, review BCP's. Discuss with M Dernehl and K Tierney.	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	NWL references ENA & EEA newsletters, and notifications from the Commerce Commission and EA. NWL has a legal compliance register that was developed by a law firm, but future amendments rely on NWL staff proactively looking for amendments. Compliance assessments are reported to the Board quarterly. Each manager is formally made aware of their compliance obligations at	Discuss with J de Bruin.	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	NWL has 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.	Discuss with M Dernehl and K Tierney. Inspect relevant Policies and Standards.	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	NWL has a comprehensive range of Inspection and Maintenance Policies and Standards. Firstly those Standards embody design standards such as safety and service levels. Secondly the materials and construction tasks are specified in detail based on NWL's material and methods Standards. Thirdly, 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 accordance with NWL's Standards.	Discuss with M Dernehl and K Tierney. Line patrol records inspected. Earth testing records inspected.	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	NWL has clearly specified AM objectives, primarily Reliability and Safety, but also including other measures such as Works Program 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. NWL believes that its asset data is of sufficient accuracy and quality for all its planning and disclosure tasks. Budgets and SAIDI forecasts are evidence of leading indicators.	Discuss with M Dernehl and K Tierney	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	NWL regularly revises its Inspection and Maintenance Procedures in response to industry events eg. The failure of another EDB's ABB ring main prompted a review of NWL's own ABB ring mains and a revision of Maintenance procedures.	Discuss with G Lloyd.	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	NWL has 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.	Discuss with M Dernehl and K Tierney. Inspect SMS Stage 2 assessment report.	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	Firstly NWL uses it design and construction standards to minimise non-compliant performance. Secondly performance of assets against thresholds is continually monitored, at intervals ranging from seconds (eg. oil levels, intruders etc) to a maximum of 5 years. This monitoring is systematically based on asset criticality and safety, and is definitely not done on an ad-hoc basis. Evidence of performance excursions initiating investigation is the recent failure of a 5 year old soft-wood pole well above ground level. That prompted a review of all similar poles from that supply batch, and resulted in the line design Standard being amended to prefer concrete poles.	Discuss with M Dernehl and K Tierney. Inspect relevant Policies and Standards.	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, NWL surveys it consumers to determine preference. NWL also adopts minimum safety requirements that meet industry best practice and ESS expectations. Maintenance and Inspection standards are written to ensure that the risk of in-service asset failure is minimised.	Discuss with G Lloyd. Inspect 2014 AMP. Inspect Maintenance Standards.	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	NWL does seek external advice or comment from the EEA or other EDB's. NWL has had an established AM model based on the International Infrastructure Management Manual, and seeks to make incremental improvements to respective activities.	Discuss with G Lloyd. Inspect 2014 AMP	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.

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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 2.4.1, clause 2.6.1 and sub-clauses 2.6.3(4) and 2.6.5(3) 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: 30 March 2015