WAIPA NETWORKS LIMITED

Asset Management Plan

1 April 2019 2020 to 31 March 2030

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Waipa Networks Limited Asset Management Plan was

Certified by:	The Board	Directors, Waipa Networks Limited
Authorised by:	Adam Fletcher	Chief Executive Officer, Waipa Networks Limited
Prepared by:	Pete Armstrong	Network Asset Manager, Waipa Networks Limited

Certification Date

This Asset Management Plan was certified by The Board that it describes actual processes and practices on 24 March 2020.

Table of Contents

1.0 Abbreviations

A, kA	Ampere, kilo-Ampere
ABS	Air Break Switch
AMD	Anytime Maximum Demand
ADMS	Advanced Distribution Management System
ADSS	All Di-Electric Self Supporting Fibre Cable
AMMAT	Asset Management Maturity Assessment Tool
AMP	Asset Management Plan
AMIP	Asset Management Improvement Plan
APL	Architectural Profiles Limited
CAIDI	Consumer Average Interruption Duration Index
CAD	Computer Aided Design
CBG GXP	Transpower New Zealand Cambridge GXP
CIC	Transpower New Zealand Customer Investment Contract
DCDB	Digital Cadastral Database
DDO	High Voltage Drop Out Fuses
Disconnector	ABS, Gas Switch, Knife Switch
DR	Demand Response
DER	Distributed Energy Resources
DSD	Transpower New Zealand Detailed Solution Development
EDB	Electricity Distribution Business
EV	Electric Vehicle
GIS	Geographical Information System
GPS	Global Positioning System
GRS	Grid Reliability Standard
GXP	Grid Exit Point
HEMS	Home Energy Management Systems
HV	High Voltage (11kV and above)
ICP	Installation Control Point
ISSP	Information Systems Strategic Plan
IT	Information Technology
KPI	Key Performance Indicator
LINZ	Land Information New Zealand
LV	Low Voltage (400V)
MD	Maximum Demand
MVA	Mega-Volt-Ampere
MW	Megawatt
MBIE	Ministry of Business, Innovation and Employment
NCP	Network Connection Point
NCS	Napier Computer System
NIC	New Investment Contract
NNCS	Non-Network Capacity Support
NZTA	New Zealand Transport Agency
ODAF	Oil Directed Air Forced
ODV	Optimised Deprival Value
PILC	Paper Insulated Lead Cover
POS	Point of Supply
PV	Photo Voltaic
RMA	Resource Management Act
RMU	Ring Main Unit
RTU	Remote Terminal Unit
SAIDI	System Average Interruption Duration Index

SAIFI	System Average Interruption Frequency Index
SCADA	Supervisory Control and Data Acquisition
SCI	Statement of Corporate Intent
SSR	Transpower New Zealand Solution Study Report
TOU	Time of Use
TMU GXP	Transpower New Zealand Te Awamutu GXP
Transpower	Transpower New Zealand Ltd
V, kV	Volt, kilo-Volt
Waipa	Waipa Networks Ltd
XLPE	Cross Linked Polyethylene

2.0 Summary of Asset Management Plan

This summary provides an overview of the content of Waipa Networks AMP. The AMP discusses the Waipa's asset management criteria (quality, capacity, reliability and security of supply) and the planning assumptions (rate of GXP and Company feeder load growth) and the methods adopted to prioritise projects.

Interaction with Corporate Strategy

The AMP is a key document that provides a systematic governance and management framework for managing Waipa's assets

The Company's business planning cycle is integrated with Waipa's Purpose, Statement of Corporate Intent (SCI), annual business plan, capital and operational budgets

Waipa's rural area has a high proportion of dairy farming with associated processing facilities. The substantial road transport network investment is making the region closer to large urban markets attracting manufacturing and the attractive urban areas are growing due to both increased employment and commuting.

Network and Asset Description

Waipa Networks Limited (Waipa) owns and operates the electricity distribution assets in Cambridge and Te Awamutu and their surrounding rural areas in the Waikato region. The Company is owned by the Waipa Networks Trust (the shareholder who represents all connected consumers).

Waipa's distribution system has higher load density than most mainly rural networks.

Waipa conveys electricity on behalf of a large number of energy retailers from Transpower's Cambridge and Te Awamutu Grid eXit Points (GXPs) via radial 11kV feeders, 11kV/400V transformers and associated 400V/230V reticulation to 27,376 ICPs (as at 31 March 2019).

Asset Management Systems, Processes and Information

The AMP describes who is responsible and accountable for asset management from the governance, executive management and operational perspectives.

The Health and Safety at Work Act has not only affected the focus on field workforce safety, but into information systems to assure asset maintenance and public safety inspections occur and the resulting work is completed. Demonstrated compliance and accuracy of system data has increased importance.

Waipa is reviewing the adequacy of the asset management information systems to determine priorities to enhance and update these systems. Information systems while effective on their own are not integrated and involve multiple data entry. Development of an Information Systems Strategic Plan will address updated asset management systems, including: a geographical information system; an Advanced Distribution Management System for optimised fault dispatch, digital notification of outages to customers, network management and analysis; a single network model for the update of network information; an asset management system for the assessment of asset risk, asset health and criticality with predictive models for forecasting network capital expenditure; and electronic drawings and document management system.

Comparative Performance and Service Levels

Waipa's service level targets for various segments of the network are set with stretch targets and an envelope (maximum value). Reliability is as expected for the type of network with targets showing a reduction over time. Customer satisfaction of over 90% as a result of independent surveys demonstrates customers are satisfied with the current reliability of the network and service levels.

Net revenue shows Waipa Networks has lower revenue (line charges per customer) than the industry or other cohort distribution businesses This is in part due to the simple 11kV distribution architecture of our network compared to networks with sub-transmission networks.

The total network opex shows Waipa Networks as having a lower than expected operating cost and is in the best quartile of reliability and cost.

Waipa Networks has reduced vegetation faults to the cohort level with increased vegetation and maintenance expenditure. In proportion, Waipa Networks has somewhat lower levels of defective equipment faults demonstrating the effectiveness of maintenance processes.

Network Development

Further Transpower enhancement work will be required at Cambridge GXP in the immediate future when, due to a combination of spot load increases and ongoing load growth, the supply transformer firm capacity will be exceeded. Of note is a significant new industrial load development, commencing with a new customer of 4.5MVA connecting in 2020 with further load growth potential within five to ten years. Transmission capacity upgrade options have been investigated, with the selected solution being to construct a new 220/33kV GXP to the west of Cambridge, and install two new 33/11kV zone substations at West Cambridge and Hautapu, with associated cabled sub-transmission circuits. In the interim five to seven-year period while the solution is being planned and constructed, Waipa Networks will deliver non-network capacity support to the Cambridge network, through a portfolio of distributed peaking generation, demand side management and distributed energy resources.

The Te Awamutu GXP supply transformer firm capacity is forecast to be exceeded from 2021, with load increases coming from the Waikeria Prison upgrade and other load growth. Load forecasts will be monitored in the interim and network development planning for Te Awamutu will continue to determine the optimal method to increase GXP transformer capacity, overcome 11kV switchgear rating limitations and address future voltage limitations of the Te Awamutu 11kV network. This may involve investment by both Transpower and Waipa Networks. Small incremental solutions are not prudent, and it is likely that a long-term solution will require increased revenue and line charges to customers.

Waipa will continue the reliability improvement strategies of splitting feeders, installing reclosers to segment feeders, automating feeder open points with load break switches to reduce restoration times and installing dropout fuses on spur lines.

Waipa encourages distributed generation on its network and the company continues to have a modest but increasing number of small capacity connections each year. Waipa's strategy to respond to potential disruptive technologies is to maintain a fast follower approach and hold a shorter 10-15-year network development horizon to reduce the risk of network over investment and possible stranding of assets. The fast follower approach will involve trialing new technologies to gain experience prior to possible full-scale deployment, including monitoring the network effects of St Kilda, a high PV penetration subdivision in Cambridge and the pilot solar PV embedded network at Lakewood. The overall objective is to maintain a watching brief on new technologies and position for the likely impacts/opportunities these present for our business.

Life-Cycle Asset Management

The AMP describes Waipa's life-cycle maintenance criteria (is the asset safe and "fit for purpose") and asset physical condition surveys which drive the company's maintenance works. Waipa completed its second asset condition survey in 2019.

We have gathered comprehensive information on the physical attributes of its assets through routine visual surveys and specific partial discharge and corona surveys as required. Based on asset age profiles the Company does not expect any issues with a

significant bow wave of equipment renewals over the next ten years. However, network maintenance expenditure over the next ten years will be steady, addressing a deteriorating wooden cross arm population with galvanised steel replacements.

Line assets are inspected every 8 years, ground mount transformers every three years and trees every six years, although reactive tree trimming is required for some fast-growing species. A review of inspection and fault data has shown low levels of assets that have been defected and then faulted confirming the adequacy of the prioritisation process.

A routine earth testing and repair programme is used to ensure system safety. Waipa employs an external service provider to carry out an annual thermal survey. Any thermal defects identified will be removed as a matter of priority.

Due to high levels of growth and a relatively young network, resources were concentrated on meeting new connection needs. Focus has now returned to network inspection and the resulting maintenance resulted in the planned SAIDI result around 60 minutes, significantly exceeding the previous target of 40 minutes. The planned SAIDI and SAIFI targets have been reset at a higher level to account for the increased maintenance defect work. This situation is expected to continue throughout the ten-year period of this AMP. With continued growth external resources have been required to meet the work volume needs. Checks on defects that have been prioritised as lower priority have shown a low incidence of having caused a fault. The management of criticality has been demonstrated as being effective. Unplanned SAIDI and SAIFI targets have been revised to account for an increase in long-duration outages, primarily caused by third party interference vehicle versus pole incidents, out-of-zone vegetation faults and defective equipment (in that order).

Most assets are younger than industry averages with low numbers of assets considered currently in need of replacement. Only pole mounted switches and transformers appear to be approaching the industry average age. WN intends to do more work on the air-break switch fleet to assess the condition. Ring main units are either SF6 insulant or vacuum insulant and therefore these assets are in good condition. Ground mount transformers are generally also in good condition with some replacements due to corrosion or aging J type fuses.

Waipa Networks pays particular attention to high criticality assets. There are a number of cables that exit the GXPs that have been temporarily de-rated due to unknown soil conditions and hence temperature at high load. There are also sections of multi-circuit lines with more than one feeder on a pole. These are subject to additional condition monitoring to mitigate the risk of multiple feeder faults. Assets vulnerable to third party damage are protected where possible.

The Company has a vegetation management programme to minimise interference from trees and maintain reliability. A systematic inspection and cut programme also focuses on tree removal. Some years ago, tree outages were above the industry norm and increased resources were applied to tree management. This has resulted in a steady reduction in faults, approaching a point where an optimal level of spend can be evaluated.

Risk Management

Waipa uses an ISO 31000 compliant risk management system. An assessment of asset risks shows a number of serious (but not high) risks and improving controls.

Waipa has assessed the risk from physical threats to its network posed by naturally occurring hazards (wind, lightning, floods, land erosion, earthquakes, volcanic eruptions and geothermal activity) and concludes that the risk is minimal and any damage to assets can be dealt with using Company and contracted resources. Waipa has a simple radial network and is confident it can restore power safely in an orderly manner after a major event. Waipa has back-up systems for its business systems and SCADA system to continue operating the business in the event of a major incident.

Waipa is a member of the Waikato Lifelines Utilities Group and will update emergency management plans and processes in 2020.

Risks associated with growth and tree trimming are under active management.

The Company has a number of two pole transformer substation structures comprising hardwood platforms that are over 40 years old and at the end of their economic life. These will be replaced on a condition prioritised basis by either a single pole transformer substation or a pad mounted substation in a programme to be completed in 2020/21.

The risk of widespread outages due to faults on multi-circuit overhead lines that supply adjoining areas on the network (hence limiting back feed capacity to the affected areas) has been evaluated, with the primary risk arising from car versus pole incidents and a secondary risk of insulator or pole top hardware failure causing a multi-circuit flashover fault.

Performance and Plans for Improvement

Overall Operational Expenditure was $8,018k which was $718k (10%) above forecast of $7,300k set for the disclosure year (March 2019). Additional expenditure of $353k was incurred in the Service Interruptions and Emergencies category due to more faults than usual and above average reactive maintenance, in particular irrecoverable car accidents. Asset replacement and renewal was overspent by $146k, resulting from increased spending on transformer, recloser and pillar box maintenance.
Non-network operational expenditure was above forecast by $266k, this was due to higher expenditure on SCADA and switching, staff costs in Network Planning and consultants.

Capital Expenditure on network assets was $6,052k which was $2,175k (26%) below the forecast of $8,227k set for the disclosure year (March 2019). This was due to an underspend on customer connection, system growth (deferral of a cable replacement project and voltage regulators) and underspend on quality of supply (reduce spend on remote controlled switches). Asset replacement and renewal was overspent compared to forecast due to higher renewal of transformers, switchgear and overhead lines.

Network operational expenditure increased in 2020/21 from 2019/20 by a total of $952k. Service interruption & emergencies increased $200k due to an increased number of long duration faults being expected based on recent history. Routine & corrective maintenance & inspection increased by $523k due to network defects & asset maintenance requirements. Asset replacement & renewal increased by $82k due to pillar box maintenance requirements. System operations increased by $84k due to more voltage checks & cable locations. The 110kV line maintenance budget has increased by $106k, associated with increased annual spending on vegetation maintenance, and a one-off increase in defects maintenance to address defects identified from the annual maintenance survey,

The ten-year network capital expenditure totals $92m, an overall increase of $29m (+32%) compared to the AMP 2019 ten- year total. There is a decrease in consumer connection capital of $6.5m due to Waikeria Project being completed. There is an increase in system growth capital of $20m due to Cambridge sub-transmission & Te Awamutu GXP cables. Asset replacement & renewal capital has increased $8.6m due to improved forecasting of expenditure on disconnectors, reclosers, powder-type fuses & Te Awamutu ripple control panel. Quality of supply capital has increased by $6.1m due to the Te Awamutu ripple plant alternative supply & remote-controlled switches. Other reliability, safety & environment capital has increased by $0.7m due to seismic strengthening of voltage regulator structures.

Two notable non-network capital projects are included in 2020/21 expenditure:

- Harrison Drive depot expansion costing $0.8m; required for additional staff and visitor car parking and expansion of depot storage area for new vehicles (digger for vegetation efficiency and improved major storm response) and future sub-transmission equipment.

- Fonterra Hautapu dry type transformers costing $0.13m; Fonterra leases the Hautapu transformers. This project is to replace oil filled units with dry-type units as a fire risk mitigation.

We are following an asset management improvement plan completed in 2018/19, with implementation of improvements to be phased over the coming several years. We aim to reach intermediate level of asset management maturity over time. The improvement plan focuses on process improvement and documentation. Further development of asset management systems and asset data will assist in making future asset management decisions. In particular, further work is required in developing asset condition data, asset health indicators and forecasts of network equipment renewal expenditure.

3.0 Background and Objectives

3.1 Purpose of the Plan

The primary purpose of this AMP is to provide a governance and management framework that implements Waipa Networks' Asset Management Policy:

Asset Management Policy

Waipa Networks is committed to maintaining, operating and developing its electrical distribution system and supporting management structures to convey electricity to connected customers in a safe, reliable, efficient and sustainable manner.

This will be achieved through the regular review, continuous development and application of an Asset Management Plan.

The Asset Management Plan provides a governance and management framework that ensures Waipa Networks:

- Sets service levels for its electricity network that reflect safety, customer, community and regulatory requirements.
- Based on those expected service levels, understands what network capacity, reliability and security of supply will be required both now and in the future and what issues drive these requirements.
- Has a robust and transparent process in place for managing all phases of the network lifecycle from concept to disposal.
- Has adequately considered the classes of risk implicit in all of the network lifecycle activities and that it has systematic processes in place to mitigate identified risks.
- Has made adequate provision for funding and resourcing all phases of the network lifecycle for incorporating into the Company's annual and ten-year budgeting cycles.
- Makes decisions within systematic and structured frameworks at each level within the business eliminating ad-hoc decisions.
- Has an ever-increasing knowledge of its asset locations, ages, conditions and the networks likely future behaviour as it ages or is required to perform at different levels.

The secondary purpose of this AMP is to inform Waipa's stakeholders of the Company's:

- policies for investment in construction, maintenance and retirement of assets,
- policies for operating the network in a safe and prudent manner,
- security of supply and network reliability targets for different consumer segments,
- areas of asset management where improvements are required,
- major network developments and enhancements over the next 10 years and
- annual capital and maintenance expenditure forecasts.

This AMP meets the legislative requirements of the Electricity Distribution Disclosure Determination 2012.

This AMP meets the needs of external users and addresses information gaps to enhance the transparency of disclosure by identifying deficiencies and promoting improvements.

3.2 Interaction with Corporate Goals, Business Planning Process and Plans

Waipa's Business Planning Process is outlined as follows.

Waipa Networks Vision Mission and Objectives

The annual Statement of Corporate Intent contains the following statement of Waipa Networks' vision, mission and objectives:

Our vision:

- **A Waipa Energy Community with customers connected to the most economic electricity supply for them. Informed decisions are made about what sustainable energy production is best for their situation and at what level of reliability they desire. Those connections are made safely all day, every day by Waipa Networks.**

Our mission:

- **To improve the lives of our connected customers through emerging and existing energy network-related solutions.**

Our objectives:

- **Deliver power safely all day every day**
- **Facilitating energy use not just a connection**
- **Building a sustainable business by establishing energy communities in the Waipa region**
- **Extend the availability of existing and new energy products from pilot projects to the broader community.**

The primary objective of the Company is to be a successful business. It will do this by:

- providing customers with outstanding service and solutions,
- providing value for money,
- operating in an environmentally friendly and sustainable fashion,
- being aware of technological changes which could impact the business model,
- pricing Line Function Services to ensure connected consumers are charged equitably to achieve sustainable profit levels, and
- having regard to the efficient use of energy.

The Company seeks to be a high performing lines company exercising a philosophy appropriate to its ownership structure, a safe and good employer, and a good corporate citizen.

The Strategic Plan has identified Asset Management as a fundamental component for achieving this. Specifically, the strategic vision that the asset management team is responsible for delivering includes:

- **Keep abreast of technology with the ability to impact on our business, develop strategies to respond appropriately to these challenges and exploit the opportunities they present.**
- **Ensure the addition of new distribution capacity will be matched as closely as possible to actual and forecast market demand.**
- **Develop shorter network capital investment horizons to mitigate against assets being stranded by developing technologies.**

- **Focus on reducing operating costs and optimising use of capital to achieve commercial efficiency and effectiveness while at all times providing outstanding service and solutions.**
- **Prudently manage assets, liabilities, risks and costs.**

The bolded items above are specific items that the Board needs to see demonstrated for commercial outcomes in the AMP. Waipa Networks' principal focus remains delivering safe, reliable and efficient electricity lines services. The regulatory construct that bounds Waipa Networks' largest asset dictates that this remains so. However, this underpins a strategic direction targeted at establishing true energy communities with Waipa Networks connected customers and exploring the possibilities afforded by the changing technology landscape in the electricity distribution industry.

To successfully deliver our Network Performance Targets there are four broad elements of our strategy that direct the activities of the organisation:

Our Customer Strategy – a customer's direct experience with the organisation is often as a result of an outage or when they want to make a change to their level of service. Our strategy is to where possible manage our customer's expectations and communicate with them in a timely manner, as it is difficult to create a positive experience when power is out to a community and we rely on the goodwill we create prior to such events occurring.

As per our strategy we will continue to engage with the community through a variety of media on areas of interest such as outages, public safety, and pricing.

Our Assets Life Cycle Strategy - we seek to proactively manage the lifecycle of assets on the Network to manage the risk to public and staff, maximise their utility and minimise costs/outages. We do this by installing new assets when growth and/or network security concerns justify it. We refurbish or replace assets when they approach end of life or represent unacceptable safety or security risk.

Our maintenance activities are designed to maintain the usefulness of our assets for as long as possible, so as to maximise their reliability, utilisation and life.

We design and maintain our networks so as to minimise any disruption to our customers and to be as resilient as possible to storms and other disruptive events. We manage asset risks by systematically assessing probability and consequences of failure. This also helps us prepare budgets and prioritise our expenditure.

Our Delivery Strategy – is to work closely with our internal contracting group who understand the local community and network geography to deliver value to our customers and stakeholders. Where we lack the expertise, we will utilise reputable third parties who understand our needs and place a similar value on health and safety and service.

We periodically review how we manage works activities for maximum efficiency and what spares inventories we need to hold.

Our Enablers Strategy – we recognise that our people are our greatest asset and continue to foster innovation and improvement through involvement in various industry working groups by individuals across the organisation, training, empowerment and recognition of achievement.

We seek to leverage off-the-shelf technology compliant with international standards where practical.

We continue to investigate areas of our information management systems and other non-network assets such as computers, vehicles and buildings for opportunities to standardise or benefit from scale.

Asset Management Plan

The annual Strategic Planning Meeting of the Executive Management and a selection of team members contributed to updating the strategic direction of Waipa Networks. Company review of the AMP by management and Company Directors takes into account that strategic direction and past network physical and financial performance, the current SCI and information affecting future network performance and expenditure.

This AMP is predicated on one of Waipa's objectives:

Deliver power safely all day every day

Additionally, this AMP is part of the process of delivering on Waipa Networks' health and safety objective:

Keeping our people safe

This AMP maintains a high-level focus on Waipa's Beliefs:

Building and maintaining community network assets and wealth

Our community is part of us

Provision of value for money

Life improvement through energy and network related business

This AMP focuses on network asset management related matters. It does not discuss business or financial matters related to the non-network asset management aspects of the Company.

Annual Business Plan and Budgets

The Annual Business Plan and Budgets are informed by the AMP and provide implementation details and the financial ability to achieve the outcomes of the AMP. The Annual Business Plan, Network Capital and Operational Budgets are approved by Directors at Waipa's March Board meeting.

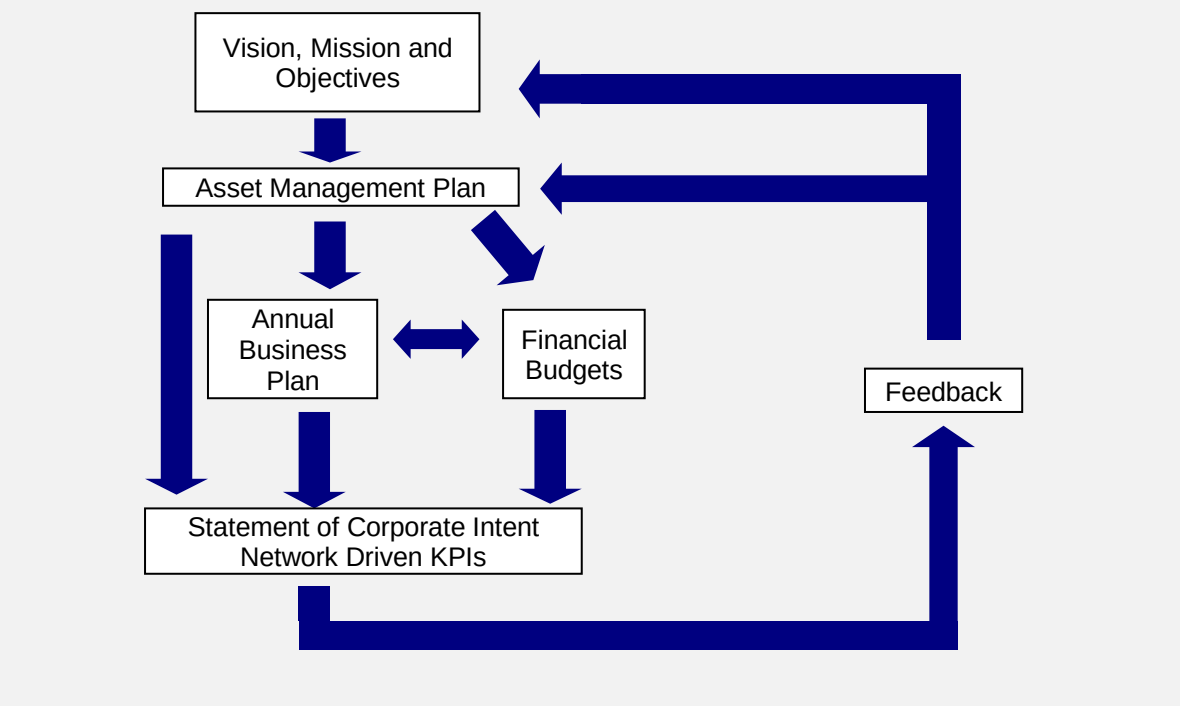
Statement of Corporate Intent

The SCI is derived from the AMP, Annual Plan and full financial budgets. The SCI sets agreed KPIs for the Company's key physical and financial performance targets for 3 financial years. The SCI is approved and adopted by the Waipa Networks Trust (Waipa's shareholder) by 31 May each year.

Company Directors report to Waipa Networks Trust in June and December on Waipa's actual physical and financial performance against the SCI targets. A gap analysis on significant variances provides an important input for Directors and Executive Management at their annual Strategic Planning Meeting.

This feedback closes the Business Planning Process cycle shown below.

Business Planning Process Cycle



3.3 Period Covered by Plan and Date Certified

This AMP identifies all new investments with Transpower and capital and maintenance works on the network that are reasonably expected to be undertaken over the next 10 years between 1 April 2020 and 31 March 2030.

This AMP was certified by Waipa's Board of Directors that it describes the Company's actual processes and practices on 31 March 2020.

3.4 Stakeholder Interests

The following table identifies Waipa's stakeholders, how they relate to Company and their reasons for doing so.

Stakeholders	Relationship / Interface	Nature of Interest
Electricity consumers	Beneficiaries of Waipa Networks Trust Independent surveys Consultation meetings Daily direct and indirect feedback	Fault services, Network reliability Quality of supply, Controlled supply New connections, Safety disconnects Service requests, Bi-annual discount Cost of supply
Fonterra Architectural Profiles Limited (APL) Aotearoa Developments Department of Corrections Major subdivision developers	Conveyance agreements where applicable Ad-hoc meetings	Future demand plans, Network capacity, Network reliability, Quality of supply, Cost of supply

Waipa Networks Trust	Shareholder Six monthly meetings	Return on investment Bi-annual discount Sustainable business Responsible corporate behaviour KPIs
Electricity Retailers	Interposed use-of-system agreements Ad-hoc meetings	Line charges and methodology Line losses, Revenue protection Billing accuracy and timeliness Retailer services Quality of supply and reliability
Waipa, Otorohanga, Waikato & Waitomo District Councils, Waikato Regional Council	Utility service provider Road requirements Regular meetings RMA / Planning	District & Regional planning Traffic management Utility services locations Co-ordinated street openings
NZTA, KiwiRail	Road user requirements Rail asset owner requirements Correspondence, ad-hoc meetings	Traffic management Street lighting Utility services locations Electrical interference & safety clearances
Other utility operators	Road user requirements Ad-hoc meetings	Utility services locations
Transpower	Transmission Pricing Agreement Customer Investment Contracts Quarterly meetings System Operator regarding operation of HTI-TMU 110kV line	Capacity, reliability and maintenance of grid transmission and connection assets including HTI-TMU 110kV line Security of transmission lines Code compliance at GXP interface
Electricity Authority Commerce Commission MBIE Auditor General Inland Revenue	Electricity Distribution Business Legal operating framework Ad-hoc meetings, discussions and correspondence	Information Disclosure compliance Threshold compliance Compliant business practices Submissions on proposals
Industry Suppliers	Goods & services provider	Products and services
Waipa Employees	In house Company work force	Zero injuries Healthy employment environment Remuneration Individual training plans Personal growth opportunities
Utility Disputes (formerly the Electricity & Gas Complaints Commission)	Customer complaints	Customer complaints
Waikato Networks Limited (Ultrafast Fibre)	Shared use of Assets	Attachment of ADSS fibre cable to poles Part ownership of Waikato Networks Limited
Chorus	Shared use of Assets	Attachment of copper and fibre cables to Waipa poles. Attachment of electricity lines to Chorus network poles.
National Emergency Management Agency	Lifeline utility emergency preparedness Waikato Lifeline Utility Group meetings	Emergency preparedness and risk management related to maintaining electricity supply during natural disasters.

Waipa Networks will issue this AMP to and consult with the following stakeholders on an annual basis as a consultation and feedback mechanism:

- Waipa District Council
- Waikato District Council
- Otorohanga District Council
- Waikato Regional Council
- Fonterra
- Architectural Profiles Limited (APL)
- Aotearoa Developments
- Major subdivision developers
- Transpower
- National Emergency Management Agency

Waipa Networks is an EDB owned by Waipa Networks Trust whose beneficiaries are the electricity consumers connected to the Company's network.

Consumer interests are ascertained by independent surveys, consultation meetings, direct and indirect feedback on the Company's plans, performance and service delivery. Stakeholder communication is based on the needs of particular groups. Currently with higher levels of growth the focus is more based in meeting needs in this area. Regular contact with other stakeholders tends to determine if specific issues need addressing.

Other stakeholders include energy retailers, by virtue of interposed use-of-system agreements, Waipa, Otorohanga, Waikato and Waitomo District Councils with district planning issues, Waikato Regional Council, Transit NZ, KiwiRail and other utility operators with common reticulation concerns and various government agencies with monopoly business and information disclosure requirements.

Waipa's commercial, energy efficiency, customer service, security and reliability of supply, compliance, staff and social and community objectives are outlined in the SCI, the essence of which is expressed in the Company's mission and objectives;

To improve the lives of our connected customers through emerging and existing energy network-related solutions

Deliver power safely all day every day

The interests of stakeholders are recognised and conveyed to the Company by Waipa Networks Trust, Waipa Networks Board of Directors and by the Company's customers, connected consumers and employees.

From an asset management perspective, the interests of Waipa's stakeholders are addressed by ensuring:

- Creation and maintenance of a safe and reliable distribution network,
- Quality of supply performance meeting consumers' needs,
- Optimisation of capital and operational expenditure,
- Maintaining a sustainable business that caters for consumer's growth requirements,
- Comprehensive risk management strategies and planning for contingencies,
- Due consideration to the environmental impact of Waipa's operations,
- Regulatory and legal compliance,
- Economically efficient pricing methodologies,
- Technically efficient selection of network equipment to optimise electrical losses
- Security standards reflecting consumers' needs,
- Robust network growth and development plans are prepared,
- Comprehensive asset replacement strategies are developed,
- Surveying and monitoring asset condition to maintain a reliable network,
- Identifying critical assets,
- Maintaining network assets in good, fit for purpose condition.

No material conflicts of interest have arisen between the Company and the Waipa Networks Trust who represent the consumer owners of the Company.

However, where conflicts arise between other Stakeholders defined in the above table Waipa's priorities for managing these conflicts are to ensure that;

- public and employee safety is not compromised,
- the solution is financially and operationally viable,

- the quality of supply is not compromised,
- the solution is in compliance with best EDB practice and
- customers' reasonable expectations are met.

3.5 Accountabilities and Responsibilities for Asset Management

Waipa's Network Management team determines the network enhancement and asset maintenance programmes, the various security of supply levels and the standards for automation and system operations that will improve network reliability and technical and economic efficiency.

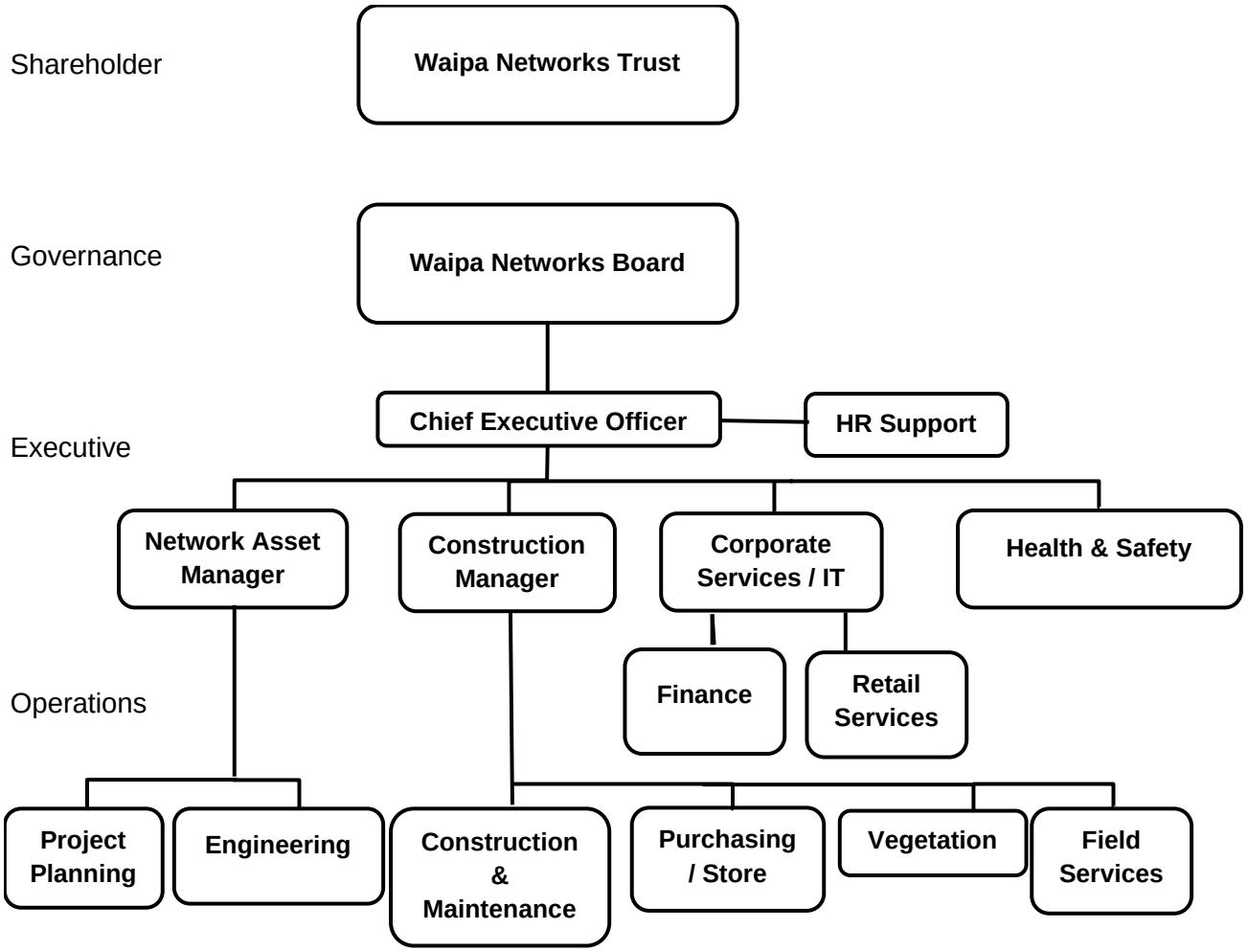
Major network capital works identified by the Network Management team with indicative budgets are tabled at the Company's September Strategic Planning meeting for Director's information, evaluation and appropriate approval.

The AMP is prepared by the Network Asset Manager, authorised by the Chief Executive and certified by the Company's Directors the following March.

Waipa's Network Asset Manager provides monthly reports to the Company's Directors on progress against targets of the annual capital and maintenance plans, system reliability and performance targets.

Waipa's Board reports to Waipa Networks Trust bi-annually on progress against the targets and plans agreed in the SCI.

An organisation chart depicting Waipa Networks Trust, Waipa's Board of Directors, Executive Management and Operational positions responsible for asset management planning and disclosure is shown below.



The Network Asset Manager holds the prime responsibility for the disclosure of the AMP and associated schedules.

The Network Asset Manager chairs the Company's Network, Operations & Engineering Team comprising; Construction Manager, Field Services Supervisor, Network Planning Manager, Customer Connections Supervisor, Construction & Maintenance Supervisor, Vegetation Supervisor, Health, Safety & Quality Manager, Purchasing & Stores Supervisor, all of whom have a significant input into the AMP by identifying the required capital projects and operational works.

The Network Information Specialists are responsible for managing records of network assets.

The Chief Financial Officer is responsible for assembling the budgets and reporting expenditure, corporate business systems and IT functions within Waipa Networks and compilation of information disclosure schedules. An outsourced Human Resources function provides support for recruitment and training of staff. The Health, Safety & Quality Manager is responsible for liaison with WorkSafe NZ, industry compliance and Waipa's Public Safety Management System and Workplace Safety Management Practices accreditation.

The Network Asset Manager, Construction Manager, Health, Safety & Quality Manager and Chief Financial Officer/IT Manager have significant input into the AMMAT assessment.

Waipa's AMP is produced within the Company and all information used in it is determined by the Company's management team. The CEO authorises the AMP and the Board certify it.

Resourcing Asset Management

The Company currently has the ability to carry out the majority of all planned and unplanned cable and pole line work and vegetation management. Waipa continually reviews the performance and cost effectiveness of its field crew services by contracting in external service providers when work load exceeds our internal resource to ensure construction and maintenance costs remain competitive. Contracting out Waipa Networks' field crews has not occurred for some years, but remains an option where necessary to ensure productive use of our internal field crews.

Waipa uses independent contractors as required to carry out thermal surveys, drone camera inspections of overhead assets, earth testing and repairs partial discharge surveys and acoustic monitoring surveys. This information is used by the Company's Network Management team for condition-based maintenance and replacement of electricity assets and network enhancements.

The Company has contracted out Control Room and Call Centre services, aspects of SCADA and communication work, main road directional drilling and traffic management on State Highways and for most roadside lines and vegetation management works.

Waipa has also contracted out the condition assessment and maintenance of the new Hangatiki to Te Awamutu 110kV line because the Company does not have these skill sets internally. Waipa will use its own fault staff to carry out fault patrols of the line as required.

3.6 Asset Management Systems, Processes and Information

Asset Management Systems

Waipa operates three primary asset management systems to manage its existing assets, plan network development and measure network performance. These systems comprise an Abbey SCADA system for network supervisory control and data acquisition, an AutoCAD system for geographic asset information and a Napier Computer System which provides an integrated data warehouse.

The Company also uses a network modelling tool, ETAP, to predict current and future network performance under steady state and fault conditions and model the impact of proposed system enhancements and future demand.

The Company's uses of these asset management systems are shown in the following table.

Asset Management System	Uses
Abbey SCADA Supervisory Control & Data Acquisition	• System control • Load control • Operational status • Network loading data • Voltage data • Alarm and fault data • Reliability data
Geographic Information System AutoCAD	• Asset geographical location data • System schematics and reticulation plans • System operations • Construction plans • Design standards • Owner, road and property boundary data
MagiQ Integrated Data Warehouse	• Installation Control Point data • Call centre enquiries • Planned outage notification • Outage (planned and unplanned) data • Asset data (type, number/length, age, asset value) • Network condition and vegetation data • Financial applications (General Ledger, Creditors Ledger, Debtors Ledger, Banking Transaction processing, Payroll, Human Resources, Stores, Purchase Orders, Asset Register (Financial and taxation) • Disclosure statistics and information
Matlab Network Data Management System	Data extraction for: • Electrical network modelling • Load flow analysis • Electrical network planning and design
ETAP Network Modelling Software	• Electrical network modelling • Load flow analysis • Short circuit fault current analysis • Electrical network planning and design • Electrical cable capacity calculations

Supervisory Control and Data Acquisition System

The prime function of SCADA is to provide a real time interface with the network which enables the safe operation and management of; network assets, reliability of supply and system peaks.

Data and alarms from field assets are brought back via Waipa's radio communication links to the Control Centre and displayed for the System Operators to remotely monitor and control equipment for optimal network performance.

The data collected includes feeder currents, voltages, real and reactive power, power factor and asset operational status. Relevant data is archived in the Integrated Data Warehouse. This information is used to establish network asset maintenance programs, plan network developments and measure and disclose network performance.

The SCADA system manages ripple injection plants at both Te Awamutu and Cambridge to control the load over peak times at GXP and/or feeder level.

Geographic Information System

The prime function of the Geographic Information System is to provide the physical location and electrical connectivity of all Waipa's network assets so that they are safely operated by the System Operators and field crews and effectively managed by the Network Information Officer and Planners.

All the Company's assets have been surveyed. The data collected included asset locations, their physical and electrical attributes and condition (serviceable/defected/asset health condition). The spatial information has been overlaid with property boundaries within the geographic information system.

The electrical connectivity from each ICP through to the Transpower GXP has been proven. The asset physical and electrical attributes and equipment defect condition status (where applicable) is archived in the Integrated Data Warehouse.

The on-going focus of the Network Information Officer is to ensure that network asset information is updated in a timely manner in the Geographic Information System and Integrated Data Warehouse System.

Asset geographical, physical and electrical attribute data is used for network development, design and consumer connections. The asset condition information is used to establish prioritised network asset maintenance programs.

Integrated Data Warehouse System

The key function of the Integrated Data Warehouse System is to provide a single repository for all data which is held in specific data bases and all the necessary applications for Waipa to operate and manage its EDB. All the data bases and applications can be accessed through a web browser.

The salient data bases are:

- ICP
- Call Centre Enquiry
- Outages (Planned and Unplanned)
- Asset Equipment including Substation and Site
- Asset Condition
- Financials

ICP Database

The ICP database is used by the Call Centre for their daily operations and to provide information to the Outage database for the calculation of network reliability performance. The ICP database contains a complete history of all outages and recorded customer comments.

ICP data comes from the customer, retailers, electrical inspectors and Waipa itself. Some of the data transferred between these parties relies on manual processes and routine checks are in place to ensure data integrity. The ICP database is continually updated with new and disconnected customers.

Call Centre Database

Waipa has contracted its call answering and dispatch activities to a remotely located Call Centre. The Call Centre logs all incoming and outgoing dispatch calls in the Call Centre database. The Call Centre relies on the ICP Database information for its operation.

SCADA information is used in an Avalanche Outage Communication Platform which updates customers with known outage information and expected restoration times.

Outage Database

Waipa operates a manual planned and unplanned Outage Database.

For planned outages switching instruction sheets are prepared identifying areas of the network affected. These are used to prepare shutdown advertising sheets to notify retailers and customers of the planned outage. The details of the intended shutdown are recorded in the Outage database. Actual switching times on the switching instruction sheets are used to update the Outage database.

For unplanned outages the details are recorded on an emergency switching instruction sheet by the System Operator. This information is used to compile an unplanned outage report. These reports are checked by the Network Asset Manager before the details are entered into the Outage database. Customer numbers for both planned and unplanned outages are sourced from the ICP database. Customer numbers can be obtained by feeder, module (section of network between 11kV switching points) or individual transformer level. The ICP database is continually updated with new and disconnected customers.

This data enables the calculation of SAIDI and SAIFI for each outage. The impact of each outage is summed to generate the outage statistics for measuring network performance for disclosure purposes. This information is also used to identify potential problems on the network and is used in the planning process.

Asset Equipment Database

Waipa's Asset Equipment Database comprises a number of subset databases which contain comprehensive physical, electrical, location and valuation information on substations, transformers, switchgear, voltage regulators and sites.

This Asset information is used for network design, asset valuation and disclosure.

Asset Condition Database

The asset condition survey information is linked to the Asset databases and is used to establish and prioritise Waipa's preventive maintenance program.

Financial Systems

Waipa has the following interlinked financial applications within the Integrated Data Warehouse essential for the operation of an EDB;

- General Ledger,
- Creditors Ledger,
- Debtors Ledger,
- Banking Transaction processing,
- Payroll,
- Human Resources,
- Stores,
- Purchase Orders and
- Asset Register (Financial and taxation).

Asset Management Process

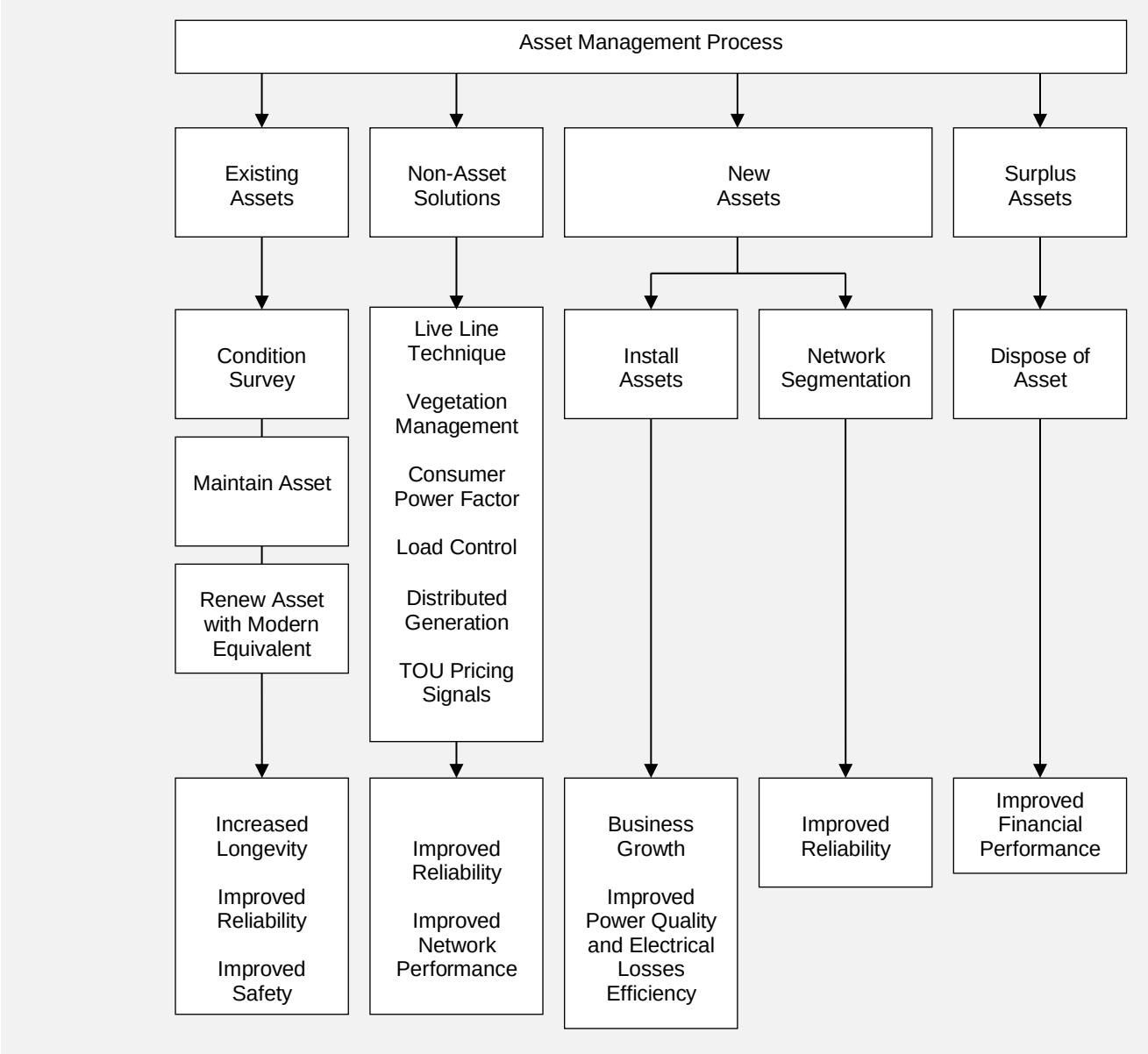
Waipa's asset management process covers the activity associated with the management of:

- existing assets through their life cycle,
- non-asset solutions to address network issues,
- the creation of new assets and
- disposal of surplus or end of life assets.

The Company's desired outcomes of these asset management activities:

- increased asset longevity,
- improved network reliability,
- improved network safety,
- improved power quality,
- technically efficient equipment to optimise electrical losses,
- improved financial performance and
- business growth

The components of the asset management process are shown in the following diagram.



Asset Management Information

Waipa's network surveys provide the Company with comprehensive information on all of its assets' locations, physical and electrical attributes and their condition at the time of survey.

This initial data obtained during the first survey completed in 2006 has been supported by subsequent asset condition surveys and construction, equipment replacement and upgrade records. In 2019 Waipa Networks completed the second asset condition survey on all feeders and has commenced the third asset condition survey of all overhead and ground mounted network assets.

Waipa has developed and operates robust asset management information systems appropriate for;

- the size of the network and number and type of distribution assets,
- the Company's financial and administrative business needs,
- consumer needs, and
- other stakeholders' requirements.

However, improvements in asset management systems to improve integration and reduce the need for staff intervention to integrate between data sources is required. The development of an Information Systems Strategic Plan (ISSP) is planned to identify and prioritise the required enhancement of asset management systems.

Matlab Network Data Management System

The Company invested in Matlab software for network data management in 2019. The system was developed internally to extract data for network management purposes, including electrical network modelling, load flow analysis and electrical network planning and design.

ETAP Network Modelling Software

The Company invested in ETAP network modelling software in 2011 and the initial data input by the Network Information Officer with the assistance of the Planners began in 2012. Completing data models of feeders has continued, with models produced when required to understand the effects of emerging voltage issues or demand from new connections or increased demands.

The software can be utilised to model the network electrically, perform load flow analysis, calculate short circuit current flows, aid electrical network design and complete electricity cable rating calculations.

Waipa can position more accurately the locations for voltage regulators, automatic reclosers and their settings and required conductor upgrades and model their effect on the network. Network development studies to plan connection of new loads to the network and to test the back-feed performance of feeders can be completed.

4 Assets Covered

4.1 Distribution Area

Waipa owns and manages electricity distribution assets in Cambridge, Te Awamutu and surrounding areas, which are predominately in the local authority areas of Waipa and Otorohanga Districts, with minor reticulation in part of the Waikato District south of Hamilton and Waitomo District south of Kawhia.

In the urban and suburban areas of Cambridge, Leamington, Te Awamutu, Hairini, Kihikihi, Ohaupo, Pirongia and Kawhia the Company's distribution assets are generally located within road reserve.

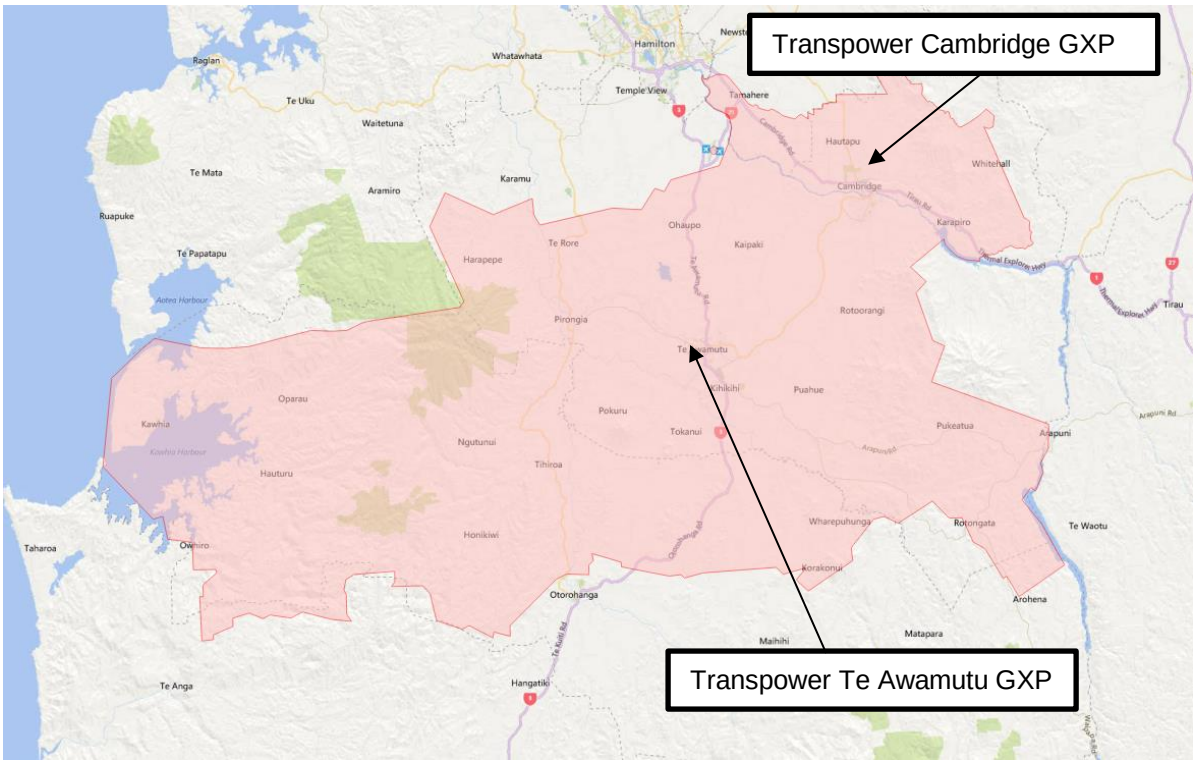
In the rural areas of Tamahere, French Pass, Roto-O-Rangi and Kaipaki that surround Cambridge and in Paterangi, Pirongia, Pokuru, Kiokio, Waikeria, Pukeatua and Mystery Creek that surround Te Awamutu, whilst the Company's distribution assets are generally located within road reserve, there are areas where these assets traverse private property as the most economical way to reticulate the area.

In the remote rural areas of Kawhia and Hauturu with low population densities there are significant areas where the Company's assets traverse private property.

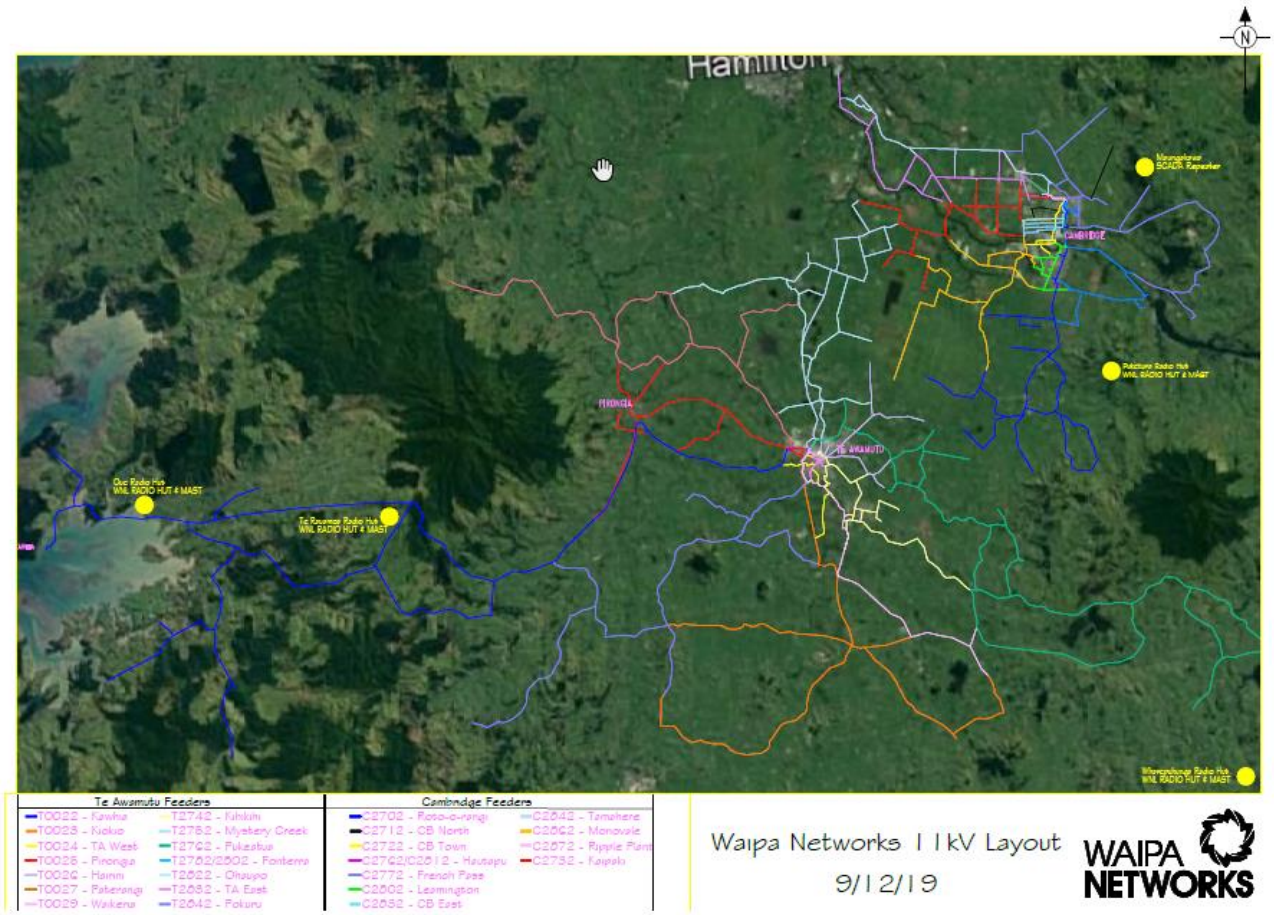
Waipa takes supply from Transpower's Cambridge and Te Awamutu GXPs at 11kV. The Company has no 33kV or higher voltages operating as a sub-transmission system or zone substations. However, due to continuous growth and the possibility of major loads connecting to the network, these options will need to be evaluated to maintain reliability, security, and continuity of supply. The Hangatiki to Te Awamutu 110kV line is a transmission asset to provide the required n-1 security for Te Awamutu GXP, and was commissioned in 2016.

Waipa conveys electricity on behalf of 15 retailers (operating under 18 brand names) from both Cambridge and Te Awamutu GXPs via 27 radial 11kV circuits, 11kV/400V transformers and associated 400V/230V reticulation to 26,320 consumer installations (as at 31 March 2018).

Waipa's distribution system covers 1,865 square kilometres. The area reticulated is shown on the following map.



The geographic view of the 27 11kV feeders on the two networks of Cambridge and Te Awamutu is shown in the following diagram. Five communication repeater sites are also shown on this diagram.

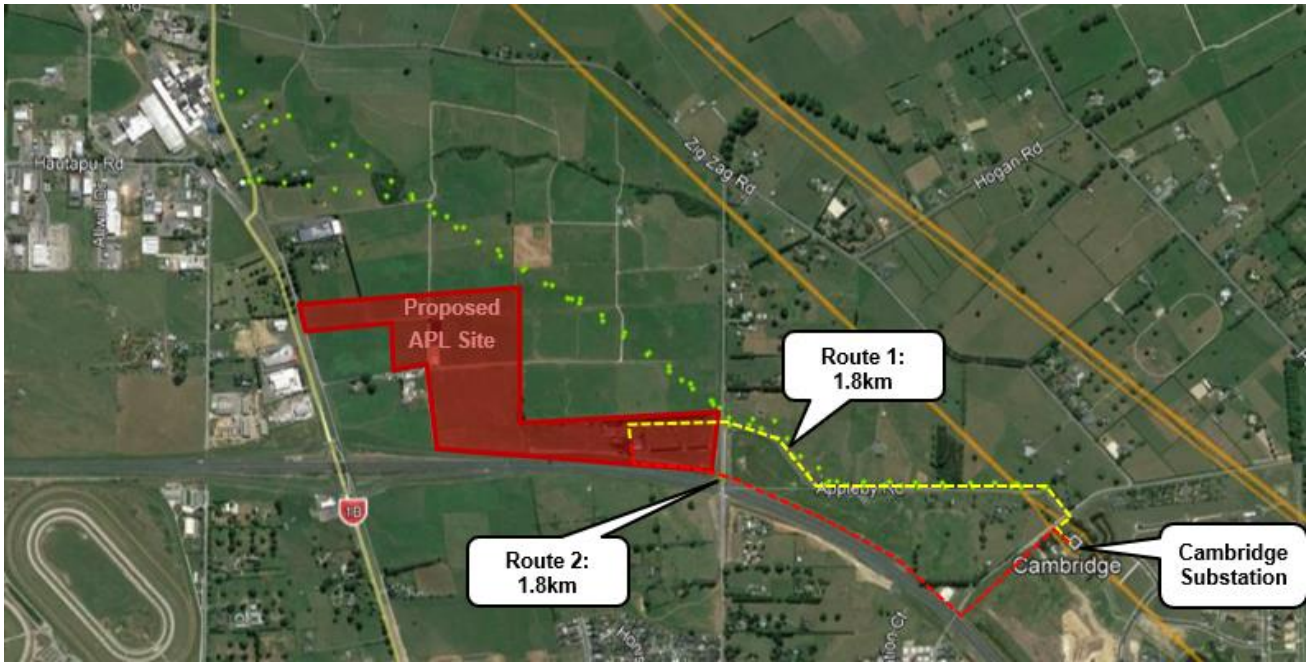


Larger Consumers

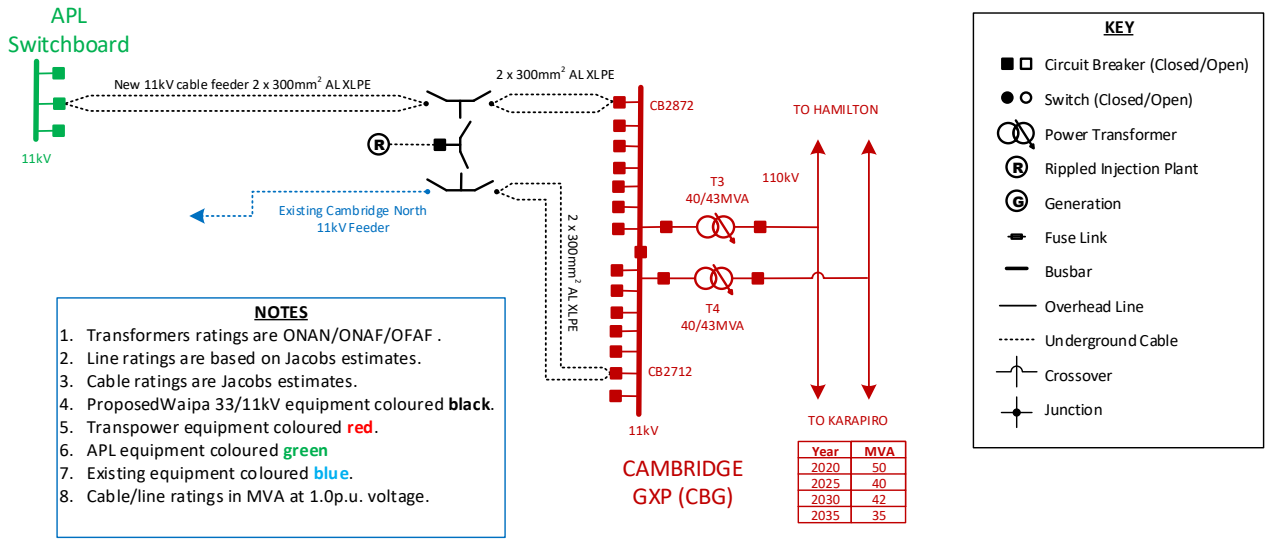
Waipa supplies two large Fonterra dairy factories located at Hautapu and Te Awamutu. The Hautapu factory is 7 km from Cambridge GXP and is supplied via two dedicated 11kV overhead line feeders. The Te Awamutu factory is located 2km from Te Awamutu GXP and is supplied via two dedicated 11kV cable feeders. Fonterra contracts every year with Waipa for each factory's MD requirement. Currently, Hautapu MD does not exceed 10MW and Te Awamutu MD does not exceed 4.5MW.

Fonterra's MD requirements have a significant impact on Waipa's system peak load control regime and available capacity at Transpower's Cambridge and Te Awamutu GXPs.

A new Stage 1 network supply has been constructed for Architectural Profiles Limited (APL) from the Cambridge GXP to their new glass and aluminium joinery factory at Hautapu. The Stage 1 supply consists of two paralleled 1.8km cable feeders connected to a Ring main unit (RMU) that supplies the APL factory and the Cambridge Ripple Plant. This is shown as Route 1 on the diagram below, Route 2 was an alternative investigated in the planning phase. The supply is capable of connecting 9 MVA of load, but the initial load of the factory is 4.5 MVA. The APL Stage 1 load addition in combination with organic load growth requires a significant upgrade to GXP capacity. Subsequent stages could add another 10 MVA of load, requiring a new industrial zone substation at Hautapu. A second RMU provides a back-feed option during Transpower circuit breaker maintenance, as shown in the single line diagram below.


Hautapu Rd
Zig Zag Rd
Hogan Rd
Proposed
APL Site
Route 1:
1.8km
Route 2:
1.8km
Cambridge
Cambridge
Substation


Ripple
Plant
Building
New 11kV
Feeder
(Route 1)
Proposed
APL Site
Existing
11kV
Feeder
RMU
Location
11kV
Switch-
room



The Department of Corrections have a project to develop a new 600 bed prison facility at Waikeria to the South of the network, but require a network connection that is future-proofed for further expansion. This will require a new feeder and two new circuit breakers on the 11kV Switchboard B at the Te Awamutu GXP to supply the new 2.0 MW load with up to 4.0MW load total in future. Construction of for this new supply is underway, and the new network supply will be commissioned in 2020. Transpower upgrade of the 11kV Switchboard B will proceed following initial commissioning of the new feeder supply, expected by 2022.

Aotearoa Developments have discussed potential increases in load at their site in Leamington in recent years. This site has excess land available for industrial use and consultation regarding their future plans is ongoing.

The Lakewood development on the north side of the Cambridge CBD area is continuing to be built out, with a final load forecast of 1.0 MVA expected. As a pilot, Waipa Networks is establishing a 450kW PV solar installation (an expected final capacity) and an embedded network on the site. The embedded network comprises three transformers with a combined nameplate capacity of 1,750 kVA. 145kW was commissioned in July 2019 (Block F), 66 kW was commissioned in November 2019 (Block D), and Block C will be mid 2020 (kW yet to be determined). There are 47 ICPs on the embedded network to date.

There are no other large consumers that have a significant impact on Waipa's network operations or asset management priorities.

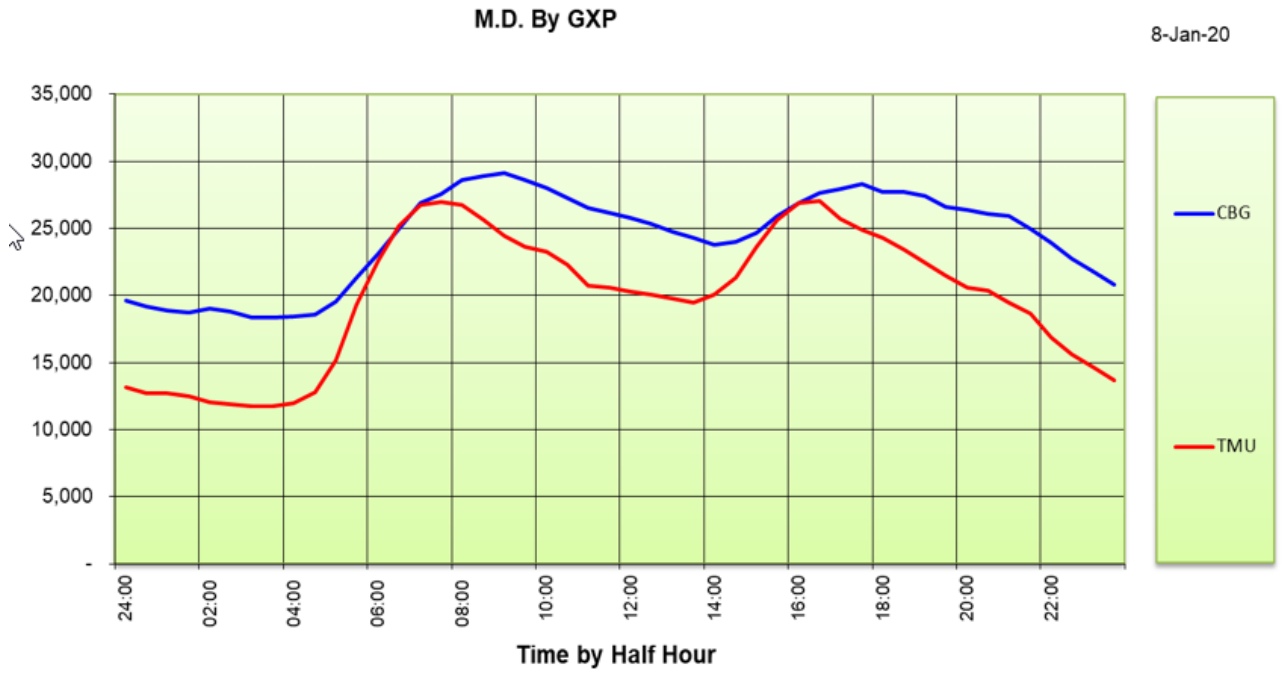
Load Characteristics

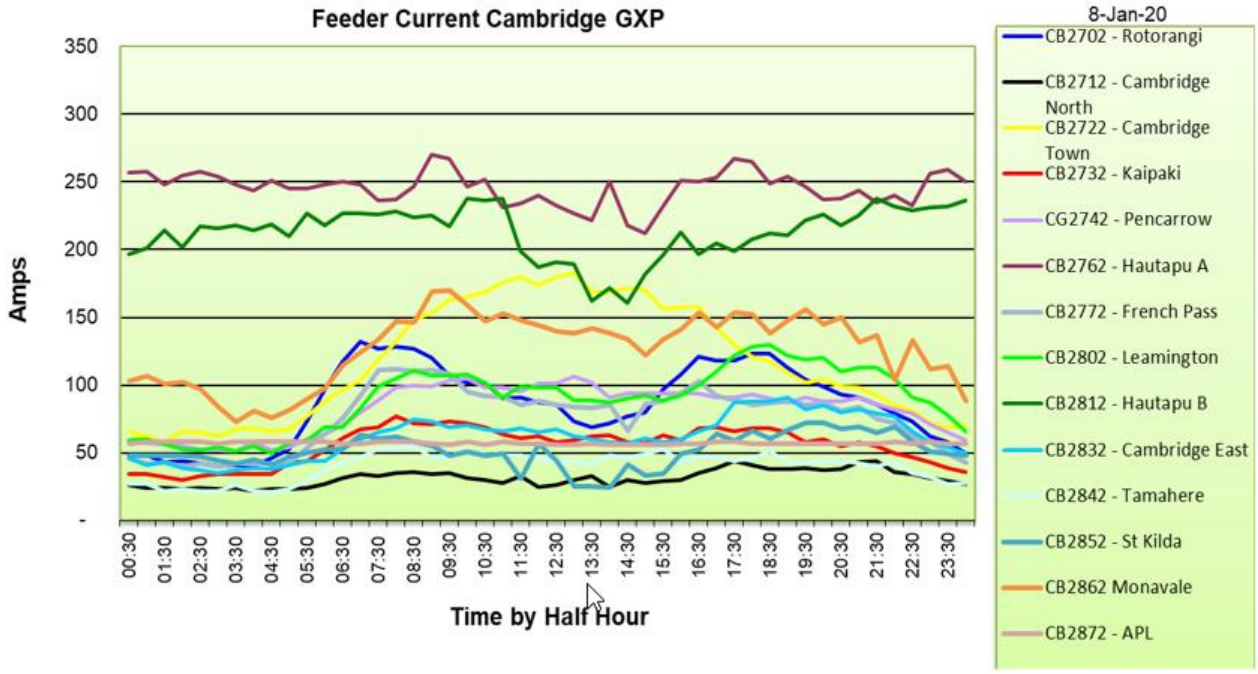
Waipa's urban and suburban feeders exhibit a typical EDB load profile where there are morning and evening peaks caused by residential demand superimposed over the commercial demand through the normal business day.

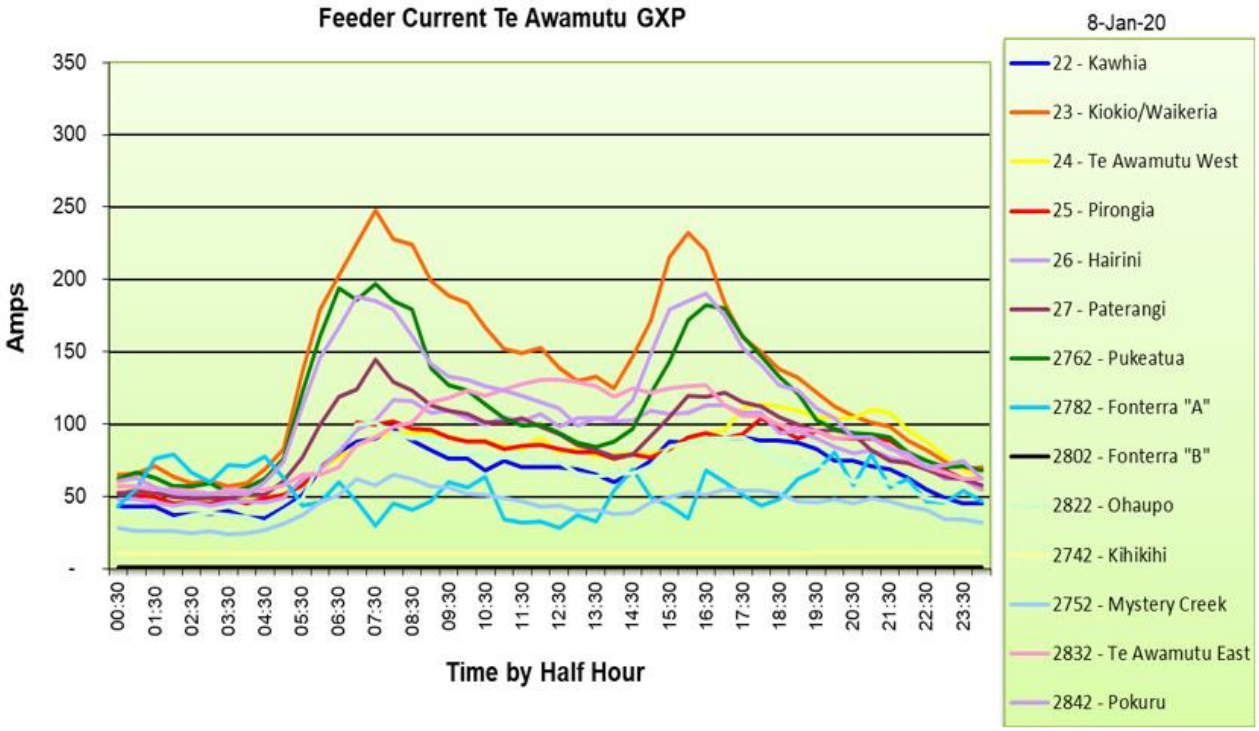
Waipa's rural feeders exhibit the same residential characteristics but with much higher early morning and afternoon demands during the dairy milking season.

The Fonterra loads are characterised by high demand with fluctuations occurring with process demands throughout each twenty-four-hour period over the dairy season.

Transpower's GXP maximum demands and Waipa's 11kV feeder load profiles for a typical week day in January are shown in the following graphs.


M.D. By GXP
8-Jan-20
35,000
30,000
25,000
20,000
15,000
10,000
5,000
-
MW
24:00
02:00
04:00
06:00
08:00
10:00
12:00
14:00
16:00
18:00
20:00
22:00
Time by Half Hour
CBG
TMU


Feeder Current Cambridge GXP
8-Jan-20
350
300
250
200
150
100
50
-
Amps
00:30
01:30
02:30
03:30
04:30
05:30
06:30
07:30
08:30
09:30
10:30
11:30
12:30
13:30
14:30
15:30
16:30
17:30
18:30
19:30
20:30
21:30
22:30
23:30
Time by Half Hour
CB2702 - Rotorangi
CB2712 - Cambridge North
CB2722 - Cambridge Town
CB2732 - Kaipaki
CG2742 - Pencarrow
CB2762 - Hautapu A
CB2772 - French Pass
CB2802 - Leamington
CB2812 - Hautapu B
CB2832 - Cambridge East
CB2842 - Tamahere
CB2852 - St Kilda
CB2862 Monavale
CB2872 - APL



Peak Demand and Energy Delivered

Historical Anytime Maximum Demands (AMD) and total energy conveyed through Transpower's Cambridge and Te Awamutu GXPs sourced from metering data are shown in the following table.

Year	Cambridge GXP		Te Awamutu GXP	
	Units (GWh)	AMD (MW)	Units (GWh)	AMD (MW)
1996	129.54	25.11	143.48	29.12
1997	139.74	26.54	144.37	28.20
1998	144.74	25.43	145.12	29.26
1999	146.32	29.05	142.73	29.96
2000	154.10	27.84	141.44	25.96
2001	159.94	30.07	142.34	26.83
2002	170.43	30.49	149.95	26.21
2003	170.92	29.30	152.08	27.38
2004	169.95	28.10	153.40	27.38
2005	178.86	27.93	155.85	28.11
2006	180.61	30.94	155.77	30.01
2007	186.49	31.84	156.54	28.48
2008	183.33	30.06	158.88	28.87
2009	183.14	32.67	158.77	28.70
2010	195.08	33.20	166.40	29.40
2011	188.70	38.98	167.86	37.30
2012	199.21	36.93	171.29	35.52
2013	202.24	36.11	174.12	34.05
2014	197.46	34.87	172.80	33.38
2015	203.59	39.22	173.45	33.73
2016	214.50	39.38	181.39	34.83
2017	211.45	39.36	182.67	35.19
2018	217.10	37.88	186.19	36.16
2019	220.52	38.90	192.44	38.23

4.2 Network Configuration

Waipa's radial 11kV distribution network receives power at 11kV from two Transpower's GXPs located at Cambridge and Te Awamutu. The Company does not have any 66kV, 33kV or 22kV commissioned substation or reticulation assets.

On some occasions a small amount of electricity is exported at 11kV by the embedded generator at Fonterra dairy factory in Te Awamutu.

The 11kV supplies from Cambridge and Te Awamutu GXPs are not configured to be interconnected.

Waipa's legacy distribution substations are predominately pole mounted transformers (up to 200kVA on two pole structures or up to 75kVA on single pole structures) and metal clad pad mount substations (up to 500kVA) in the urban and suburban areas.

Newly commissioned substations are either metal clad pad mounted (typically 50kVA up to 300kVA) or pole mounted up to 100kVA as permitted by the respective District Council Plan requirements.

Waipa's legacy 400V reticulation is predominately overhead except for urban areas. New 400V reticulation is generally underground as required by the respective District Council Plans with the exception of rural and remote rural areas where overhead reticulation is permitted on economic grounds.

Waipa's distribution system comprises (as at 31 March 2019):

Cambridge Area

- 14 11kV feeder circuits connected to Cambridge GXP,
- 438km 11kV circuit (338km overhead line, 100km underground cable),
- 335km 400V circuit (149km overhead line, 186km underground cable),
- 1,395 11kV/400V transformers (127,994kVA capacity) and
- 6,971 Poles (6,002 - Concrete, 970 – Wooden, 14% of the total).

Te Awamutu Area

- 14 11kV feeder circuits connected to Te Awamutu GXP,
- 932km 11kV circuit (890km overhead line, 42km underground cable),
- 488km 400V circuit (358km overhead line, 130km underground cable),
- 2,130 11kV/400V transformers (134,345kVA capacity) and
- 15,080 Poles (14,468 – Concrete, 612 – Wooden, 4% of the total).

System switching, isolation and protection are achieved via Transpower's GXP circuit breakers and Waipa's ring main units, line auto reclosers and sectionalisers, disconnectors, 11kV dropout fuses and 400V fuses.

A SCADA system and radio communication system enables remote monitoring and control of distribution switchgear and voltage regulators, and remote monitoring and control of GXP feeder circuit breakers.

Two 11kV ripple injection plants and receiving relays at consumers' installations enable implementation of energy retailers' tariffs, control of street lighting and management of feeder loads and GXP maximum demands.

Cambridge Network Configuration

Transpower owns the 110kV line assets, the 110kV/11kV transformers and 11kV switchboard to which Waipa's 11kV feeders are connected.

Cambridge GXP is supplied via a double circuit 110kV line from Karapiro to Hamilton and has an n-1 security of supply.

There are two 40MVA ODAF transformers at Cambridge giving a total installed capacity of 80MVA and a firm capacity of 40MVA. These transformers operate in parallel and supply an 11kV bus bar via two incoming circuit breakers. However, the 11kV incomers and bus bar are only rated at 2500A or 47.9MVA.

There are fourteen 800A rated 11kV circuit breakers supplying radial urban and rural feeders including two feeders supplying a Fonterra dairy factory at Hautapu and one feeder supplying the APL glass factory.

The fourteen 11kV radial urban and rural feeders are predominately concrete pole lines. These lines, in conjunction with their associated 400V reticulation, supply Cambridge, its suburbs and rural areas adjacent to the Waikato River from Lake Karapiro to Tamahere on the outskirts of Hamilton.

In the urban and suburban areas there is a moderate amount of underground reticulation with pad mounted transformers and pad mounted switchgear.

Te Awamutu Network Configuration

Transpower owns the 110kV line assets, the 110kV/11kV transformers and 11kV switchboards to which Waipa Networks Te Awamutu 11kV feeders are connected.

Te Awamutu GXP is supplied via a single circuit Transpower 110kV transmission line from Karapiro and a single circuit 110kV transmission line from Hangatiki owned by Waipa Networks.

Te Awamutu also has 7.5MVA of embedded generation at the Fonterra dairy factory site which is connected to the Transpower's Te Awamutu GXP via 11kV supply cables.

There are two 40MVA OFAF transformers at Te Awamutu giving a total installed capacity of 80MVA and a firm capacity of 40MVA. These transformers operate in parallel and supply two 11kV bus bars via four incoming circuit breakers.

There are twelve 630A rated 11kV circuit breakers supplying radial urban and rural feeders and two 1250A rated 11kV circuit breakers supplying Fonterra dairy factory site in Te Awamutu.

The twelve 11kV radial urban and rural feeders are predominately concrete pole lines. These lines, in conjunction with their associated 400V reticulation, supply Te Awamutu's urban, suburban and rural areas north to Mystery Creek, south-east to Arapuni, south towards Otorohanga and west to Paterangi, Pirongia, Pokuru and Kawhia.

Two underground cable circuits supply the Fonterra dairy factory.

In the urban and suburban areas there is a moderate amount of underground reticulation with pad mounted transformers and pad mounted switchgear.

4.3 Network Assets, Age and Condition

Network Feeder Assets

Waipa's primary assets are the 11kV feeders supplying town, rural and remote rural consumer ICPs.

Appendix A shows the Company's 11kV feeder attributes as at 31 March 2019.

Supervisory Control and Data Acquisition System Assets

Waipa owns a SCADA system to operate its feeder network and control load, street lighting and metering tariffs. SCADA system remote terminal units are fitted to Transpower's circuit breakers at Cambridge GXP and Te Awamutu GXP, Waipa's ripple injection plants and various voltage regulators, 11kV line auto reclosers and automated air break switches on the distribution network.

The SCADA comprise a master and hot standby located in Waipa's control room at 240 Harrison Drive, Te Awamutu and two remote operating terminals located in WEL Networks Control Centre in Te Rapa. The SCADA network configuration and operating schematics are backed up daily onto Waipa's central server.

Remote Engineering Access
Remote Engineering access is the capability for authorised Waipa Networks personnel to remotely communicate and login to field intelligent electronic devices. It will allow technical staff to program/access field devices directly and increase their capability to analyse faults and shorten response times by making appropriate changes remotely without having to drive to the site. It will avoid any safety risks associated with local access of intelligent electronic devices such as fall from ladders and also, limit the costs associated with deployment of field teams for faults or voltage issues which can be fixed remotely within minutes. Waipa has completed a pilot of remote engineering access on the two RMUs associated with the APL Stage 1 supply.

Ripple Injection Plant Assets

Waipa owns and operates two ripple injection plants located at Cambridge GXP and Te Awamutu GXP respectively. The Cambridge ripple injection plant is located in Waipa Networks' building at the GXP, which was refurbished and seismically strengthened in 2016. The Te Awamutu ripple injection plant is located in a separate room in Transpower's Te Awamutu GXP switch room. Ripple injection signals are initiated by the SCADA system via these plants to control load, street lighting and metering tariffs. The Company also owns the receiving relays in consumers' installations.

Radio Communication Network Assets

Waipa owns separate analogue radio voice and data communication networks comprising;

- Radio repeater sites located at Pukekura in Cambridge, Te Rauamoa on the south western slope of Mt Pirongia, Wharepuhunga near Lake Arapuni and Mount Oue near Kawhia,
- Base stations are located at the Harrison Drive depot in Te Awamutu and at the premises of the Company's Control Room service provider,
- Vehicle mounted radios and hand held units used by the Company's field crews and
- Radios in remote terminal units at Transpower's GXPs and on automated voltage regulators, auto reclosers and disconnector switches.

Network Asset Age

Waipa's distribution asset type and age profiles as at 31 March 2019 are shown in Appendix G.

The Company uses the weighted average age of the poles to determine the age of its primary pole line assets because there is no other reliable information on the age of conductors and cross arms available.

The 11kV Line Age Profile indicates that the Company rebuilt the majority of its network during the 1980s. Hardwood poles were changed for concrete poles and it is assumed that the pole hardware was renewed in the majority of cases. In most cases the existing overhead copper conductor was re-used.

From the two complete network asset condition surveys completed to date and the number of defect forms generated, a view of the general condition of network equipment is formed. This suggests that the Company does not expect to be confronted with an unmanageable "wall-of-wire" issue within the 10-year horizon of this AMP. However, an emerging defect trend shows that hardwood cross arms are nearing end of life on a number of feeders, and a robust programme of defect replacements of these assets with the modern equivalent galvanised steel cross arms will be required over the coming eight to ten years to address this issue.

Network Asset Value

Waipa's distribution regulated asset base (RAB) as disclosed as at 31 March 2019 is shown in the following table, (in $,000). Note that the 2019 RAB includes the Hangatiki – Te Awamutu 110kV line (classified as sub-transmission).

Regulated Asset Base Value

	Subtransmission lines	Distribution and LV lines	Distribution and LV cables	Distribution substations and transformers	Distribution switchgear	Other network assets	Non-network assets	Total
Total opening RAB value	**18,369**	**28,349**	**19,885**	**26,861**	**13,899**	**4,281**	**1,915**	**113,559**
Total depreciation	253	1,133	672	899	530	278	253	4,018
Total revaluations	273	421	295	395	206	64	28	1,682
Assets commissioned	121	382	326	1,504	584	8	313	3,238
Asset disposals	-	-	-	232	-	-	52	284
Total closing RAB value	**18,510**	**28,019**	**19,834**	**27,629**	**14,159**	**4,075**	**1,951**	**114,177**

Asset Condition

Feeder Assets

Waipa Networks completes a rotational visual network asset survey to assess the condition of network equipment and identify defects that require resolution. The asset types surveyed include; conductors, poles, stay wires, cross arms, insulators, arm braces, binders, dead ends, transformers, reclosers, disconnectors, drop out fuses, cable terminations, surge arrestors, earthing and matters of public safety including ground clearances to live equipment. Asset defects are prioritised into the following categories for remedial work; Urgent (3 months); 1 year and within 5 years.

An urgent priority is assigned to asset defects that presented a safety hazard to the public, field crews, livestock or property. The 1-year and within 5-year priorities are assigned to asset defects on a diminishing probability of causing loss of supply. However, in practice when a shutdown area is identified for defect repairs, all defects regardless of priority are remedied at the same time, in order to make most efficient use of resources once the line crew is deployed to an area and a shutdown is planned.

The total number of 11kV and 400V defects awaiting repair (as at 31 March 2019) are shown in the following table. Total defects remaining have increased significantly from 399 in 31 March 2018 to 890 and defects identified since has further increased the defect stock. Focus on defect repairs has accelerated, with 431 defects being repaired during 2018/19. An additional $100k was budgeted for Survey Defects Maintenance compared to the 2015/16 base line to address outstanding defects and prevent a bow-wave of defects accumulating as the survey back log is worked through. because of the focus on new connections.

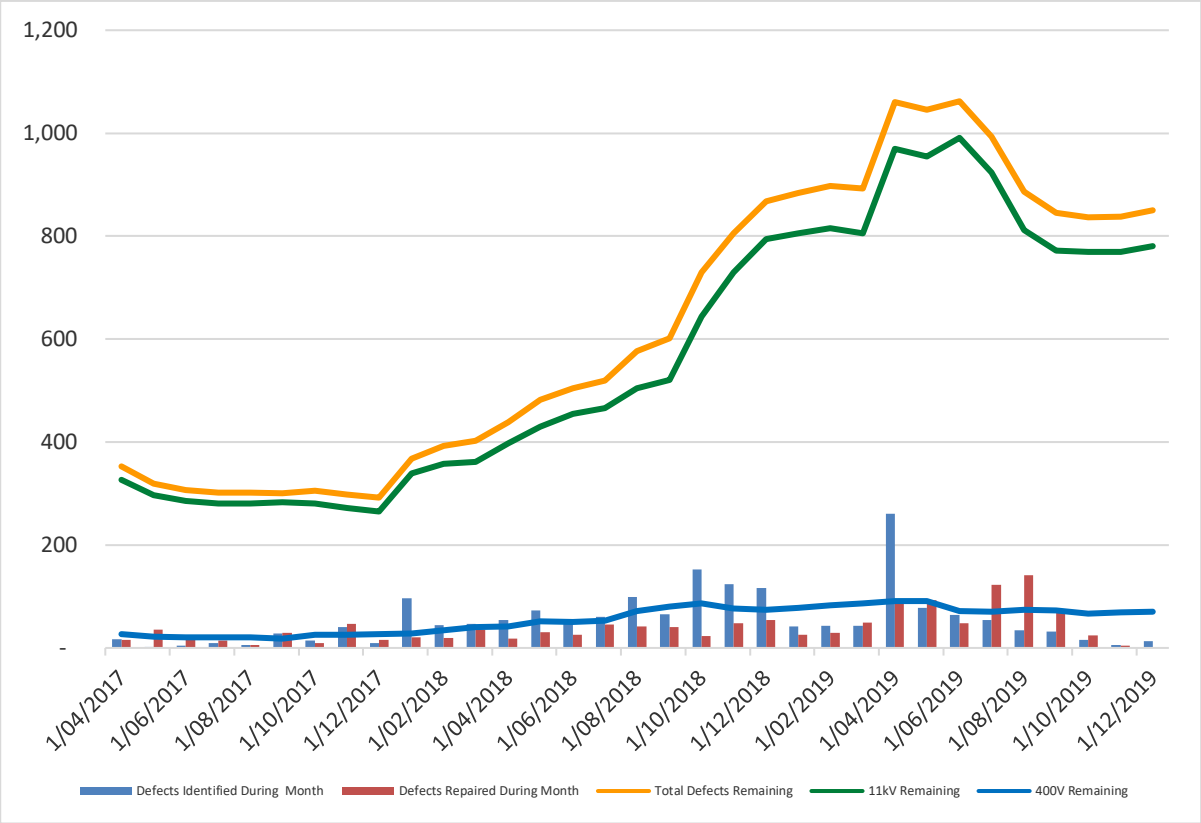
	Totals
Total defects remaining	890
11kV defects remaining	803
400V defects remaining	87

Network Survey Status

Currently there is a backlog of network survey inspections, caused by recent high levels of new connections work. A response to recover the backlog commenced in March 2018, with increased staff resource dedicated to network condition surveying as a prudent response to intervene to return the network survey status to normal over a period of four years. Reactive spot surveys to address urgent defects identified from the field are also completed, and urgent defects prioritised for repair.

The historical defects trend showing the defect stock remaining and defects identified and repaired for each month for the period Mar-15 to Oct-18 shows the defects stock varying from circa 260 to 721 over that time. The current total defects outstanding as of December 2019 is 850, mainly 11kV defects. The sharp upward trend in identified defects is a result of increased resourcing for the asset condition survey,

in order to catch up the backlog in surveys of the feeders. Year to date in 2019/20 the spend on defect maintenance has exceeded budget, $357k against a budget of $293k, and is forecast to reach $535k for the 2019/20 year. External contracting resource has been engaged to increase the number of defects being repaired and the budget provision in the 2020/21 budget has been increased for both survey defects and reactive defects identified as urgent by field staff.

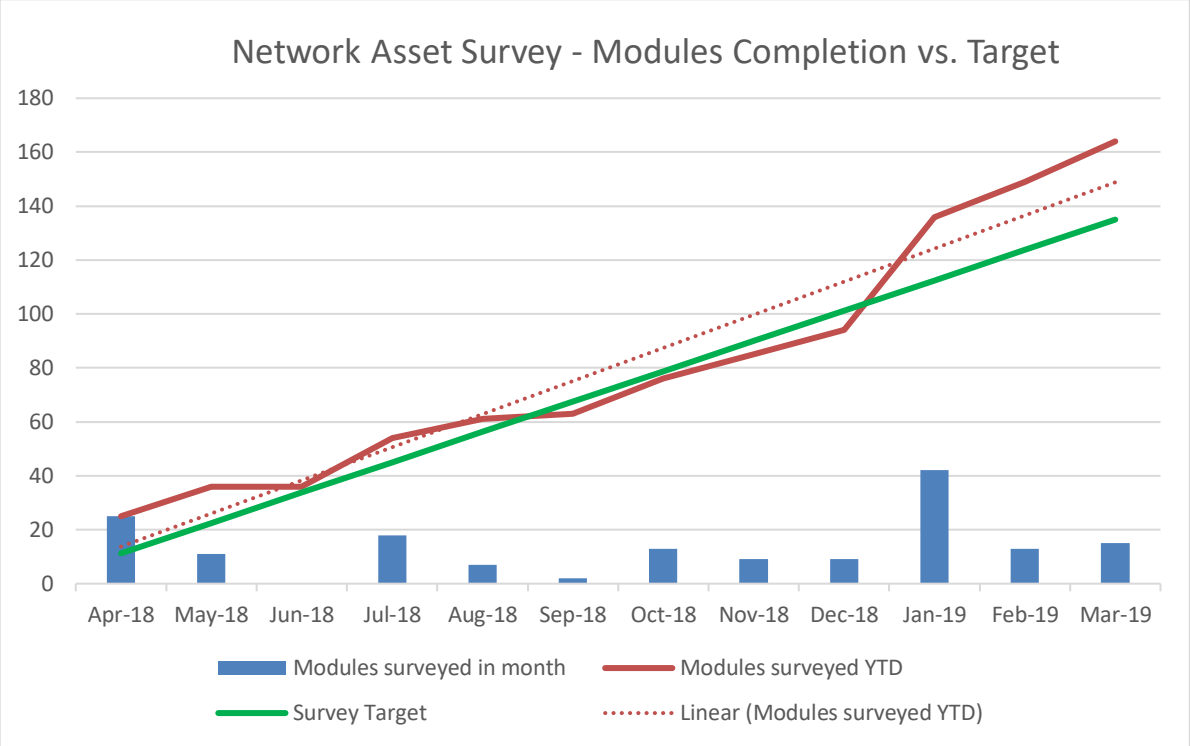


Further detail on what types of defects and what equipment is affected is presented in the table below, showing the expected routine range of typical network defects. This table shows the current 11kV defect stock, showing that cracked or rotten cross arms are approximately 43% of the defects. A failed cross arm will usually result in an electrical fault and possibly insufficient ground clearance for conductors, but should not result in lines on the ground. Following this are insulators at 14% and HV fuse links at 13%, which are not high public safety risk defects. There are 49 (6%) pole defects, which would pose the highest safety risk in the event of a pole failure. 61% of these pole defects are “poor mechanical protection”, which means that a concrete pole has insufficient concrete coverage of the steel reinforcing, due to chipped or spalling concrete. That will weaken the pole over time as the reinforcing is exposed to moisture and rusts, but does not pose an immediate risk of pole failure.

Defect Type	Outstanding	HV Fuse / Link	Air Brake Switch	Sectionaliser	Transformer	ABS	Cable Guard	Cable Termination	Conductor	Crossarm	Deadend	Earthing	Equipment Numbers	Fuses	Insulator	Insulator Binding	Lightning Arrestor	Links	Opossum Guard	Pole	Private Vegetation	Public Vegetation	Recloser	Regulator	Stay Pole	Stay Wire	Streetlight	Transformer	Transformer Site Num	Ring Main Unit	Substation	Pillar	Broken	Equipment Numbers M
Earthing (missing/failed)	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-
Equipment Numbers	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Broken	15	-	-	-	-	3	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	3	5	-	-
Cracked	156	-	-	-	-	1	-	-	-	145	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Faded	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leaking	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Loose	9	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	1	-	-
Low Sag	12	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Missing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moving Ground	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rotten	206	-	-	-	-	-	-	-	3	201	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rusting	26	3	-	-	-	1	-	-	4	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	2	1	-	-
Touching Condustor	12	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	9	-	-	-
Growing near line within falling dis	8	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	6	-	-	-
Insulator Damage	3	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Damaged TX mounting	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	6	-	-	-
TX Paint	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Obstruction	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	2	-	-	-	1	-	3	3	1	-	-
Loose Binding	10	1	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chipped	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poor mechanical protection	305	107	-	-	-	2	-	-	7	13	-	-	-	-	100	-	5	-	-	30	-	-	-	-	-	-	-	29	-	-	8	4	-	-
Floating	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	1	-	-	-	3	-	-
Touching Condustor	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
No Cable Guard	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-
Burning	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Need removed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Not Seismically Compliant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Equipment Numbers Missing	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-
Not Stock Proof	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Corana Survey	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Thermal Survey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RMU Survey	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	3	-	-	-	-
Battery failure	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Comms failure	5	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
Malfunction	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Maloperating	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-
Access issue	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
IP failure	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
RTU replace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	831	112	-	-	-	10	-	-	24	359	-	-	-	-	117	-	6	-	-	49	-	-	9	8	-	1	-	68	-	8	44	15	-	-

To resource the network survey to eliminate the backlog, a new Planning Officer has been employed, dedicated to completing the network survey. Along with 50% of the existing Planning Officer's time allocated to the network survey, it is estimated that 90 modules[1] per year would be surveyed and the identified defects scoped and priced for rectification. Hence the estimated time for the survey deficit of 176 modules to be eliminated by this 1.5 FTE Planning Officers is 3.5 years.
This emphasizes the degree of backlog in the network survey that has accumulated, and shows that it is not realistic to continue with the current resourcing if the network survey deficit is to be eliminated.

The module completion achieved versus target significantly outperformed the target required to remove the backlog over a four-year period. The 135-module per annum target was exceeded by 29 modules.



The annual budget for defects repair has historically stood at $537k, with 2016/17 and 2017/18 being increased to $703k and 2018/19 to $806k to deal with the bow wave of defects currently on hand. The Maintenance – Survey Defects budget has been increased to $860k and the reactive 11kV overhead maintenance budget increased from $70k to $120k for the ten-year period (2020/21 to 2029/30) to absorb the cost of repairing the backlog defects; this has been extended to the full 10-year period because of the ubiquitous stock of cross arm, HV fuse and insulator defects identified by surveys recently.

The second complete survey of all network feeders has taken longer than the expected 8 years to complete because of the survey back log as discussed above. Feeders have been surveyed in the same order as the first survey. The programme is based on an approximate even spread of kilometres of line being surveyed each year, refer to Appendix D.

Other Asset Condition Programmes

Waipa gains further asset condition information from;

- A vegetation management programme,
- An earth testing and repair programme,

[1] A module is a feeder section bounded by switching points, air break switches or ring main units. The network survey is divided up into feeder modules to track completion.

- Asset thermal surveys,
- Partial discharge surveys,
- Acoustic monitoring and
- Corona surveys.

The vegetation programme is based on even spread of kilometres of line being surveyed each year modified by known growth trends on specific feeders. The programme results in each feeder being systematically cleared every 5 years and reactive trimming being required depending on the type, growth rate and quantity of vegetation menacing our power lines. Tree "hot-spots" are dealt with reactively as required, as well as the front end of each feeder out to the first recloser being patrolled annually.

The earth testing and repair programme which is now coordinated with the visual asset defect survey is based on an even spread of earth banks requiring testing each year. The programme results each system earth being checked every 8 years.

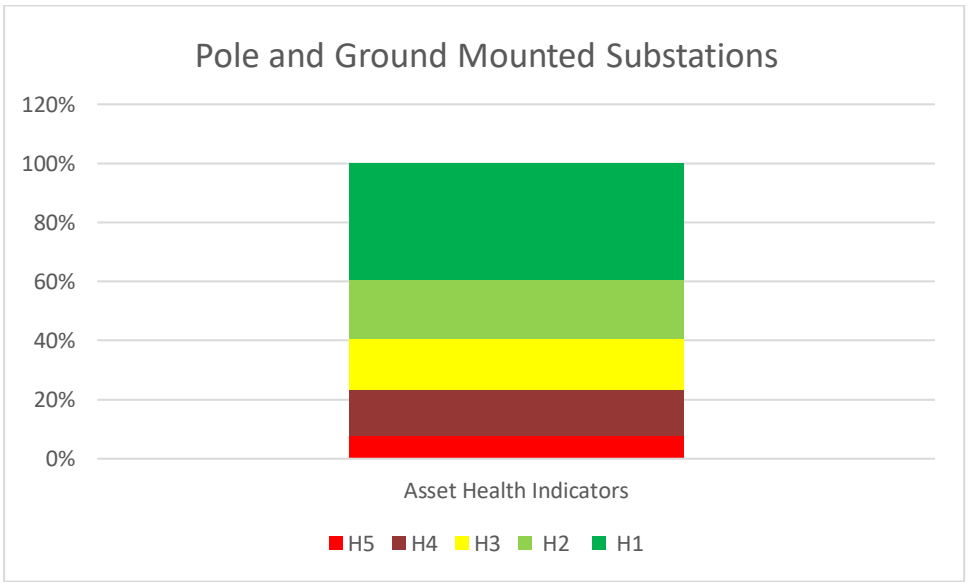
Waipa engages an external service provider to carry out an annual thermal survey of arterial feeder disconnectors, line and transformer, dropout fuses, cable pothead terminations and line connections during high load periods. Thermal defects are treated as urgent and are repaired as soon as possible.

Asset Stock and Asset Health Indicators as at 31 March 2019:

Below are charts of the pole asset health in accordance with the EEA Asset Health Indicator Guide, using an assumed age – asset health relationship for the asset population. The exception is for ground mounted transformers and RMU, where inspected asset health condition data is available from the maintenance inspection programme.

Most assets are younger than industry averages with low numbers of assets considered currently in need of replacement. Only pole mounted switches and transformers appear to be approaching the industry average age. WN intends to do more work on the air break switch fleet to assess the condition and operability of the fleet. In general conductor and insulators are in good condition.

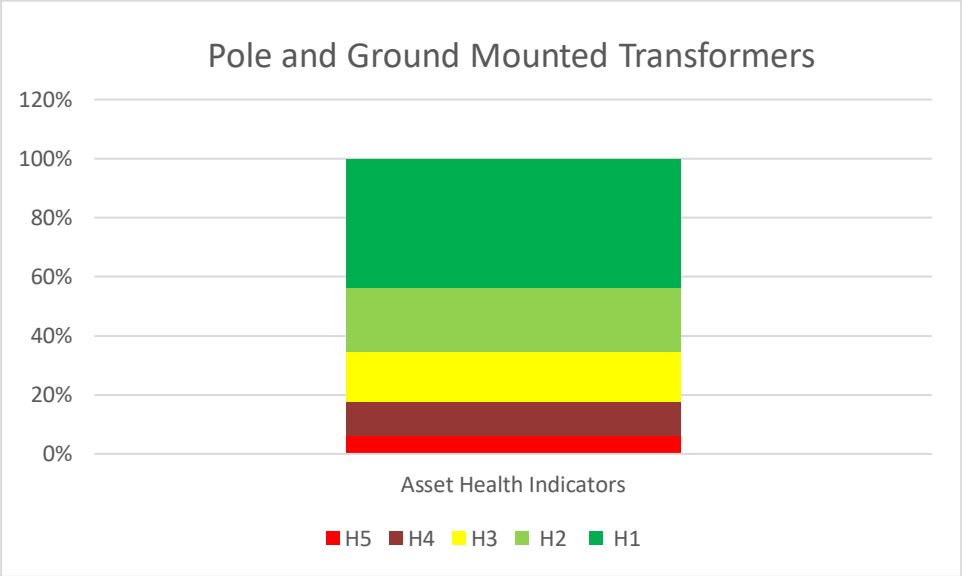
The Company had 2,727 single and two pole transformer structures on the network. The visual asset condition survey is used to initiate maintenance or condition-based replacement for this type of asset.



The Company has 18 ageing two pole hardwood platform transformer structures. While the hardwood platforms have been maintained as required over the years these assets are approaching the end of their economic life. Furthermore, this type of substation structure no longer conforms to modern industry standards. All of these two pole transformer structures will be replaced on a public risk and

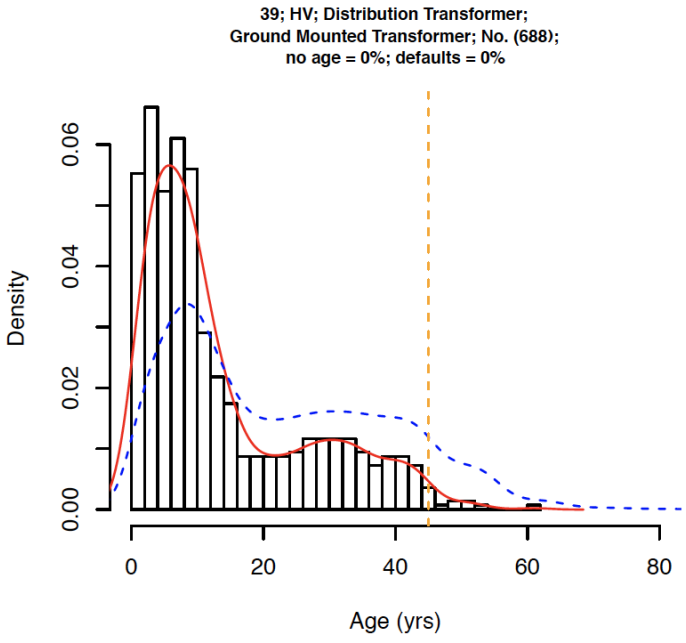
condition prioritised basis by either a single pole transformer substation or a pad mounted substation for staff and public safety by the end of 2020/21.

Waipa had 2,727 pole mounted transformer substations on the network sized up to 100kVA. These assets are virtually a run to failure asset, with replacement triggered either by failure in service or due to lightning strikes, or defect replaced due to oil leaks or excessive rust. The asset health of the population is good, with only a small proportion of the assets in H1 and H2 requiring replacement.

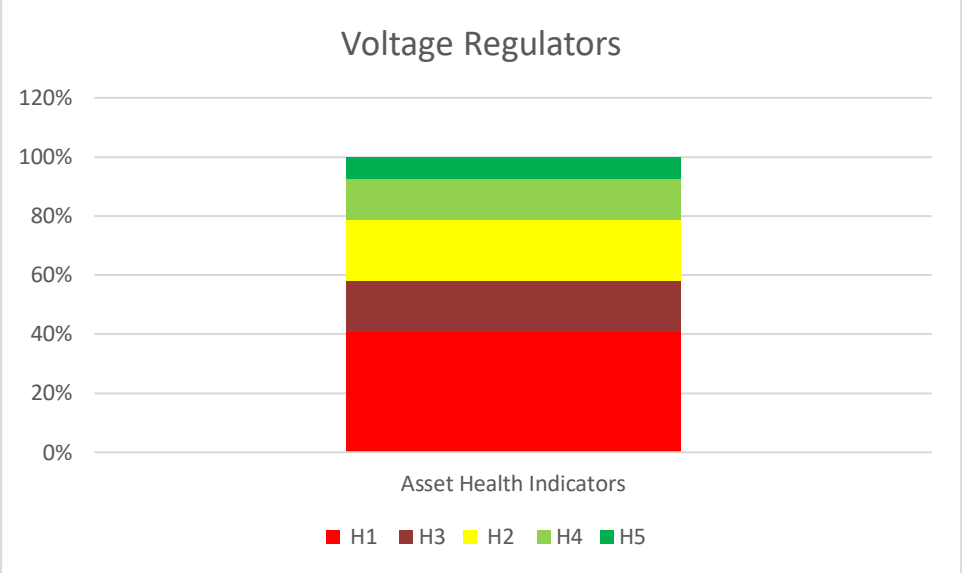


Waipa had 800 pad mounted transformer substations on the network. While minor remedial work is carried out when a defect is detected, the asset is only replaced when it fails in service or load growth requires larger capacity to be installed.

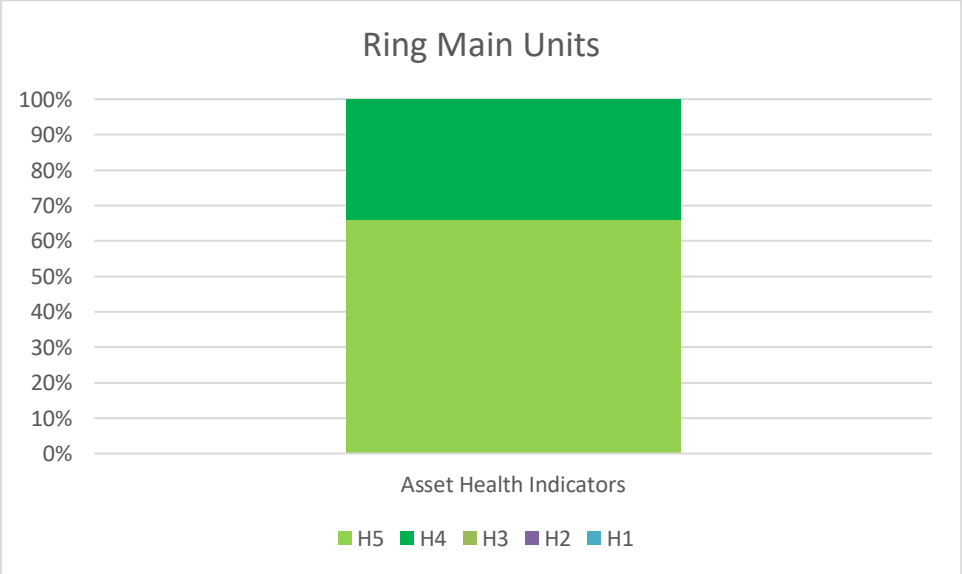
Ground mount transformers are generally also in good condition with some replacements due to corrosion or aging J type fuses. Below is also the age profile of Waipa Networks assets with the smoothed ages in red and the industry average ages plotted as a dashed blue line. This shows that the ground mounted transformer ages are less than the industry average, which is consistent with the sample of inspected assets.



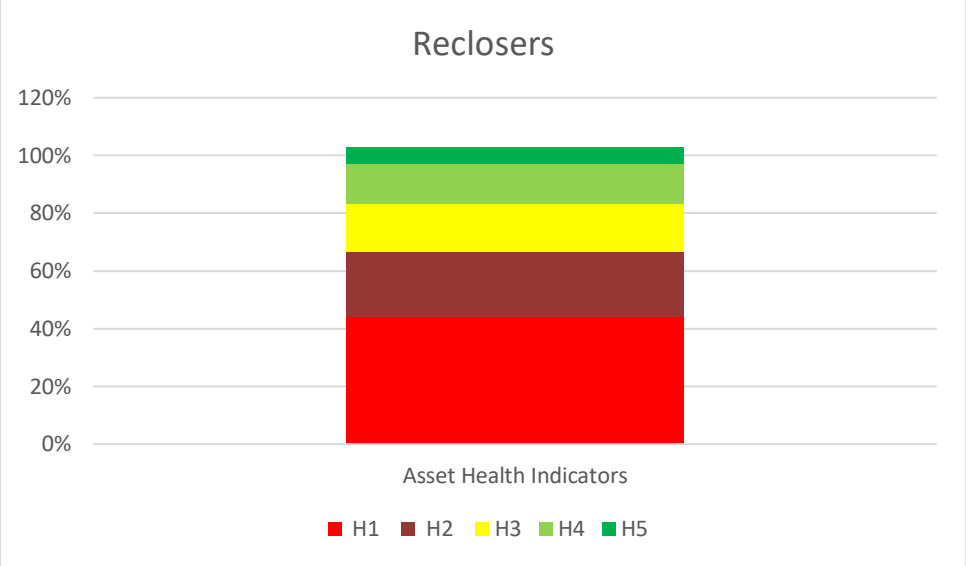
Waipa Networks had 54 voltage regulators in service ensuring voltage limits are adhered to over the range of load conditions on mainly rural feeders. The large number of assets in the H1 and H2 asset health condition is due to the age of the fleet. Greater emphasis on the inspection programme for the voltage regulator fleet will ensure that actual asset condition is used to inform the asset maintenance and replacement programme. A fleet asset management plan to better manage the planned replacement of voltage regulators and seismic strength of voltage regulator structures is intended to be written as part of the Asset Management Improvement Plan (AMIP).



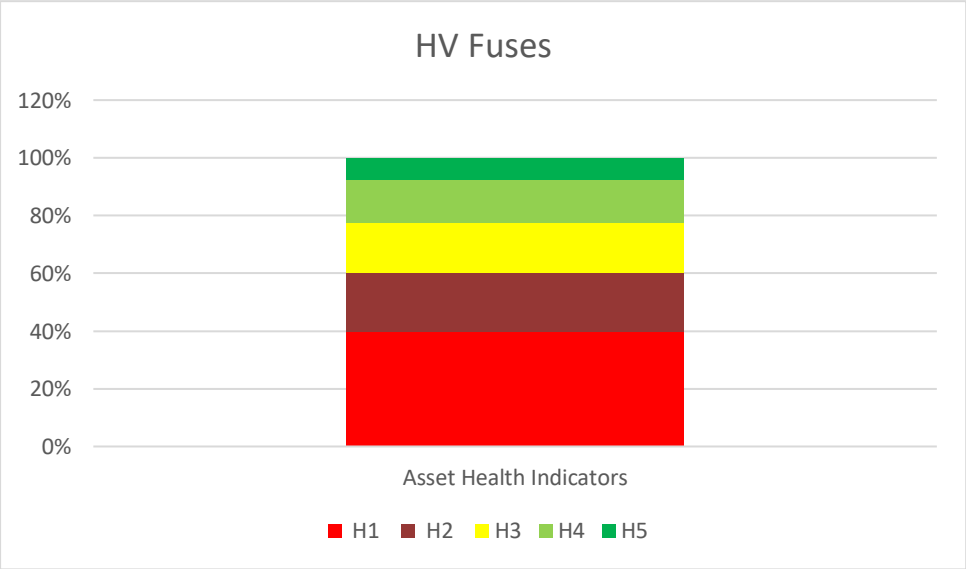
Waipa Networks had 110 Ring Main Units (RMU) in service. Waipa was cognisant of the industry's concern about oil-filled switchgear and had a program to completely replace all of its oil-filled RMUs with SF_6 RMUs as a public safety initiative. The last oil filled RMU was replaced in 2013/14. All ring main units are either SF_6 insulant or vacuum insulant and therefore these assets are in good condition.



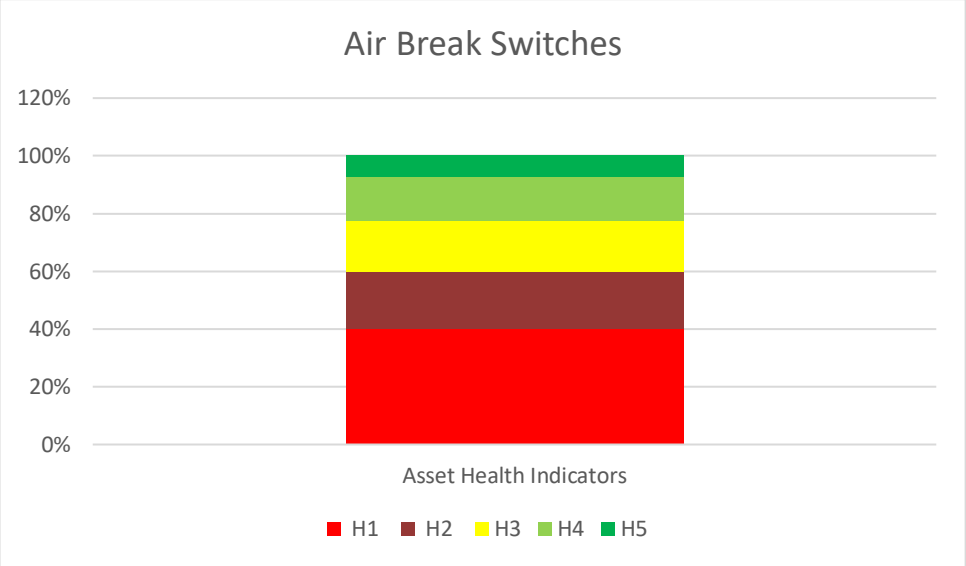
Waipa Networks had 114 Reclosers in service to sectionalise the network for faults and limit the number of customers affected by network faults. The high number of H1 and H2 assets reflects the aging nature of our recloser fleet. A programme of replacing RC1 control boxes with new RC10 control boxes will assist in maintaining the operation of the recloser fleet until ultimately the recloser circuit breaker unit will require replacement. A fleet asset management plan to better manage the planned replacement of reclosers is intended to be written as part of the Asset Management Improvement Plan (AMIP).



Waipa had 4,511 sets of 11kV pole fuses in service. The older "Vulcan" sets comprise varnished paper insulating tubes and powder fuses which continue to deteriorate over time. Some newer sets were constructed using stainless steel brackets and galvanised nuts and bolts which have corroded and need replacing. The Company will continue to replace these defective 11kV pole fuses with stainless steel assemblies when they fail in service and when they are identified as a defect during the programmed visual feeder asset surveys. A proactive programme to replace the powder fuse types prevalent in the Te Awamutu urban area has been programmed for the period 2020/21 to 2024/25.

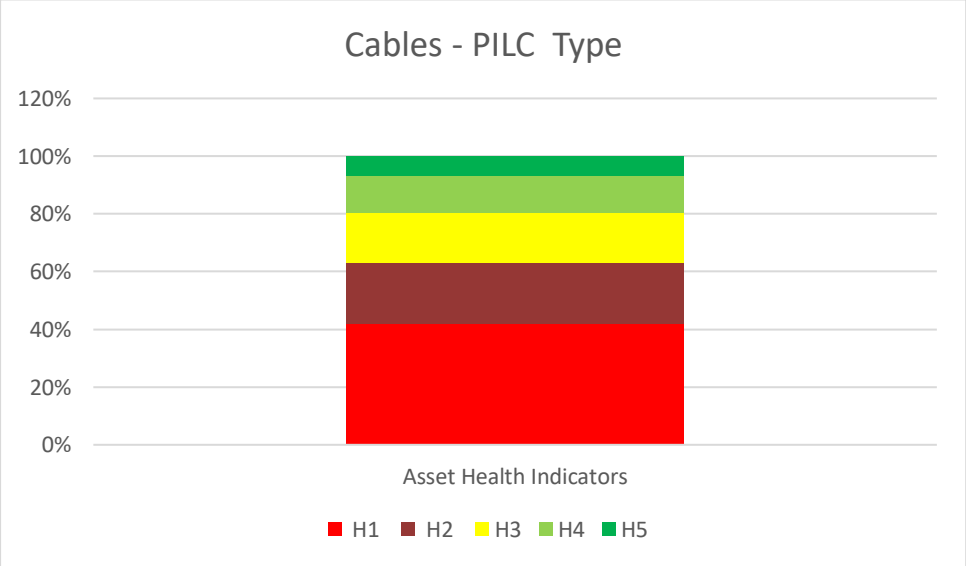


Waipa Networks had 641 air break switches in service. Their most common mode of failure is to "freeze up" through infrequent use or their contacts weld together when they pass fault current. Insulator failure and jumper breakages are other common failure modes. Defective air break switches are replaced when they fail in service or at the time the pole line is reconstructed with Entec Ecoswitch vacuum interrupting load break switches. The decision to replace open air break switches with enclosed load break switches was made in 2016 given that the capital cost increase for the enclosed type was modest, and better reliability, longer life and lower maintenance costs are expected. A fleet asset management plan to better manage the planned replacement of aging air break switches is intended to be written as part of the Asset Management Improvement Plan (AMIP).

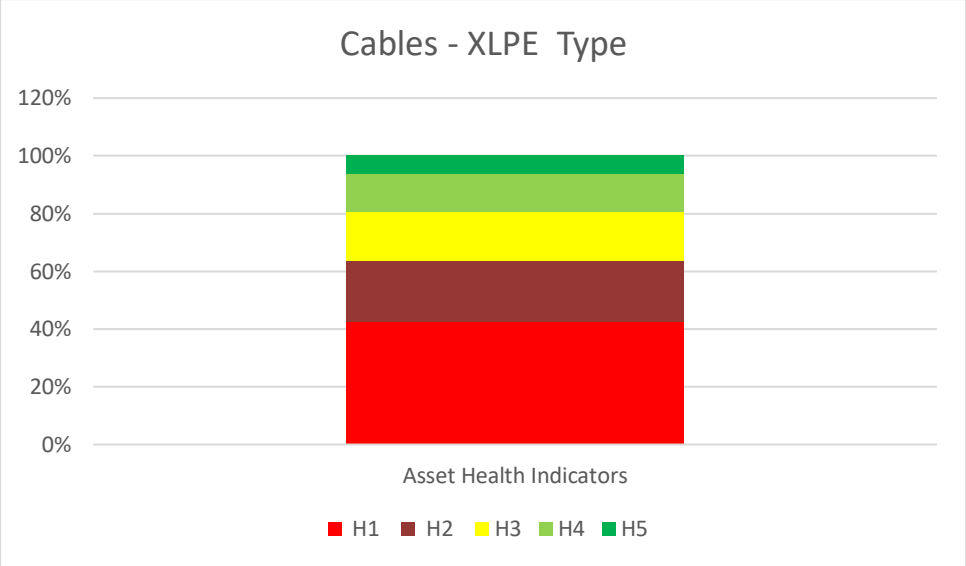


Waipa had 2,379km of cables on the network. There are two classes of cable, the original Paper Insulated Lead Cover (PILC) cable with an expected service life of 70 years, and the modern equivalent Cross Linked Polyethylene (XLPE) cable with an expected service life of 45 years.

The PILC cable asset health indicators show that there is a large proportion of cable nearing the expected age for replacement. However, we are not seeing the cable failure events that would trigger replacement, so proactive replacement is not recommended.



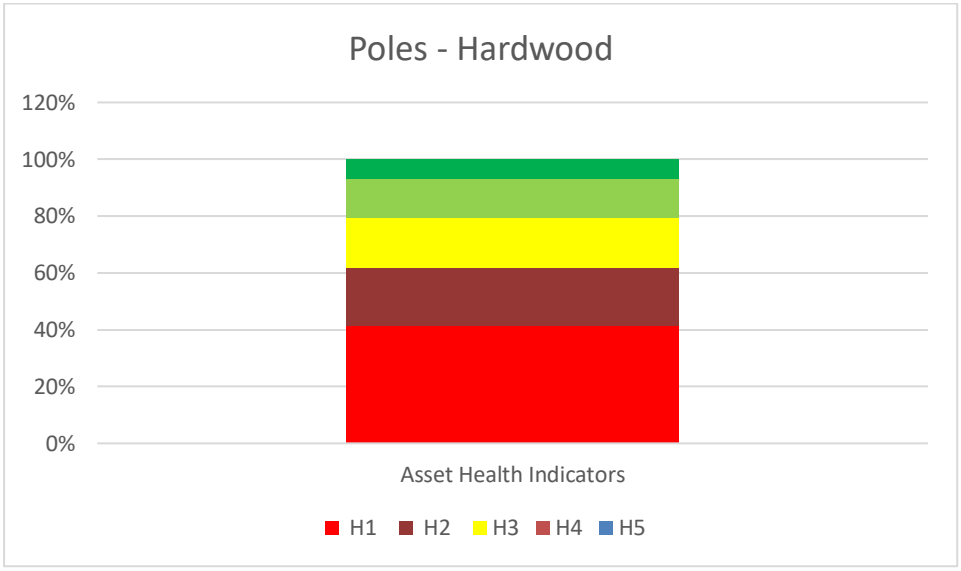
The XLPE cable asset health indicators show that that there is a large proportion of cable in the expected age for replacement. Closer inspection of the data shows that this is both the pre-1980 cables that are prone to the water-treeing failure mode and Modern XLPE cable. We are seeing some XLPE cable failures, but only the older XLPE type CANZAC cables are selected for a proactive replacement policy.



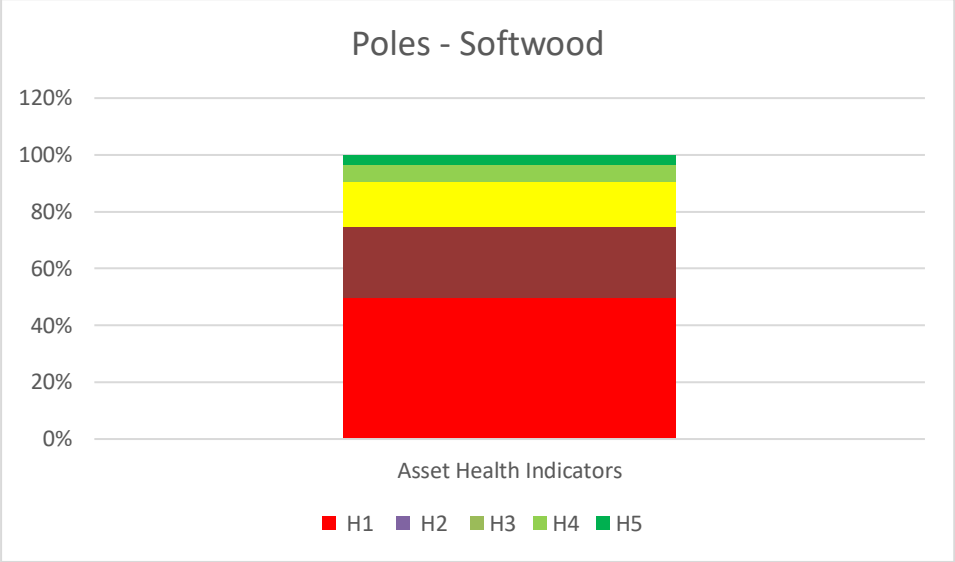
The network has the pole type population as shown in the table below. The risk of failure posed by wooden structures is managed by the asset condition survey criteria, which requires all hardwood poles supporting HV lines and all larch wood poles to be defected and replaced, as well as any poles in poor condition not expected to last until the next survey. The risk of failure posed by concrete poles especially light Vierendeel and Bill Young poles is recognised. Improvements in standard testing procedures for wooden poles will be developed in 2020/21 along with improvements in the asset condition survey inspection standard.

Pole Types	Material	Number	%
Hardwood	Wooden	295	1%
Softwood	Wooden	1,090	5%
Larch	Wooden	194	1%
Brown Bros Light	Concrete	10,237	46%
Brown Bros Heavy	Concrete	327	1%
Stresscrete	Concrete	7,373	33%
Bill Young	Concrete	509	2%
Window	Concrete	179	1%
Other	Other	3	0%
Busck	Concrete	1,808	8%
Concrete	Concrete	37	0%
110KV Line	Concrete and steel	188	1%
Total		**22,240**	**100%**

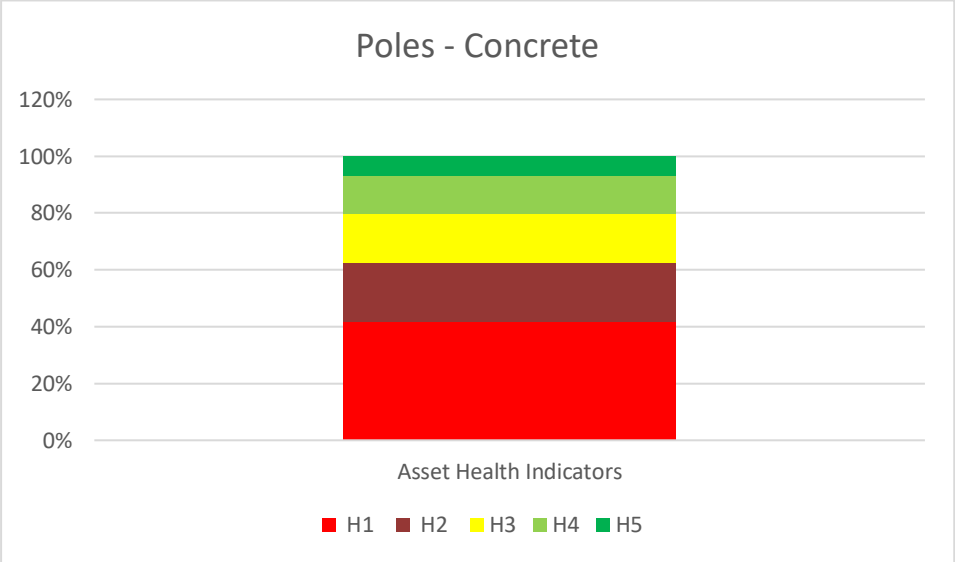
The following section looks at all poles on the network by material type. The hardwood pole asset health indicators show that that the majority of poles are in the H1 and H2 category, reflecting the advanced age of this pole population and the management strategy of phasing them out of the network by condition.



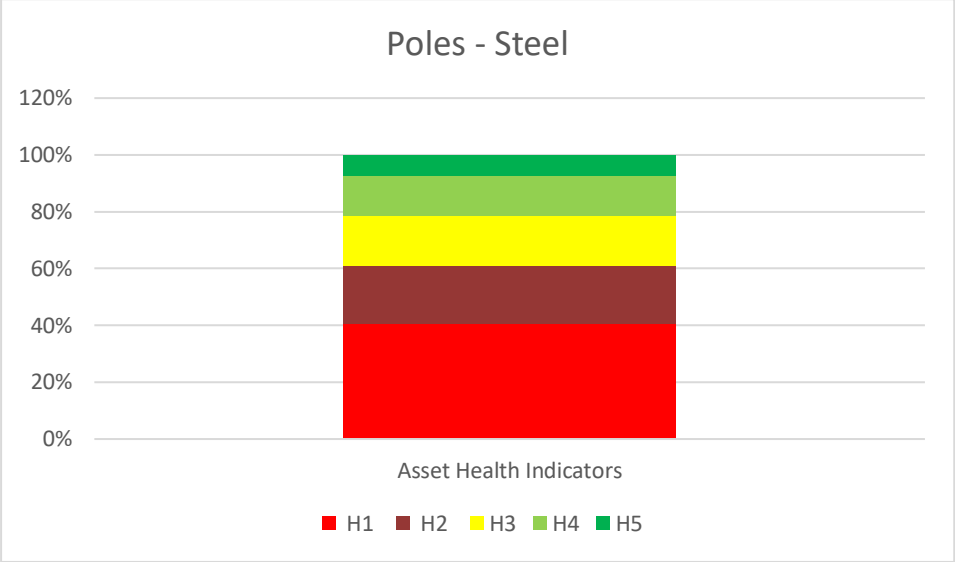
The softwood pole asset health indicators show that that the majority of poles are in the H1 and H2 category, reflecting the advanced age of this pole population and the management strategy of phasing them out of the network by condition.



The concrete pole asset health indicators show that that the majority of poles are in the H1 and H2 category, reflecting the higher age of this pole population. However. by condition the majority of concrete poles are in a serviceable condition, hence the need for actual condition data for concrete poles to more accurately reflect the status of this pole population.



The steel pole asset health indicators show that that the majority of poles are in the H1 and H2 category, reflecting the higher age of this pole population. However. by condition the majority of concrete poles are in a serviceable condition, hence the need for actual condition data for concrete poles to more accurately reflect the status of this pole population.



The Waipa Networks pole age profile is generally younger than the industry average.

Asset Criticality

Waipa Networks pays particular attention to high criticality assets. The loading level of GXPs and the need for further investment is closely monitored, and discussed in this plan. There are a number of cables that exit the GXPs that have been temporarily de-rated due to unknown soil conditions and hence temperature at high load. There are also sections of multi-circuit lines with more than one feeder on a pole. These are subject to additional condition monitoring to mitigate the risk of multiple feeder faults. Assets vulnerable to third party damage are protected where possible. Defects from condition monitoring are prioritised to ensure that those that have a high probability of causing outages or that may pose a health and safety risk are attended to urgently.

Checks on defects that have been prioritised as lower priority have shown a low incidence of having caused a fault. The management of criticality has been demonstrated as being effective.

Supervisory Control and Data Acquisition

The centralised SCADA system has had the following upgrades and enhancements in the last three years:

- We have replaced the PCs at Te Awamutu control room with two high performing new PCs. These new PCs host Master and backup SCADA.
- The software on these new PCs are upgraded to Powerlink 3.80 (from 3.74) to provide a better reliability and performance.
- We have also added three licenses for Abbey secure link client which allows our engineers, faults and technical people to remotely view and monitor our remote devices in real time.
- We have installed two SMS modems which automatically sends out text messages to our faults team and engineers for any critical alarms or events.
- As part of the upgrade and to enhance our SCADA capability further, we have also installed a second SCADA gateway and a new UHF radio".

The SCADA system remote terminal units fitted to various voltage regulators, 11kV auto reclosers and automated air break switches on the distribution network will be replaced as required.

Cambridge Ripple Injection Plant

Waipa installed a new 283Hz Enermet static ripple injection plant in 1999/2000 to avoid propagation problems when the Cambridge GXP transformers were upgraded from two 20MVA to two 40MVA in July 2002. The Cambridge ripple converter panel failed in service in 2019 and has been replaced with a new converter panel.

All 7000 492Hz relays in consumers' premises were replaced over the period 2002-2004.

Waipa has retired the new 297Hz coupling cell at Te Awamutu. In 2015/16 a project was completed to retune this coupling cell to 283Hz and use it to replace the existing 283Hz coupling cell at Cambridge which is nearing its full capacity.

The recovered Cambridge 283Hz coupling cell will be sold as the intended use (Ngutunui 110/11kV point of supply) is no longer on the expected development path.

Te Awamutu Ripple Injection Plant

In 2007/08 Waipa installed a new 283Hz Enermet coupling cell for the Te Awamutu relay change programme and a new 297Hz Enermet coupling cell to replace the old 297Hz Landis and Gyr coupling cell.

The Te Awamutu relay change out program involving 9,301 relays was completed during March 2015. All the existing 297Hz relays in the field have been replaced with new 283Hz ripple relays thus avoiding further degradation of signal strength for correct relay operation.

The Te Awamutu ripple converter panel is of a similar age and condition as the failed Cambridge panel, so it has been scheduled for replacement with a new converter panel in 2020/21.

Radio Network Communication Assets

Voice Network

Replacement of obsolete analogue repeaters and all analogue radios due for replacement with digital units was completed in 2019/20.

Data Network

Waipa intends extending its analogue data radio network used by SCADA to communicate with remote terminal units for reclosers, voltage regulators, automated ABS and Transpower GXPs. This network currently manages 200 sites and was constrained prohibiting the connection of 12 new reclosers in 2015/16 and future additions. To overcome this Waipa installed another analogue data channel and reallocated a proportion of CBG RTUs including CBG GXP RTU, and upgraded the existing Abbey SCADA serial Modulink communication modules with a new digital IP gateway communication module.

4.4 Justification for Assets

Waipa does not currently have any 66kV or 33kV sub-transmission line or zone substation assets. Due to increasing loads, the network is nearing a point where capacity and voltage limitations may seriously compromise the security and reliability of the network. If the load continues to grow along with the addition of some major loads, there will be no other option other than reinforcing the network with a combination of targeted 33kV sub-transmission lines and zone substations. The development of a sub-transmission system and zone substations may incur significant costs, but this will also ensure long term security and reliability for the Waipa community.

Stakeholder dissatisfaction with poor transmission reliability performance coupled with Transpower's need for a nine-hour planned outage every four years to maintain equipment at the Karapiro and Te Awamutu GXPs was the key driving forces for the project for a second 110kV circuit to the Te Awamutu GXP. Transpower was unwilling to address the need for a second line to Te Awamutu as it did not meet their grid investment criteria.

The new line from Te Awamutu to Hangatiki by Waipa Networks now provides the needed security of supply (n-1) to the Te Awamutu network and improves reliability. This line is operated by the Transpower System Operator as part of the national grid, but is owned by Waipa.

Feeder Assets

All the Company's 11kV and 400V feeders are constructed from commonly manufactured industry proven components that are essential for effective and efficient conveyance of electricity from Transpower's GXPs to the NCPs connecting consumer owned assets.

The distribution asset types that comprise the Company's 11kV and 400V feeders are;

- 11kV lines on concrete or wooden poles,
- 11kV cables either XLPE or PILC,
- 400V lines on concrete or wooden poles,
- 400V cables either XLPE or PILC,
- street lighting lines and cables,
- ring main units, SF_6 or vacuum switches and fuse switches,
- auto reclosers and sectionalisers,
- disconnectors and load break switches,
- dropout fuses,
- transformers (pole or pad mounted ranging from 1kVA to 1500kVA),
- substations (pole or pad mounted or in customers premises),
- voltage regulators and
- consumer service connections, either underground pillars or overhead cut-out fuses.

There are no redundant assets and no areas of the network that are uneconomic using the ODV criteria.

SCADA, Ripple Injection Plants and Radio Communication Equipment

Other system fixed assets used by the Company to control and operate its 11kV feeders effectively and efficiently are;

- SCADA system,
- radio voice and data communication network and equipment and
- ripple injection plants and receivers.

None of these assets are redundant or inappropriate for their role.

Asset Selection Policy

Waipa owns and operates a basic interconnected radial 11kV pole line network that has satisfactorily delivered power safely and efficiently to consumers over a number of years.

The Company is confident that the type of network assets installed will continue to provide a safe and reliable service to consumers over the 10-year horizon of this AMP.

Waipa's asset selection policy is to use only tried and proven products. The Company adopts a position of being "leading edge not bleeding edge". When new modern equivalent assets are considered, their performance and life-cycle cost are evaluated by Waipa's Operations Committee comprising the Construction Manager, Network Asset Manager, Field Services Supervisor, Customer Connections Supervisor, Construction & Maintenance Supervisor, Vegetation Supervisor, Health, Safety & Quality Manager, Purchasing Officer, Network Information Officer, with consultation with the Network Planning Manager, Electrical Engineer and Planning Officers before they are installed on the network. All new assets are sized and specified appropriately for their intended use and life.

Redundant assets

No assets were found to be redundant as part of the 31 March 2004 ODV process, subsequent reviews or during the March 2014 stock take. In contrast, more automation of 11kV switching points and feeder segmentation by line auto reclosers and sectionalisers, disconnectors and dropout fuses will be required to enable reliability targets to be achieved or bettered.

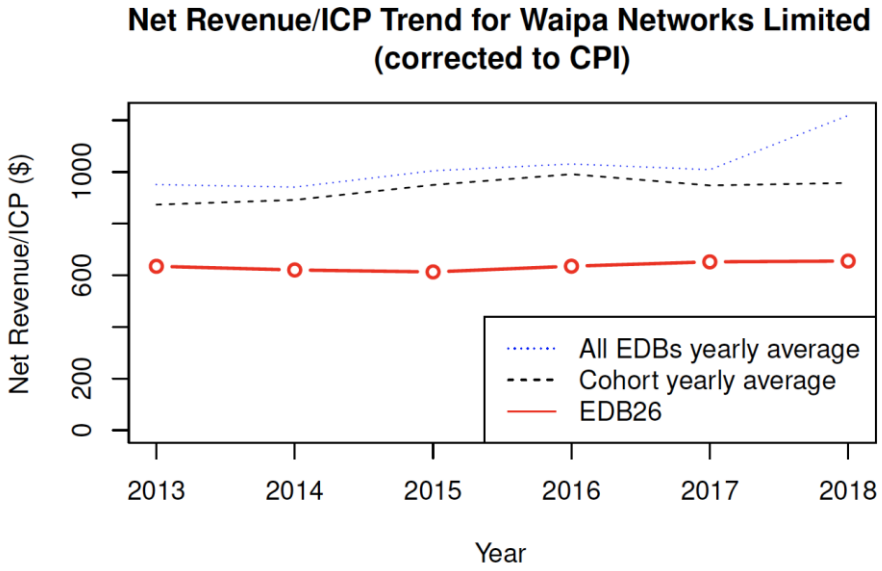
5 Comparative Performance and Service Levels

5.1 Comparative Performance

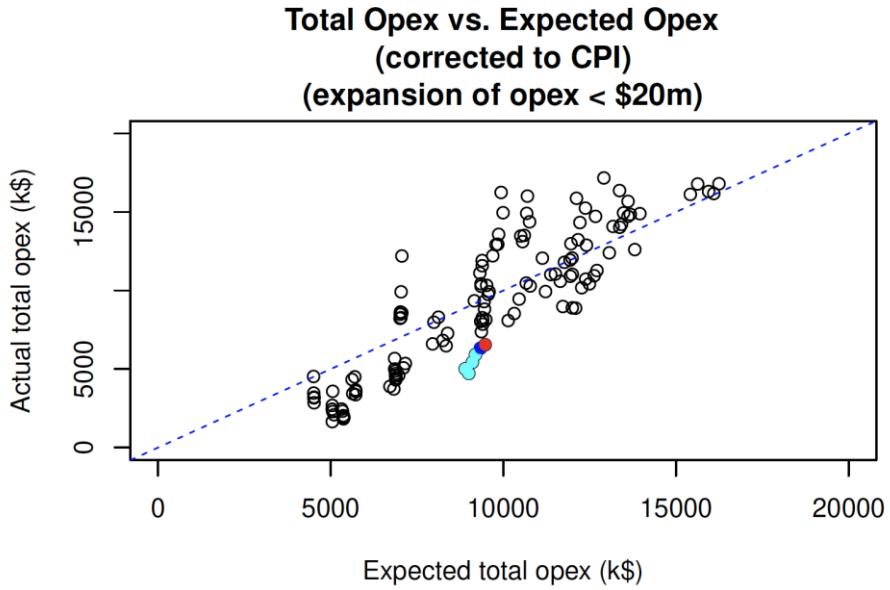
A comparative performance analysis has been completed based on a number of metrics, with Waipa Networks compared to both the whole industry and a Medium/Mixed cohort of distribution businesses of a comparable medium size and mixed urban and rural coverage area. The Medium/Mixed cohort is as follows:

- Alpine Energy
- Counties Power
- Electra
- EA Networks
- Horizon Energy Distribution
- Mainpower New Zealand
- Marlborough Lines
- Network Tasman
- Network Waitaki
- Northpower
- Powerco
- Unison Networks
- Waipa Networks
- WEL Networks

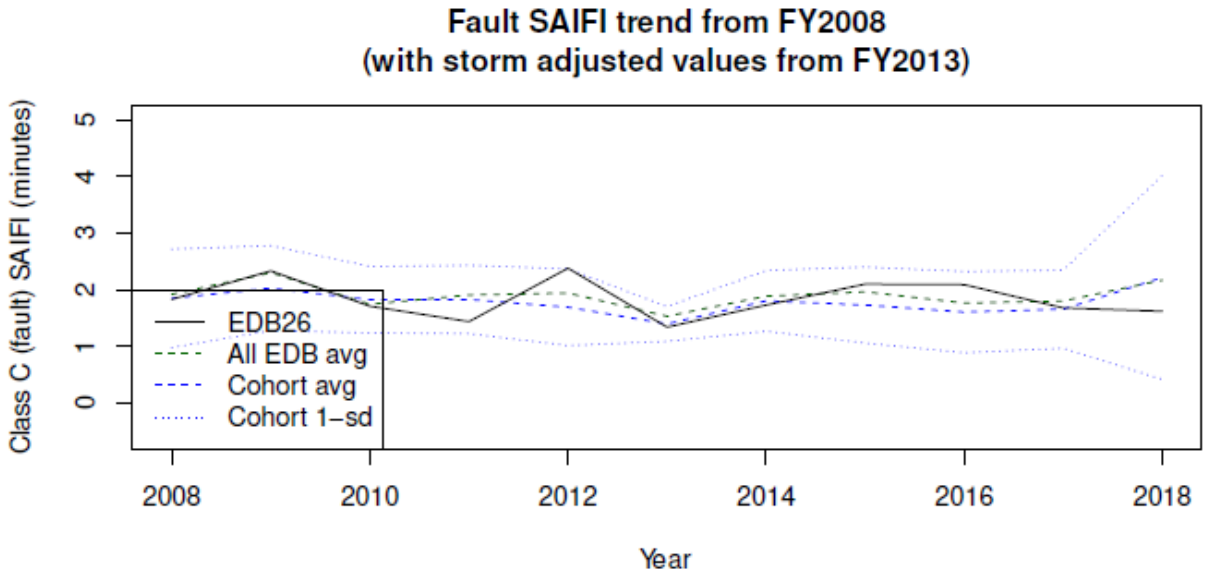
The Net Revenue chart below (net of Transpower charges) shows Waipa Networks has lower revenue (line charges per customer) than the industry or other cohort distribution businesses. This indicates that Waipa Networks has been able to minimise the line charges burden to their connected customers, in comparison to other electricity lines businesses. This is in large part due to the simple 11kV distribution architecture of our network compared to networks with sub-transmission networks.



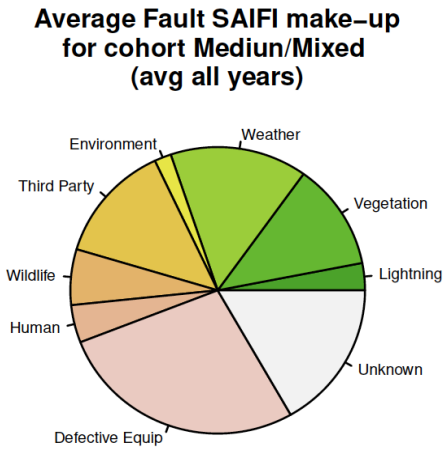
The total network opex in the chart below shows Waipa Networks (coloured dots) as having a lower than expected operating cost, below the trend evident from other industry players. The red dot is the latest year.

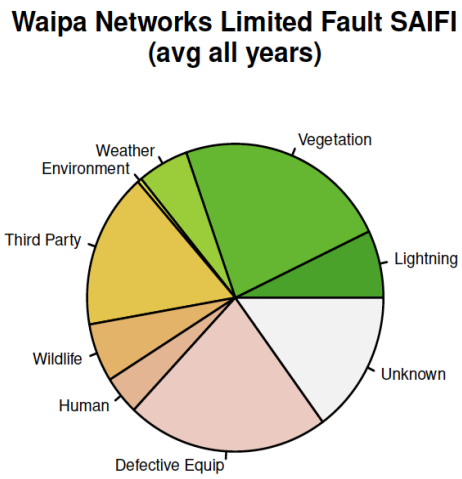


SAIFI is charted over time below, showing Waipa Networks (EDB26) to have an average number of faults per customer. Variations year to year are generally related to weather in that year.

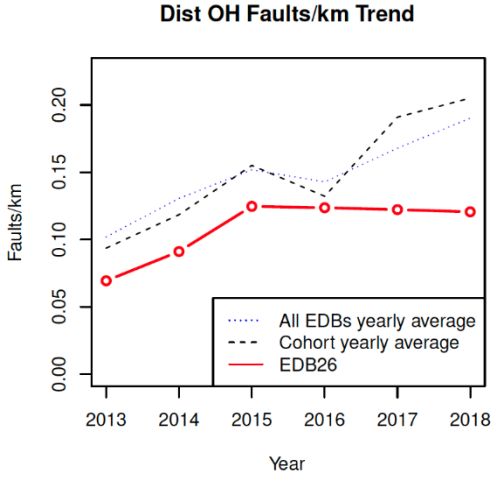


The chart below shows Waipa Networks as having higher vegetation and third-party faults than the cohort. In proportion Waipa Networks has somewhat lower levels of defective equipment faults. Waipa Networks has increased vegetation maintenance expenditure to address the level of tree faults, and more recent reliability data indicates that this is having a positive effect.





The number of faults on a network tends to indicate the effectiveness of the underlying maintenance and replacement processes. The chart below for the overhead network shows that the cohort has steadily increasing faults over time while Waipa Networks has a slightly decreasing trend over the last four years. This indicates that the Waipa network maintenance processes appear to be functioning effectively.



In terms of energy efficiency Waipa Networks is around industry norms for utilisation of assets and energy losses.

In summary, Waipa Networks has low line charges as a result of low operating expenditure. Reliability is as expected for the type of network, with a current focus on reducing tree outages through increased vegetation maintenance. Disclosure information confirms effective maintenance processes are being achieved.

5.2 Price Quality Expectations

Waipa has employed a number of mediums to consult with customers:

- Annual customer survey
- Public meetings
- Customer Helpdesk and Website feedback forms, and
- Complaints Resolution Process

Annual Customer Survey

The primary method of consultation with customers is our annual customer survey. The survey takes place midyear and consists of 400 telephone interviews with randomly selected customers. The overall results have a margin of error of +/- 4.8% at the 95% confidence level.

For analysis, each customer/ICP is assigned a category from each of the four customer groups:

- Grid Exit Point (Te Awamutu, Cambridge)
- Feeder Type (Urban Te Awamutu, Rural Te Awamutu, Urban Cambridge, Rural Cambridge)
- Tariff Type (Residential, General)

GXP / Feeder Type have been identified as the key indicators and so quotas are enforced for the survey to ensure the survey sample reflects the population mix.

Some key results from the surveys:

- Customer satisfaction consistently exceeds 90%.
- On Price versus Quality, the 2018 survey found the following:
- When customers were asked to think of the last time they had a power cut, 58% were not prepared to pay any extra to reduce the likelihood of it happening again. Only 5% were prepared to pay extra, while 37% were unsure.
- For a number of years we asked customers for their preference regarding price parity between urban and rural properties. Consistently customers preferred that all customers pay the same regardless of the fact it costs more to supply rural customers than urban ones.

Public Meetings

Waipa Networks organises public meetings on an ‘as required’ basis. Examples in recent years have been for:

- Planned Transpower maintenance affecting over half the customers on our network and explaining the Company’s rationale and route selection process for the second 110kV line from Te Awamutu to Hangatiki.
- Tamahere community meeting to explain network performance, the network supply characteristics for their area and tree trimming and feeder splitting initiatives to improve network reliability.
- St Kilda community meeting to offer Power Genius home energy management systems to assist consumers in understanding their energy use and how best to optimise the energy self-consumption from their solar Photo Voltaic (PV) systems.

Customer Helpdesk and Website Feedback Forms

Waipa maintains toll free numbers for customers to contact us regarding any issue of our operations. We also maintain e-mail contact details of key staff on our corporate website, and a feedback form for customers to use.

Fault calls and their resolution are recorded in the Company database. Network faults are analysed and reported to the Board.

Complaints Resolution Process

The Company operates a Complaints Resolution Process in accordance with Utilities Disputes (formerly the Electricity & Gas Complaints Commissioner) requirements. All complaints are assigned a case manager and complainants are fully involved and informed on the progress of their complaint.

Complaints are analysed by complaint type and customer type. The Company receives very few complaints. For the 3 years (ending 31 March 2018), the average number of complaints registered per year represented only 0.01% of the total ICPs. 98% of complaints were able to be resolved using our in-house Complaints Resolution Process. Any feedback provided is used to improve the quality of our service going forward.

Customer Price/Quality Expectations & Waipa Networks Pricing

The results of consultation suggest Waipa's strategy of providing a good level of service and low lines charges should continue. With customers supporting price parity, there is little mandate to offer a pricing structure more diverse than we already offer. It should be noted that the high retail margins, enabled by our low charges, attract a large number of retailers and provide customers with choice. The large number of retailers operating in our area mean our prices, and changes, are largely obscured by the retail market.

The one project where customers have expressed a need for increased quality and a willingness to pay for it is the Te Awamutu 110kV reinforcement project and we have used the feedback received when incorporating the Hangatiki – Te Awamutu 110kV line in our distribution pricing.

5.3 Customer Consultation

Waipa Networks has two types of consultation; Customer-initiated and Company-initiated.

Customer-Initiated

Customer-initiated consultation usually occurs due to a specific need of a customer, or after a Network event affecting one or more customers. This is summarised in the following table.

Customer Need or Event	Method of Consultation	Desired Planning Outcome
New connection to Network or upgrade of existing connection	Network Connection Application and capital contributions processes	Approvals take network load and growth into consideration. Trends in new connections help plan network income and investment.
Vegetation management	Processes under the Electricity (Hazards From Trees) Regulations 2003	Vegetation management programme addresses all geographic areas according to their specific species growth rates.
Faults	Customer faults number, call centre and field service	Immediate response to resolve fault. Faults individually and collectively analysed to identify medium and long term investment needs.
Complaints	Use of the customer Disputes Resolution Process	Registered complaints are analysed for trends. Service trends are used to assist network investment decisions.

Company-Initiated

Waipa consults with the following groups regarding significant projects and medium/long term network planning.

Customer Group	Method of Consultation	Desired Planning Outcome
Large Customers	Individual meetings /correspondence as required.	Consideration of larger customers given for key network investments.
Customer Advocacy / Interest Groups	Public meetings/individual meetings /correspondence as required.	Consideration of customer advocacy / interest groups given for key network investments.
Customer Groups (Residential/ Commercial / Urban / Rural)	Annual Customer Survey	Refer below.
Local District Councils, Regional Council & National Regulatory Bodies	Local Council planning cycles and District Plan updates. Meetings with Council officers as required for specific projects. Public meetings / correspondence as required.	Consideration of local and national regulatory bodies given for key network investments.
All	Public and Stakeholder meetings	Consultation with regard to large network development projects that affect all consumers.

Annual Customer Survey

The Waipa Networks annual customer survey is the predominant method by which Waipa Networks consults with customers. The independent phone survey of 400 randomly selected customers covers a wide range of operational and public relations aspects of the Company's work with a particular focus on supply satisfaction.

The July 2019 survey revealed the results shown in the following table.

Customer Satisfaction	Result	Target
Overall	96%	95%
Length of Shutdowns	92%	90%
Number of Shutdowns	93%	90%

Note – for the purposes of this report, customers who responded as "No Opinion" or "Don't Know" were considered to be ""Satisfied".

The annual customer survey is used as the means of assessing performance with regards to Consumer Oriented Performance Targets.

5.4 Consumer Oriented Performance Targets

The following table indicates the Consumer Oriented Performance categories and targets the Company has deemed appropriate based on customer feedback. The % target figures listed are the results returned in each category for the respective customer survey year.

Performance Indices	Target 2020/2021	Target 2021/2022	Target 2022/2023	Target 2024/2024	Target 2024/2025	Target 2025/2026	Target 2026/2027	Target 2027/2028	Target 2028/2029	Target 2029/2030
Overall	95%	95%	95%	95%	95%	95%	95%	95%	95%	95%
Length of Shutdowns	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%
Number of Shutdowns	90%	90%	90%	90%	90%	90%	90%	90%	90%	90%

Waipa recognises achievement of these satisfaction performance targets is dependent upon fulfilling our Vision, Mission and Objectives and seeking continued improvement in the Company's security and reliability targets.

Waipa Networks Objectives

The Company intends to build on its good relationship with its customers and other stakeholders by continually improving the network performance costs and efficiency consistent with the Company's objectives:

- **Deliver power safely all day every day**
- **Facilitating energy use not just a connection**
- **Building a sustainable business by establishing energy communities in the Waipa region**
- **Extend the availability of existing and new energy products from pilot projects to the broader community.**

Security Targets

Security of supply is assessed by reference to a level of in-built asset redundancy.

An "n" security level implies no alternative means of supply. If a component fails then supply is lost. An "n-1" security level is one in which supply is not lost in the event of any single component failure. An "n-1 switched" security level is one in which supply is lost until the faulty asset is isolated. Power is restored by closing interconnecting switches between feeders. Waipa's system is not operated in a "closed ring" manner. Therefore, the best feeder security level offered is n-1 switched.

The security of supply for Transpower's transmission and grid connection assets will be retained as a n-1 security of supply standard. When upgrading transmission connection assets, the Grid Reliability Standard (GRS) economic test will be applied by Transpower for the short-list selection of preferred options. This includes comparing the costs and benefits of transmission upgrades to the costs and benefits of the status quo option, where load shedding is required for transmission outages. All costs and benefits are compared on a time value of money basis.

Waipa's network security objective is to strive for the following security levels to be achieved for Transpower's Transmission Grid and GXP assets and specific parts of the Company's distribution network.

Transpower / Waipa Asset	Security Level
Transpower transmission lines supplying GXPs	n-1, economic test for selection of options
Transpower GXP transformers	n-1, considering economic test for selection of options
11kV urban lines	n-1 switched
Other 11kV lines	n-1 switched where interconnection is economic
Remote rural 11kV lines	n
All 400V lines	n

Reliability Targets

Network supply reliability is measured using;

- SAIDI – the system average interruption duration index (minutes)
- SAIFI – the system average interruption frequency index
- Faults per 100km of 11kV line

from which CAIDI the consumer average interruption duration index is calculated, where CAIDI = SAIDI / SAIFI.

Waipa's target is to continually improve network reliability over the ten-year planning horizon of this AMP. The following table shows the targets that have been set in the SCI for the next three years and extrapolated for the AMP horizon of 10 years for reliability.

Extended Duration Interruptions

This section presents the investigation of the underlying causes for an apparent deteriorating trend that may indicate potential issues with Waipa Networks' practices in relation to extended duration interruptions

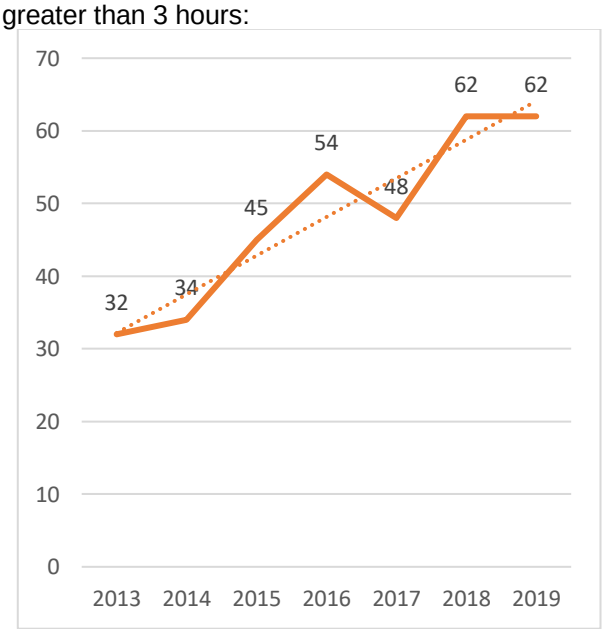
Extended duration interruptions are classified as service interruptions longer than three hours. Deteriorating trends in extended duration interruptions may indicate changes to restoration practices, declining network asset health in general, or a reduction in available post-contingent network capacity.

The following metrics (based on 2013-19 ID data) were analysed to identify any potential issues with Waipa Networks' practices in relation to extended duration interruptions that may justify further review:

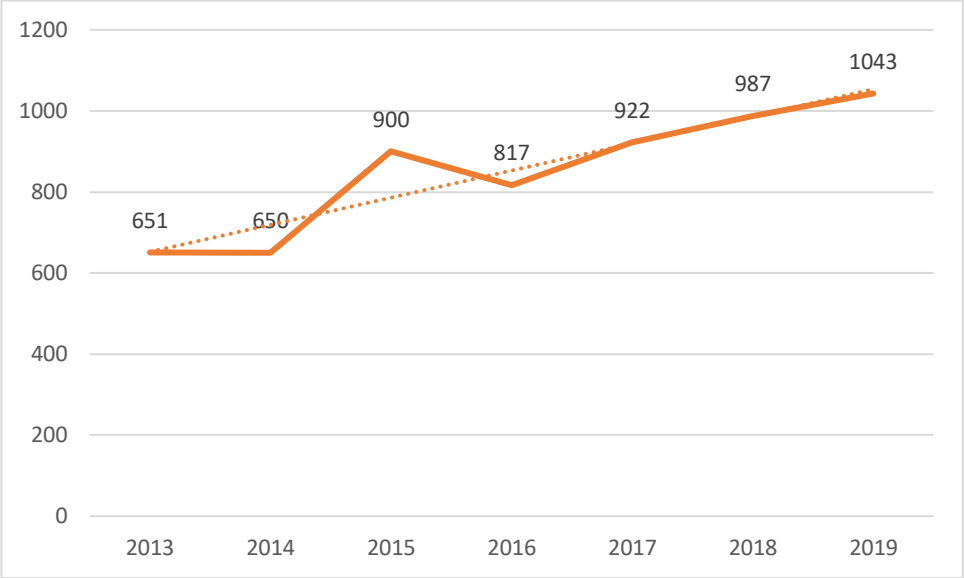
- Interruption duration
- Emergency expenditure

The following graphs illustrate the apparent trends related to interruptions with durations greater than 3 hours and the opex expenditure category that this is likely related to.

Number of interruptions greater than 3 hours:



Service Interruption and emergency expenditure ($000'S)



Explanation of Past Trend

The data in Table 1 provides a breakdown of the causes of the unplanned outages of greater than three hours duration (henceforth referred to as long duration outages).

Unplanned outages > 3 hours duration by cause:

	Lightning	Vegetation	Human Error	Defective Equipment	Adverse Weather	Adverse Environment	3rd Party	Wildlife	Unknown
	Outages Over 3 Hours								
2010	-	2	-	6	9	-	9	3	-
2011	-	-	-	5	10	1	8	-	-
2012	-	3	-	5	19	1	9	3	-
2013	-	7	-	5	1	-	13	4	2
2014	4	4	1	13	1	-	8	-	3
2015	1	18	1	12	2	-	9	2	2
2016	1	7	1	19	-	-	22	1	3
2017	3	7	1	12	5	2	18	1	-
2018	5	14	1	13	7	-	21	1	-
2019	1	9	1	13	6	-	31	-	1

The three main drivers of long outages that show an increase over the 10-year period are:

- Third party interference – this is largely car versus pole incidents.
- Vegetation – long duration outages are typically out-of-zone trees falling through the lines, so not controlled by expenditure trimming trees out of the D1 and D2 growth limit zones under the Tree Regulations.
- Defective Equipment. Refer to table below.

Defective equipment causing long duration outages is presented in the table below. There is no clear pattern of a particular class of equipment causing more long duration outages. There was a spate of insulator failures in the period 2014 to 2016 caused by a poor batch of insulators and this has since reverted to a similar rate as the beginning of the ten-year period. There may be a trend in the failure of 11kV conductor/cable but given the small number of occurrences it is not possible to say if there is any more than random variation.

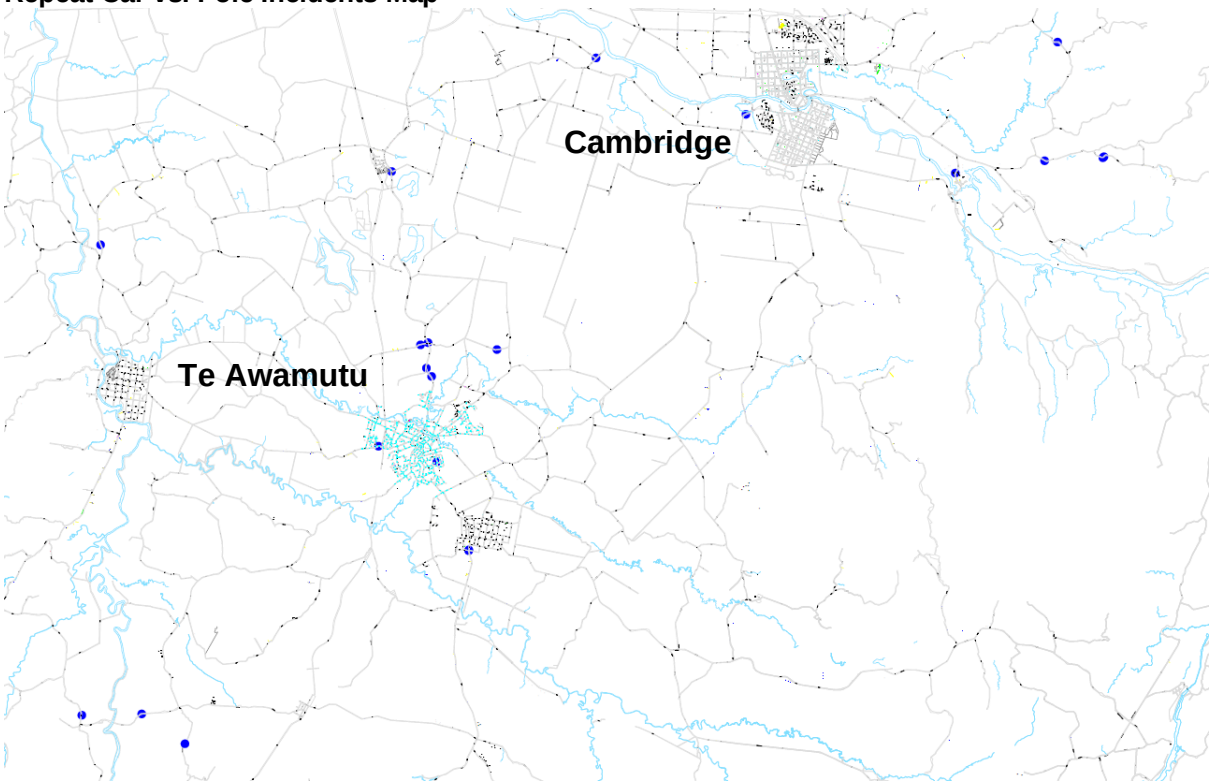
Defective equipment unplanned outages > 3 hours duration by cause:

	Insulator / Binder	LV Fuse	X-arm, arm Brace	11kV Conductor / Cable	Pole, stay pole, stay wire	Fuses DDO	Switchgear, ABS, Reclosers	Surge Arrestors	Transformer
	Outages Over 3 Hours								
2010	2	-	1	1	-	-	1	1	-
2011	2	-	1	1	-	-	1	-	-
2012	-	-	-	3	-	-	-	2	-
2013	-	-	-	2	-	-	-	2	1
2014	4	-	2	3	-	2	2	-	-
2015	6	-	2	-	-	1	1	1	1
2016	6	-	-	5	1	-	4	2	1
2017	2	-	-	3	-	2	2	1	2
2018	2	-	2	3	-	-	1	1	4
2019	3	-	3	3	-	-	2	-	2

Current Activities to Address Deteriorating Trend in Interruption Duration

Third party interference via car versus pole incidents is in general a random event where preventative measures such as barriers or undergrounding is not cost effective. Waipa Networks has a process of geographically mapping all car versus pole incidents, and identifying any repeat pole strikes for review. The review considers if the location is inherently hazardous and if remedial measures would be justified. There is a case where repeated pole strikes on a section of State Highway 39 led to the line being relocated further from the road. In the vast majority of cases however, the pole strike was a random event and often expensive relocations or barriers cannot be justified. Figure 1 below shows as blue dots all of the repeat car versus pole incidents on our network since circa 2006.

Repeat Car vs. Pole Incidents Map



We do not have evidence to indicate why more car versus pole incidents are occurring on our network. It is probable that traffic flows have increased, with strong population growth in Cambridge and Te Awamutu and people traveling to Hamilton for their work.

Vegetation maintenance budget was increased in 2016/17 from $700k to $1m per annum, with an increase in the number of arborists and trucks to service this higher level of spend. The increased vegetation maintenance expenditure has been effective in reducing the number of D1 and D2 "in-zone" vegetation faults. The increased budget has allowed more trees to be removed completely instead of just being trimmed, reducing repeat faults and eliminating "out of zone" tree faults from branches or trees failing through the lines. The increased level of spending per km of network compares well with other EDBs, but is not sufficient to remove all trees that pose an "out of zone" tree fall risk to the network.

We do not have evidence to indicate why more vegetation long duration outages are occurring. It is possible that warmer weather is increasing tree growth, and more intense weather events (e.g. rainfall or wind) is stressing the trees and leading to more destructive "out of zone" tree faults.

Defective Equipment in our view shows no clear pattern of a particular class of equipment causing more long duration outages. We continue with our programme of network asset condition surveys and resolving the defects that arise from the inspections. We have a backlog of network defects arising from our asset inspections, so we are increasing our budget to spend more on resolving defects in the coming years to address the backlog.

Planned Activities to Address Deteriorating Trend in Interruption Duration

Third party interference via car versus pole incidents is in general a random event where preventative measures such as barriers or undergrounding is not cost effective. In the planning phase for our AMP 2021 we will assess the cost of marking poles with white paint and reflector markers and compare this to the risk of car versus pole accidents. We are concerned that reflector marking of poles may actually contribute to out-of-control drivers focusing on the pole and striking it because it is visible. Our initial assessment is that the cost of pole marking would not be justified on a risk basis, even if it was targeted to higher volume roads.

Vegetation maintenance practices and budget is not intended to change related to long duration outages, because the "out of zone" tree faults cannot be completely eliminated due to budgetary

constraints and feasibility related to public views around the amenity value of trees near our network. Our current risk assessment approach of removing trees completely instead of trimming will continue.

Defective Equipment is a fault cause that we continue to monitor to identify trends with equipment types that may have an increasing failure trajectory. If a trend is identified, we would instigate a renewal replacement or maintenance programme within our AMP planning phase to address the issue.

Changes to Expenditure Forecasts
We have increased our budget for service interruption and emergency expenditure to $1,066k for FY 2020/21 and for rest of the ten-year period following. As the causes of the long duration outages (apart from defective equipment) are largely beyond our control, the higher expenditure on service interruption and emergencies is expected to continue for the foreseeable future. Post-incident learnings from long-duration outages are incorporated into our standard responses for future incidents.

We have increased our budget for defects arising out of the network asset condition survey from $636k in FY2019/20 to $779k in FY2020/21 and for rest of the ten-year period following. We are unsure if there will be a need to expend at this higher level for the entire 10-year period, but we think that there is quite a large population of wooden crossarms that will require replacement over this period. It is prudent for us to maintain this higher level of defect maintenance until we have more information on the defects trend.

Changes to Planned SAIDI Targets
The current situation with a focus on catching up the backlog in the network asset survey, and resolving the resulting maintenance defects is that the planned SAIDI and SAIFI performance has been much higher than target, due to the outages required to repair defects. This has been particularly the case with outages in Leamington, where the high ICP counts per transformer have resulted in significant SAIDI counts for planned outages. The forecast planned SAIDI for 2018/19 is slightly over 60 minutes, this will exceed the target of 40 minutes by over 20 minutes. There is no margin to account for the substantial uplift in planned SAIDI within the total SAIDI target.

As a result, the planned SAIDI and SAIFI targets have been reset at a higher level to account for the increased maintenance defect work. This situation is expected to continue for the entire ten-year period of this AMP. The unplanned SAIDI and SAIFI targets have been maintained at the current level, with an increase in the total planned plus unplanned target as a result.

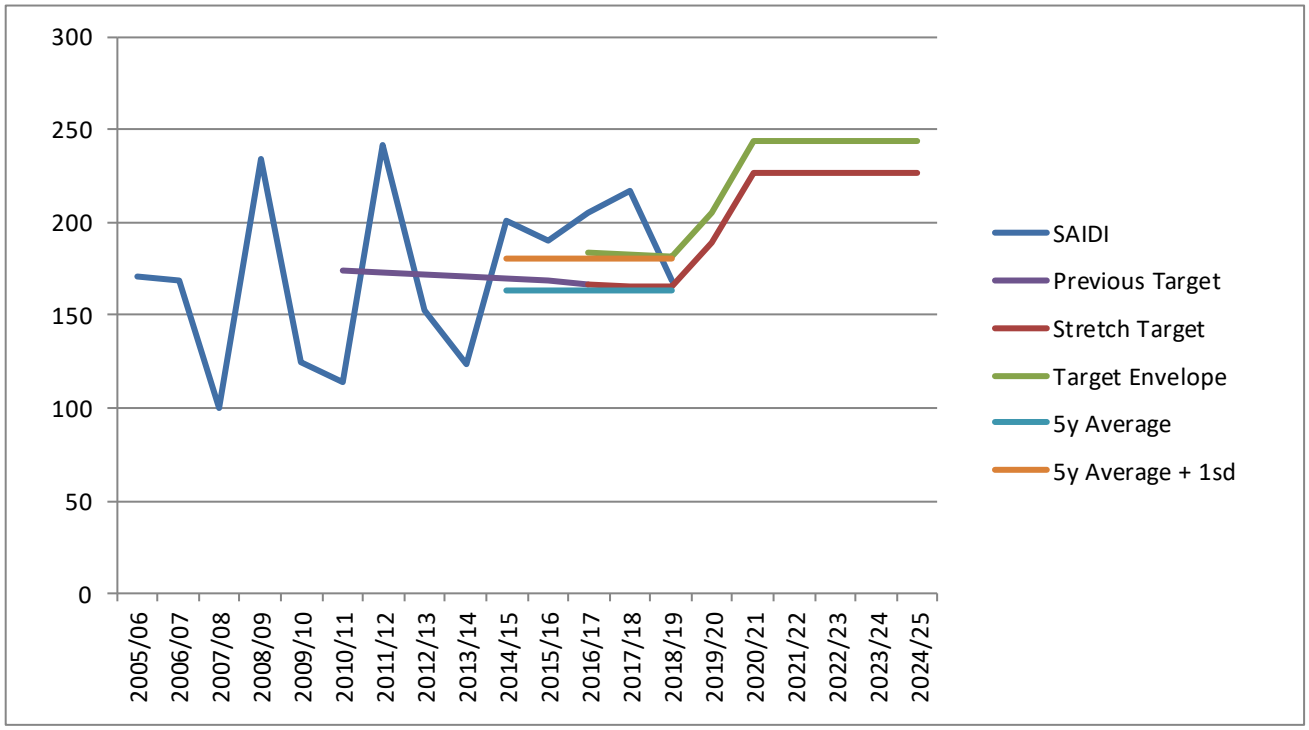
Stretch Target
The targets have been revised from 2020/21 to reflect the recent deterioration in SAIDI and SAIFI performance, linked to higher rates of long-duration outages (greater than three hours) caused by increased levels of car versus pole incidents and “out-of-zone” vegetation faults from trees falling through the lines. Each unplanned KPI is set flat for the next five years, with a gradual improvement (in the case of SAIDI and SAIFI) over the following five years. In the case of Faults per 100km of 11kV line the target maintains the same performance over the ten-year period.

Target Envelope
Natural variation occurs in the network reliability KPIs, and results year to year may be quite volatile given storm conditions, uncontrollable incidents like third party interference and out of zone tree contacts. A KPI target envelope has been set by adding one standard deviation of the past five years actual performance to the target KPI. This means that the target envelope will be achieved in approximately 84% of annual outcomes, assuming that the KPI performance is a normal distribution about the mean. This target envelope is calculated in the same way as the quality path regulation targets imposed by the Commerce Commission.

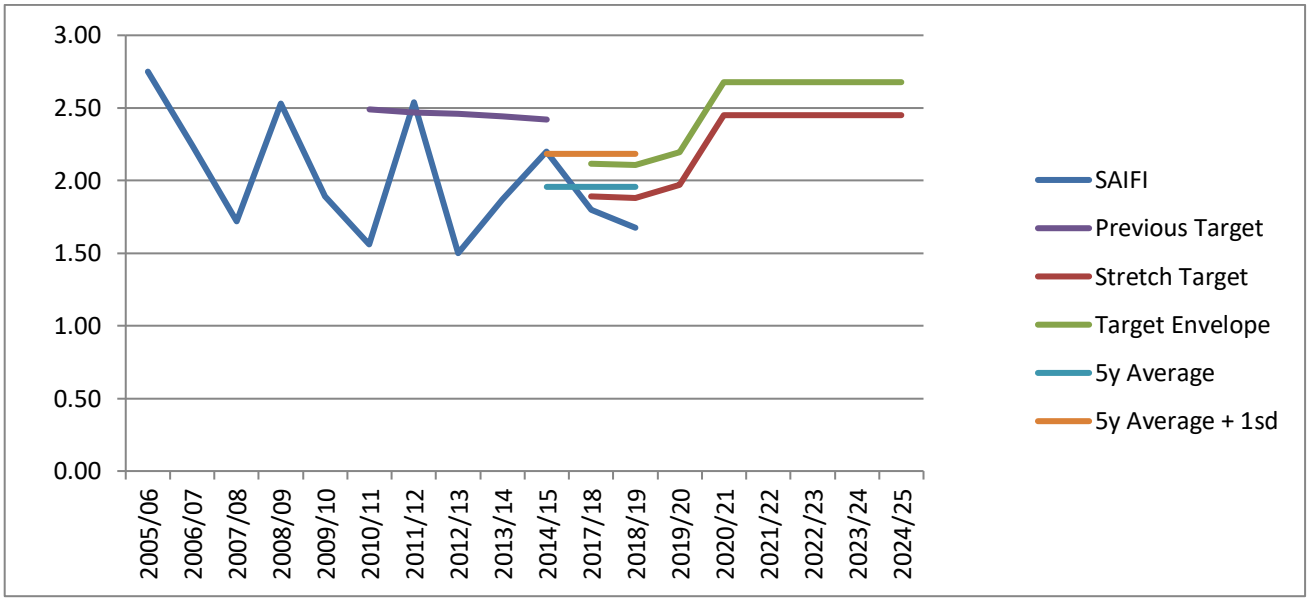
The use of a Stretch Target maintains a continuous improvement discipline for network supply reliability. The Target Envelope provides a realistic bound for the majority of outcomes given volatility in network reliability, and provides a signal for investigation if outcomes exceed the Target Envelope.

The following graphs show the past ten years actual results, the five-year average and five-year average plus one standard deviation, previous targets and the new stretch targets and target envelopes.

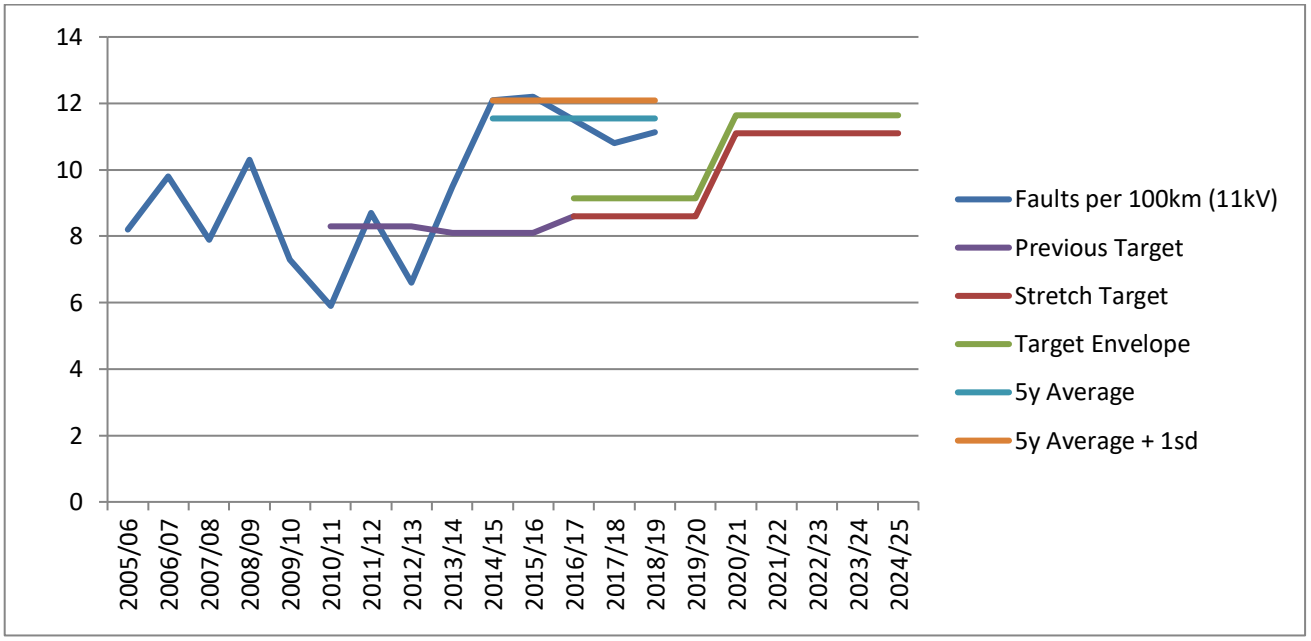
SAIDI Performance and KPI Targets



SAIFI Performance and KPI Targets



Faults per 100km of 11kV Line Performance and KPI Targets



Live-Line Techniques

Every opportunity will be taken to use live-line techniques where it is cost effective, with the overriding objective of ensuring that safety is maintained at all times. This approach is unchanged. If more live-line work was to be attempted in order to restrict the impact of maintenance shutdowns on planned SAIDI, the inherently lower productivity of live-line work would restrict the volume of work that could be completed within the year. Hence live line techniques are selected where this is a more efficient approach and may avoid the disruption of a shutdown to customers.

The current approach to deenergised work is to cluster planned work that requires a shutdown into modules and complete all work within a single module shutdown if resources allow. This minimises SAIDI and customer inconvenience. An initial target of 68 SAIDI minutes per year of planned outages for asset renewal, refurbishment and maintenance has been set, reflecting the higher volume of network work occurring as discussed above.

Reliability Targets

We have revised our Forecast Class C SAIDI and SAIFI as presented below, to reflect the current environment of long duration outages.

Network Reliability Performance Indices	Target 2020/21	Target 2021/22	Target 2022/23	Target 2023/24	Target 2024/25	Target 2025/26	Target 2026/27	Target 2027/2028	Target 2028/2029	Target 2029/2030
Planned SAIDI Target	80	80	80	80	80	65	65	65	65	65
Unplanned SAIDI Target	159	159	159	159	159	158	157	156	155	154
Planned SAIFI Target	0.27	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
Unplanned SAIFI Target	2.18	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30	2.30
SAIDI Stretch Target	227	227	227	227	227	226	157	156	156	157
SAIDI Target Envelope	244	244	244	244	244	243	174	173	173	174
SAIFI Stretch Target	2.45	2.45	2.45	2.45	2.45	2.44	2.42	2.41	2.40	2.38
SAIFI Target Envelope	2.68	2.68	2.68	2.68	2.68	2.66	2.22	2.22	2.22	3.22
Faults/100km 11kV Stretch Target	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5	13.5
Faults/100km 11kV Target Envelope	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0	14.0

Targets for the number of planned and unplanned outages are presented in the table below. With regard to planned targets, higher levels of planned outages are expected related to the Waikeria Project in 2020/21. For the subsequent years, a higher level of planned outages to resolve defects is expected. The target for unplanned outages is 160, being the average of five years; the last four years plus the annualised forecast for 2019/20.

	Actual	Actual	Actual	Forecast	Target	Target	Target	Target	Target
	2014/15	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25
No. planned outages	82	82	98	*190*	180	180	180	180	180
No. unplanned outages	163	151	148	*168*	190	190	190	190	190

5.5 Targets for Asset and Electricity Distribution Business Performance

Asset Delivery Efficiency Targets

Waipa uses the performance indicators of Loss Ratio to measure network asset delivery efficiency.

Loss Ratio

Loss Ratio measures the ratio of kWh lost on the distribution network to kWh conveyed per year. Lost units are the difference between metered sales to consumers and metered purchases at each Transpower GXP and distributed generation supplied to the network.

Losses are composed of physical losses due to the heating of distribution assets, un-metered supply and theft. Losses are difficult to measure accurately because all unit sales through retailers' meters would need to be read instantaneously at year-end to calculate the difference between conveyed and sold energy. Currently only Time-of-Use meters in consumers' installations can supply the required accuracy for sales.

Load Factor

Load Factor measures the ratio of kWh conveyed per year to the kW MD multiplied by the number of hours in a year. Improvement in this performance indicator requires minimisation of MDs via a fully functional load management system whilst delivering contracted service levels. Load Factor can also be improved by increasing the kWh conveyed over the distribution network. Because network assets are built to meet MD a good Load Factor is essential to obtain economic use of assets.

Load control is used to control MDs to:

- Defer capital investment in larger assets
- Reduce Transpower charges
- Reduce network losses

In the short term the dominant reason to minimise the MD of a network is to minimise Transpower charges. In the medium term it is to defer capital investment. Its impact on losses is minor and ignored in all practical respects.

When Transpower's charging methodology changed from being based on a network's 12 highest anytime MDs to its contribution to a region's 100 anytime MDs there was no reason to manage a networks MD at times of low regional demand. From 2010/2011 Waipa's practice changed from the former to the latter and Load Factor is no longer used as a key performance measure for the network.

Asset Delivery Efficiency Targets

Asset Delivery Efficiency Performance %	Target 2020/21	Target 2021/22	Target 2022/23	Target 2023/24	Target 2024/25	Target 2025/26	Target 2026/27	Target 2027/2028	Target 2028/2029	Targ 2029/
Loss Ratio	<6.5	<6.5	<6.5	<6.5	<6.5	<6.5	<6.5	<6.5	<6.5	<6.

Business Efficiency Targets

Waipa uses the performance indicator Total Operational Expenditure per ICP as a measure of the Company's financial efficiency. The following table shows the targets that have been set in the SCI for the next 2 years and extrapolated for the AMP horizon of 10 years for Business Efficiency.

Business Efficiency Targets

Asset Delivery Efficiency Performance %	Target 2020/21	Target 2021/22	Target 2022/23	Target 2023/24	Target 2024/25	Target 2025/26	Target 2026/27	Target 2027/2028	Target 2028/2029	Target 2029/2030
Total Operational Expenditure per ICP	<370	<370	<370	<370	<370	<370	<370	<370	<370	<370

These targets are consistent with the Company's objectives of:

Provision of value for money

Public Safety, Amenity Values and EDB Performance Goals

Waipa will take all steps to eliminate the risk of injury to people, animals and damage to property by ensuring that;

- All electrified assets are secure from inadvertent or accidental contact by the public,
- all equipment earthing complies with industry standards,
- all network assets are maintained in good, safe working order,
- all faults are detected and disconnected from supply automatically and made safe.

These objectives are consistent with the first element of the Company's objectives:

Deliver power safely all day every day

The Company will be cognisant of the requirements of the Resource Management Act, Waipa District Council Plans, Waikato District Council Plans, Otorohanga District Council Plans, Waitomo District Council Plans, New Zealand Transport Agency requirements and On Track requirements when constructing new lines.

These objectives are consistent with the Company's principle of operating in an environmentally friendly and sustainable fashion.

Waipa will comply with the regulatory obligations applicable to EDBs. The following table identifies Waipa's legislative responsibilities.

Safety	Amenity Values	Consumer, Commercial and Employee	Electricity Distribution Industry
Health and Safety at Work Act 2015 and regulations	Resource Management Act 1991	Consumer Guarantee Act 1993 The General & Scheme Rules for the Energy Complaints Scheme operated by Utility Disputes Limited	Electricity Act 1992
Fire Safety and Evacuation of Buildings Regulations 2006	Waipa District Council Plans	Fair Trading Act 1986	Electricity (Safety) Regulations 2010
Building Act 2004	Waikato District Council Plans	Privacy Act 1993	Electricity Industry Reform Act 1998
Civil Defence Emergency Management Act 2002	Otorohanga District Council Plans	Companies Act 1993 Energy Companies Act 1992	Energy Companies Act 1992
Fire and Emergency New Zealand Act 2017	Waitomo District Council Plans	Contract (Privity) Act 1982	Electricity (Hazards from Trees) Regulations 2003
	Land Transport Safety Authority requirements Land Transport Act 1998 Road User Charges Act 2012 Road User Charges Regulations 2012	Employment Relations Act 2000 Holidays Act 2003 Minimum Wage Act 1983 Wages Protection Act 1983	Electricity Disclosure Requirements 2004 Electricity Industry (Statistics) Regulations 1996
	KiwiRail Requirements	Financial Reporting Act 2013	Commerce Act (Electricity Distribution Thresholds) Notice 2004
	National Code of Practice for Utility Operators' Access to the Transport Corridors and the Utility Access Act 2010	Commerce Act 1986	Electricity Governance Regulations 2003
	Heritage New Zealand Pouhere Taonga Act 2014	Accident Compensation Act 2001	Electricity Industry Act 2010 Electricity Industry (Enforcement) Regulations 2010
		Child Support Act 1991 Criminal Records (Clean Slate) Act 2004 Human Rights Act 1993 Immigration Act 2009 Immigration Advisors Licencing Act 2007 Parental Leave and Employment Protection Act 1987 Smoke-free Environments Act 1990	Safety Management Systems for Public Safety – Electricity and Gas industries – NZS 7901:2014
		Goods and Services Tax Act 1985 Income Tax Act 2007 KiwiSaver Act 2006 Student Loan Scheme Act 2011 Tax Administration Act 1994	Electricity Governance (Security of Supply) Regulations 2008
		Occupier's Liability Act 1962	Electricity Industry Participation Code 2010
			Plumbers, Gasfitters and Drainlayers Act 2006

Quality of Supply Goals

Voltage

Waipa will provide supply at each NCP to meet regulatory voltage requirements, and promptly address reported incidents of voltage outside regulatory limits consistent with the Company's objective;

Deliver power safely all day every day

Power Factor

Waipa will continue to work with electricity retailers and electrical contractors to ensure consumers' installations are maintained with a power factor of better than 0.95 (lagging) to maximise electricity conveyance through its assets by reducing network reactive load and losses consistent with the Company's objective;

Provision of value for money

Interference

Waipa will continue to work with electricity retailers to ensure as far as possible that one consumer's installation does not cause interference for any other consumer and that consumers' installations does not adversely impact on ripple injection signal strength or quality consistent with the Company's objective:

Provision of value for money

Load Management Goals

Waipa will continue to operate its load management system to minimise the Lower North Island Maximum Demand interconnection charges from Transpower and to minimise capital investment on the distribution network.

Waipa will price load control services so that they are attractive for electricity retailers to implement with their customers. Both objectives are consistent with the Company's objective:

Provision of value for money

Prudent Operator Goals

The Company seeks to be a high performing lines company exercising a philosophy appropriate to its ownership structure, a safe and good employer, and a good corporate citizen. Waipa is committed to being a good employer and responsible EDB network operator consistent with the principles required to meet the Company's objectives:

- providing customers with outstanding service and solutions,
- providing value for money,
- operating in an environmentally friendly and sustainable fashion,
- being aware of technological changes which could impact the business model,
- pricing Line Function Services to ensure connected consumers are charged equitably to achieve sustainable profit levels, and
- having regard to the efficient use of energy.

and the Company's Health and Safety Vision:

Keeping our people safe

Reliability Goals

The Company aims to continually improve the quality and reliability of its service. Reliability will be improved and the risk of outage to consumers reduced by implementing the Company's segmentation programme and continuing a preventative maintenance programme based on asset condition surveys and vegetation management of trees menacing lines consistent with the Company's objective:

Deliver power safely all day every day

Work Practice Goals

The Company seeks to use best work practices and continually upgrade skills for all staff to improve effectiveness and safety consistent with the Company's Health and Safety Vision:

Keeping our people safe

The risk of injury to employees or contractors will be reduced by ensuring that all contractors and employees are suitably trained, qualified and meet minimum auditable standards for health and safety procedures, design standards and operating standards before being permitted to work on the distribution network.

The Company encourages safe working practices, provides high quality tools, plant and personal protective equipment. Both of these initiatives are consistent with the Company's Health and Safety Vision:

Keeping our people safe

Environmental Goals

The risk of Company operations adversely impacting on the environment will be reduced by ensuring the use and disposal of any hazardous materials such as transformer oil is in accordance with good industry practice. The Company seeks to consistently achieve the best environmental outcomes from all its activities and holds Gold Enviro-Mark certification. Waipa's on-going environmental initiatives are consistent with the Company's objective:

Building a sustainable business by establishing energy communities in the Waipa region

Asset Record Goals

Waipa will maintain accurate records locating all overhead and underground plant and equipment in the field owned by the Company. Standard construction design drawings from Waipa's Design Manual will be used for most new construction and for maintenance requirements. Full construction drawings will be maintained for any non-standard installations operated by the Company in accordance with its following objective:

Building a sustainable business by establishing energy communities in the Waipa region

5.6 Justification for Service Level, Asset and EDB Targets

The Company has set its service level and asset performance targets after analysing the historical performance of other EDBs and wishing to position itself consistently in the top ten achievers.

Waipa Networks Vision and Objectives

Waipa intends to build upon its good relationship with its customers and other stakeholders by continually improving the network performance cost effectively consistent with the Company's objectives;

Deliver power safely all day every day

Building a sustainable business by establishing energy communities in the Waipa region

Customer Satisfaction Targets

The customer satisfaction categories were chosen based on analysis of typical customer issues: planned/unplanned outages, the number and length of those outages and voltage fluctuations. Overall satisfaction was also included as a general indicator of performance.

The percentage targets were chosen using the following methodology:

Overall satisfaction: for a number of years this has been in the mid-high 90s. The target has been set at 95% as a minimum realistic target given historic performance.

The number of voltage fluctuations: the 2015/16 target of 80% was set based on historical performance and has been increased to 90% in 2016/17. 90% was set taking into consideration the rural nature of a significant portion of the Network.

Outages: the 2016/17 target of 90% was set taking into consideration the rural nature of a significant portion of the Network.

Refer to Section 5.3 for Consumer Oriented Performance Targets table.

Security

Waipa has set future security level targets for Transpower assets and its own distribution assets as a consequence of customer consultation.

The Company undertakes annual Customer Surveys conducted by an independent service provider. It has held Public Consultation meetings in Cambridge, Te Awamutu and Kawhia to gain feedback from consumers on the service it provides as well as security and reliability of their supply.

Generally, consumers continue to be satisfied with Waipa's service and the reliability of the Cambridge and Te Awamutu networks.

Reliability

Supply reliability including response targets should be established taking into account consumer needs and their willingness to pay for an improved service. Given the complexity of quantifying all of our customer requirements and relating them to network performance, targets are normally set on a qualitative and generic basis.

From recent consumer surveys it is not evident that Waipa's customer base supports heightened (or reduced) levels of supply reliability, especially where these would involve increased (or decreased) line charges.

However, from a telephone survey of 400 customers in July 2014, 59% of respondents were in favour of customers paying extra for improved reliability and security of supply for Te Awamutu.

Under the previous regulatory regime, the Company's reliability thresholds were prescribed by the Commerce Commission. The regulatory targets were based on historical network performance and it is likely that even in the absence of regulatory intervention, Waipa's reliability targets and performance would have been similar to those achieved under the regime.

Waipa has set future reliability targets to continually improve the quality and reliability of its network performance. These targets have been established in light of the recent good network performance and reflect the Company's perception of growing expectations of our community.

Asset Delivery Efficiency Targets

Loss Ratio

The use of this loss ratio as a 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 optimum level of efficiency in terms of losses, given physical constraints.

Waipa intends to run its distribution network to its fully rated capacity without thermally damaging or prematurely aging the network assets. This will increase the network technical losses over time for existing assets. New assets will be sized to meet future load growth and have lower initial losses. It is expected that future total network losses will remain at close to current levels.

Business Efficiency Targets

The use of Operational Expenditure per Network Connection Point as a service level, particularly when comparison with peers is undertaken, is justified as it enables an understanding as to whether operating expenditures are appropriate and efficient given the operating parameters of the company.

The Business Efficiency Targets adopted by the Company (Executive Management, Directors and Trust) will ensure that Waipa can continue to offer low network line charges while continually striving to improve reliability of service.

Safety

Waipa has set its future asset, energy delivery, efficiency, and reliability and safety performance targets after consultation with stakeholders and in accordance with the Company's objectives:

Deliver power safely all day every day

Waipa's health and safety goal is to achieve zero accidents and lost time injuries in accordance with its Health and Safety Vision:

Keeping our people safe

Environmental

Waipa's environmental goal is to fully comply with all reasonable requirements of the Waipa, Otorohanga, Waikato and Waitomo District Councils and the Waikato Regional Council and to avoid incidents that would cause environmental harm in accordance with the Company's objective principles:

Operating in an environmentally friendly and sustainable fashion

Voltage

Waipa along with other EDBs has a regulatory obligation to provide supply within statutory voltage limits. The Company will continually strive to ensure that regulatory voltage standards are not breached.

Power Factor

Waipa has set future power factor limits to avoid potential Transpower reactive power penalty payments incurred if power factor is less than 0.95 (lagging) and to reduce network reactive load and losses.

6 Network Development Plans

6.1 Planning Criteria and Assumptions

Waipa planning criteria for network development plans takes into consideration;

- capacity of an asset to convey electricity,
- quality of supply (voltage within regulatory limits),
- reliability (SAIDI, SAIFI, CAIDI) and
- security of supply (probabilistic, n-1 or n).

As the Company has a number of long radial rural feeders there is a need to provide conductors of adequate cross-sectional area to maintain satisfactory voltage levels along and at the extremities of these feeders. Typically, the initial sections of all feeders radiating out from Transpower's Cambridge and Te Awamutu GXP require 300mm^2 Al cables and heavy line for adequate fault rating, back feed capacity and voltage support.

Waipa takes its 11kV supply directly from Transpower's 110kV/11kV 40MVA 15% impedance transformers at Cambridge and Te Awamutu. Transpower's 11kV fault duty is now such that Waipa feeder cables radiating out from these GXPs require a 500MVA or 26kA fault duty screen for the first few kilometres before the fault duty diminishes sufficiently for normal distribution switchgear with a fault duty rating of 250MVA or 13.1kA.

As the network comprises 11kV and 400V reticulation assets only, the Company need only buy a limited scope of assets. The assets chosen comply with the load requirements and fault duty of the network.

The Company's main assets comprise: cables, lines, reclosers, voltage regulators, ring main units, gas switches/ABS and dropout fuses. Their performance ratings are described in the following table. Due to the radial configuration and simplicity of the network it is cost effective to limit the number of models of reclosers, ring main units, voltage regulators, gas switches /ABS and dropout fuses to one model for each asset.

Asset Ratings / Distance from GXP	TPNZ Circuit Breaker	Waipa Cable	Waipa Line	Waipa Recloser	Waipa RMU	Waipa Voltage Regulator	Waipa ABS	Waipa DDO
<3km	800A / 400A, 26kA CBG GXP 1250A / 630A 26kA TMU GXP	400A, 26kA 3c300mm^2 Al XLPE Cu Screen	490A AAAC Krypton 158mm^2	630A 16kA 4sec	630A 20kA 3sec	300A 200A 100A +/-10% 32 taps	630A 12kA 1sec	100A 12kA 1sec
3km-10km		400A, 13.1kA 3c300mm^2 Al XLPE Cu Screen						
10km-25km		300A, 10.6kA 3c185mm^2 Al XLPE Cu Screen	410A AAAC Hydrogen 111mm^2 333A AAAC Helium 77mm^2					
>25km		200A, 9.1kA 3c95mm^2 Al XLPE Cu Screen	250A AAAC Fluorine 49mm^2					
spur		100A, 3.3kA 3c35mm^2 Al XLPE Cu Screen	140A ACSR Squirrel 21mm^2					

Note abbreviations:
Al: Aluminium
Cu: Copper
ACSR: Al Conductor Steel Reinforced
AAAC: All Al Alloy Conductor

Waipa procured ETAP software in 2011/2012 to use for accurately calculating and determining the requirements of new assets. Input of network information commenced into the programs models and has been used for design and planning purposes. Additional modules of ETAP were purchased in 2019 to complete cable rating calculations, facilitate the import and export of data and allow unlimited busbars for larger network modelling studies.

Other inputs to the Company's network development plans come from District Councils, Waikato Regional Council, property developers, Fonterra and other major industrial consumers.

The District Councils in Waipa's reticulation area have adopted a 30-year planning horizon for local development. The Company regularly assesses the impact of these developments on the network and makes submissions on these plans as appropriate. Given the growth in the Cambridge area and recent interest from industrial customers in the area, a more comprehensive grid exit point capacity and sub-transmission network development plan has been completed, to address the longer-term capacity needs of the area. A similar grid exit point and sub-transmission plan will be developed for the Te Awamutu network area in 2020.

The impact of developers subdividing existing properties is assessed from year to year.

The two Fonterra dairy factories, Waipa's largest consumers, keep the Company informed of their maximum demand (MD) requirements on an annual basis. Any significant increase in the long-term capacity requirements are discussed as they arise and a solution agreed between the parties.

Major developments are monitored as they arise, with network development plans being developed to determine efficient supply methods. Examples of these are the Waikeria Prison upgrade project and the APL aluminium and glass joinery factory development.

Waipa intends to continue to supply remote connected consumers' installations beyond April 2013 provided it remains economic for the Company to do so.

Maximum Demand Growth on Waipa Feeders

MD growth predictions for all Waipa's feeders were established using half hourly load data. The underlying MDs on Waipa's feeders were determined by analysing each half hour load and eliminating abnormal loads caused by total or partial switching of feeders for capital and maintenance works and for restoration of supply after a fault. Development of a load forecasting tool using a projection of historical feeder maximum demands has been completed in 2017, in order to more accurately assess future growth on feeders.

The following tables show the maximum demands of each feeder (Amps) and GXPs (MVA) using this new load forecasting tool.

CAMBRIDGE													
Year	C2702 Rotorangi	C2712 CBG North	C2862 Monavale	C2842 Tamahere	C2772 French Pass	C2722 Cambridge Town	C2802 Lemington	C2832 Cambridge East	C2852 St Kilda	C2732 Kaipaki	C2742 Pencarrow	C2762 & 2812 Hautapu A & B	GXP Total, MVA
2020	283	191	233	266	327	302	299	243	28	230	244	437	52.3
2021	299	238	235	271	336	305	307	250	29	235	256	437	55.0
2022	306	286	237	276	345	307	314	257	31	240	267	437	58.8
2023	314	288	239	281	354	309	322	265	32	244	279	437	60.1
2024	322	291	241	287	364	312	329	273	33	249	291	437	61.5
2025	329	294	243	292	373	314	337	281	34	254	303	437	62.9
2026	337	297	246	298	382	317	344	290	35	259	314	437	64.2
2027	345	300	248	303	391	319	352	298	36	263	326	437	65.6
2028	352	303	250	309	400	321	359	307	37	268	338	437	67.0
2029	360	306	252	315	409	324	367	317	38	273	350	437	68.3

TE AWAMUTU														
Year	T2742 Kihikihi	T2752 ystery Cre	T2822 Ohaupo	T0022 Kawhia	T0023 kio/Waike	T0024 TA West	T0026 Hairini	T0027 Paterangi	T0025 Pirongia	T2842 Pokuru	T2832 TA East	T2762 Pukeatua	T2782 & T2802 Fonterra A & B	GXP Total, MVA
2020	212	103	154	153	260	262	226	175	211	221	208	260	73	41.6
2021	212	107	157	157	262	263	230	179	215	227	205	267	73	41.8
2022	212	111	160	162	263	265	233	182	218	234	201	273	73	42.0
2023	212	115	163	166	265	266	237	186	221	240	198	279	73	43.2
2024	212	119	166	170	267	268	240	190	225	247	195	285	73	43.5
2025	213	123	168	175	268	269	244	194	228	253	191	292	73	43.7
2026	213	126	171	179	270	271	247	198	232	260	188	298	73	43.9
2027	213	130	174	184	272	272	251	202	235	266	184	304	73	44.1
2028	213	134	177	188	273	274	254	206	239	273	181	311	73	44.3
2029	213	138	180	192	275	275	258	210	242	279	178	317	74	44.5

Network Analysis to Identify Constraints

Waipa Networks has previously predicted when its feeders would become capacity or voltage or security constrained as determined by applying approximate criteria. This was used in the absence of a full set of load flow models for accurate analysis of feeder capacity, voltage performance and the ability to back feed feeders.

Prior to and during 2017 load flow models for all of the 27 11kV feeders were developed. Load flow analysis of Cambridge feeders was completed to assess capacity, voltage and security of supply via adequate back feed from alternative feeders. This work identified a number of voltage support investments required to ensure voltage performance during peak loads and during back feeding. Analysis of the Te Awamutu feeders commenced in 2019 and will continue in 2020. Other network analysis work will involve a continuous review of transformer loads, conductor types and lengths in feeder models along with the impact of load growth on future capacity and voltage limitations.

Capacity Constrained Feeders

Waipa deems that a feeder has reached its capacity constraint when its 10th MD exceeds its switchgear, cable or overhead line maximum thermal rating.

Voltage Constrained Feeders

Waipa deems that a feeder reaches its voltage constraint when the delivered voltage levels anywhere along the length of the feeder fall below the minimum design limit of ±5% and prescribed regulatory voltage of 0.94pu (that is, ± 6%) for LV networks.

Security of Supply Constrained Feeders

The Company's stated security of supply objective for 11kV urban and suburban areas and other 11kV lines where interconnection can be provided economically is n-1 switched. This provides security of supply in the event of a fault close to the GXP, or the feeder circuit breaker being removed from service for maintenance This objective can be best tested by actual load flow analysis of feeders in a back-feeding configuration. The previous practice of limiting 11kV feeders to be loaded up to 66% of their rating so that there is the ability to switch load to two (or more) adjacent feeders accounts only for thermal capacity, when the load flow analysis of back feeding Cambridge feeders showed clearly that voltage was often a key limiting factor for back feeding.

Investment in voltage regulators and capacitors to achieve security of supply through back feeding is relatively much less than providing feeder interconnections or constructing new feeders. However, some longer rural feeders are encountering voltage limits and it is imperative to investigate alternative solutions for the long-term ability of the network to continue to meet forecasted demand. Solutions to security issues will be economically tested where the cost is excessive or the security benefit provided is modest.

6.2 Prioritisation Methodology Adopted for Development Projects

Waipa prioritises Transpower new investments and the Company network development projects by a combination of the number of customers affected and predicting when Transpower transmission, GXP assets and the Company's feeder assets become constrained. The following table shows the priority that the Company places on these constraints.

Constraint	Priority Level*
Low Voltage	First Priority
Lack of Capacity	Second Priority
Poor Reliability	Third Priority
An Unacceptable Level of Security of Supply	Fourth Priority

***Where finite resources constrain the completion of multiple projects.*

These predictions are made by analysing;

- Transpower's transmission line security level,
- Transpower's GXP underlying maximum demand growth,
- the Company's underlying feeder load trends,
- customer driven work,
- the Company's feeder reliability (SAIDI, SAIFI, CAIDI) performance and
- the Company's feeder security level.

Transpower's new investments and Waipa's network development projects are evaluated using network development analysis including load flows which identifies when an asset is predicted to become constrained. Waipa then prioritises and schedules projects so that the assets are not constrained and solutions are implemented in a timely manner.

In the past Waipa has been able to schedule and implement all the Company's development projects in good time to avoid the assets becoming constrained, without incurring any conflicts of resources. However, in the last three years engineering resource limitations have deferred progressing projects due to the workload pressure of major developments (Waikeria prison expansion, new APL glass factory) such as:

- New or upgraded Voltage regulator projects for Cambridge area
- New capacitor project for Pukeatua feeder in Te Awamutu area
- Replacement Te Awamutu GXP cables

Planning for these projects are now in advanced stages for implementation in 2020/21.

6.3 Demand Forecasting

Maximum Demand Growth at Transpower's GXPs

Cambridge GXP

Over the past 5 years the underlying average growth in energy (kWh of electricity) imported through Cambridge GXP was +2.23% per year.

Over the same period the 5-year average growth in MD at Cambridge GXP (with full load control) was 2.21%, and has ranged between -3.7% and +12.5% per year.

Te Awamutu GXP

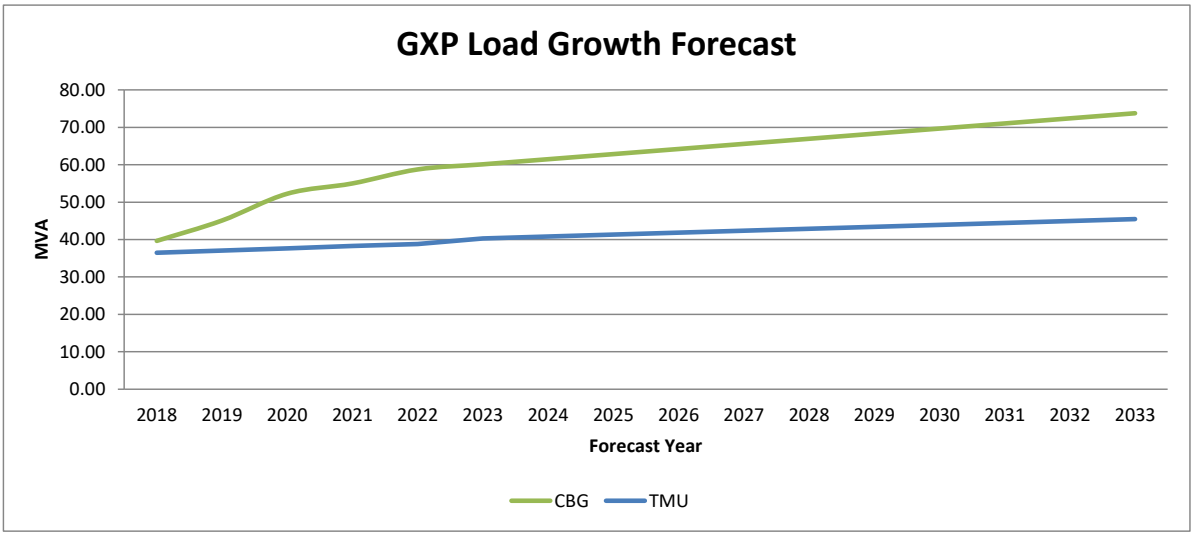
Over the past 5 years the underlying average growth in energy (kWh of electricity) imported through Te Awamutu GXP was +2.18% per year.

Over the same period the 5-year average growth in MD at Te Awamutu GXP (with full load control) was +1.21%, and has ranged between -2.0% and +5.7% per year. The Te Awamutu GXP MD has increased recently due to operating restrictions on the Fonterra Te Awamutu factory cogeneration unity.

Maximum Demand Growth at Transpower GXPs

The historical large step increases in MD at both Te Awamutu and Cambridge (17.4 % and 26.9% respectively) were associated with a change in load control policy. The Company places less emphasis on controlling its own anytime MD instead it focuses on controlling its contribution to the 100 Lower North Island Coincident Peaks. Fluctuations since reflect annual seasonal differences and annual changes in Fonterra demand/Te Awamutu dairy factory internal generation.

Waipa uses the historical trends to forecast future MDs based on a build-up of individual feeder demand forecasts, moderated with a diversity factor for each GXP. The Company forecast MDs for both CBG and TMU GXPs are shown in the 'graph below. Waipa predicts a forecast of 6.3% increase at CBG GXP (dominated by the APL load increase) and 1.4% increase at TMU GXP over the 10-year planning horizon, with predicted step load increases in Cambridge and Te Awamutu based on committed or likely developments.



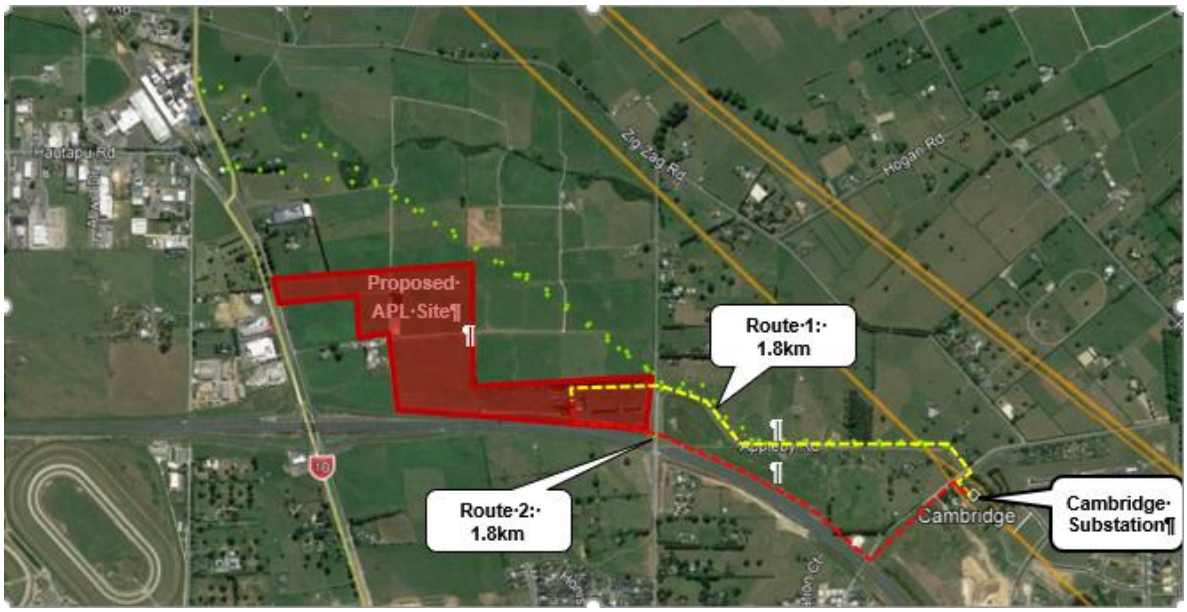
Impact of Substantial Projects or Developments on Maximum Demand

The load forecast allows for the 1.1MVA load increase associated with the Lakewood development, a combined hotel, apartment and commercial development on the northern edge of the Cambridge CBD which is currently under construction. Allowance is also made for a potential 1 MVA industrial processing development in the Cambridge area within the next five years. A 2.5 MVA load increase in 2021 associated with the new Waikeria 600 bed prison facility has been incorporated into the Te Awamutu GXP forecast, with a subsequent increase of 1 MVA potentially required in 2023. Historical new developments comprise; subdivisions, dairy farms and small retail outlets. Waipa has recently connected two fast moving consumable goods outlets which the Company considers large loads. However, it is predicted that this type of load can be connected to the network without dramatically increasing the MD beyond forecast predictions because of load diversity on the respective GXP and the Company's ability to manage controlled load.

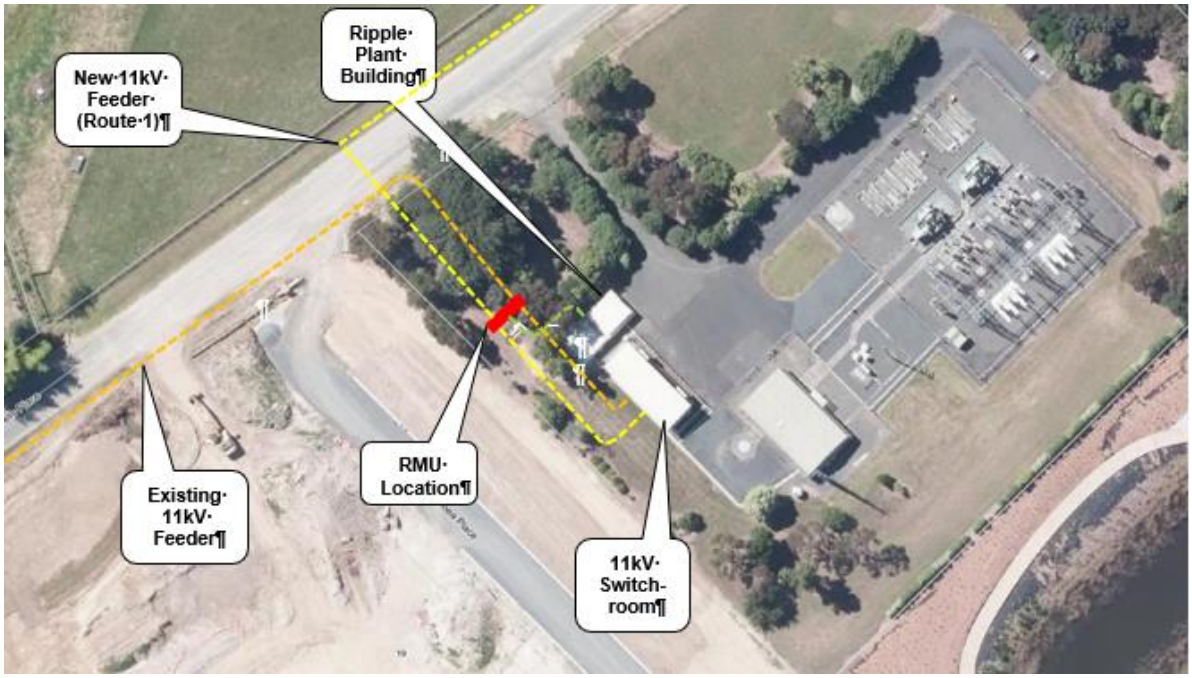
A significant development that has arisen in the past year is the APL aluminium and glass joinery factory on newly zoned industrial land at Hautapu. The initial stage involves the construction and fitout of a 400m by 100m factory building, with associated 4.5 MVA electrical load. This required the installation of a new express feeder from the Cambridge GXP and a connection to the Cambridge North feeder to supply the factory. The load increase at Cambridge GXP would exceed the firm capacity, requiring a special protection scheme to shed feeder load in the event of a supply transformer or 110kV line tripping at peak load periods. Subsequent development of an aluminium extrusion plant

in the five-year time frame would increase demand at the site to an estimated 19 MVA. To supply this further GXP capacity would be required, as well as a 33/11kV zone substation to supply the site and the Hautapu dairy factory.

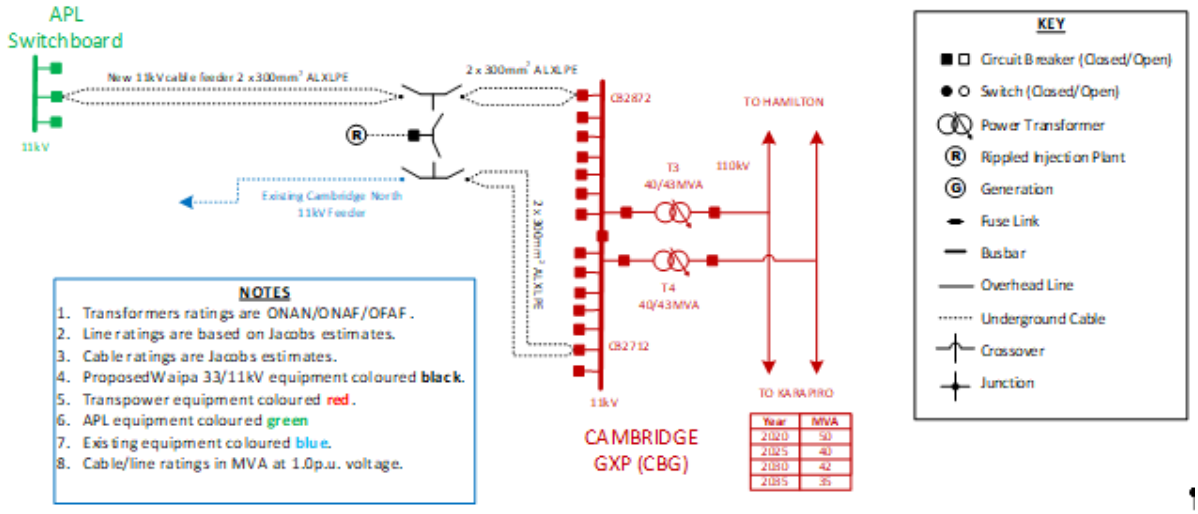
The geographic view of the APL Stage 1 supply is shown below. Route 1 was selected and constructed in 2019.



Detail of the APL Stage 1 feeder connection is shown below, showing RMU connections for the APL feeder, the Cambridge Ripple Plant and the back-up supply from the Cambridge North feeder.



The single line diagram for the APL Stage 1 supply is shown below.



Impact of Distributed Generation on Maximum Demand (MD)

Waipa continues to have very low levels of distributed generation on its network and has assumed for the purpose of forecasting MD that any existing or future distributed generation will have minimal effect on MD. Distributed generation, by nature, is not available 100% of the time, particularly for the most common form, solar PV. This is caused by periods of low generation or generation not occurring co-incident with network peak load. These assumptions will be reviewed once distributed generation connections become more significant and if battery storage costs significantly decline and adoption rates become more mainstream.

Impact of Demand Management on the Maximum Demand

The Company has assumed for the purpose of forecasting MD that any form of Demand Side Management will not have any material effect on reducing the MD. Currently, there is no quantitative evidence retailer demand side management initiatives have been adopted by their respective consumers.

Waipa has a ripple control load management system that controls 10MW of connected load in Cambridge and 12MW of connected load in Te Awamutu over peak periods. The Company has assumed for the purpose of forecasting MD that its load control system is fully functional and that full load control is being exercised over peak load periods.

The Company assumes that for the immediate future smart meters and smart tariffs introduced by retailers will continue to offer load control to connected consumers. We have seen some decline in uptake of ripple control relays in new connections, this is assumed to be partly due to alternative water heating options such as instant gas hot water heaters.

Transpower GXP Assets Longevity

Using the firm transformer capacity and n-1 security criteria the longevity of Transpower's GXP assets has been predicted assuming an MD growth of 6.4% per annum at Cambridge GXP and 1.4% per annum at Te Awamutu GXP.

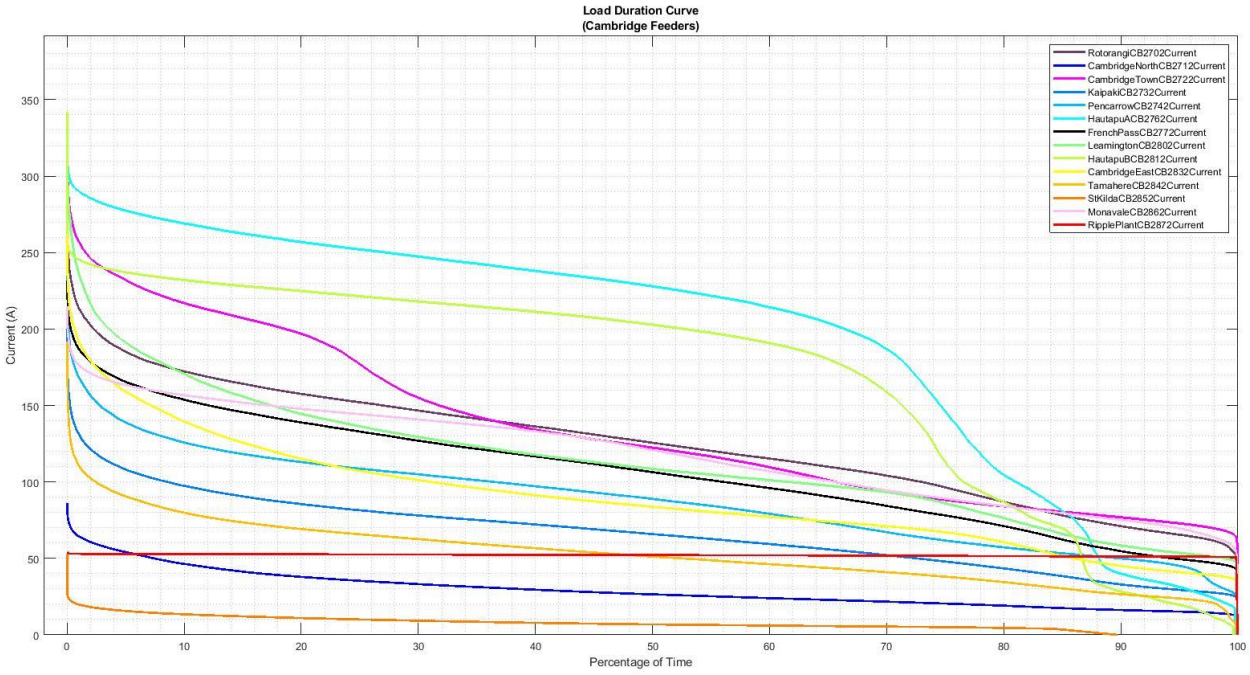
Waipa predicts Transpower's transformer firm capacity at Cambridge GXP will be reached in 2019. The Te Awamutu GXP transformer firm capacity is predicted to be reached in 2020.

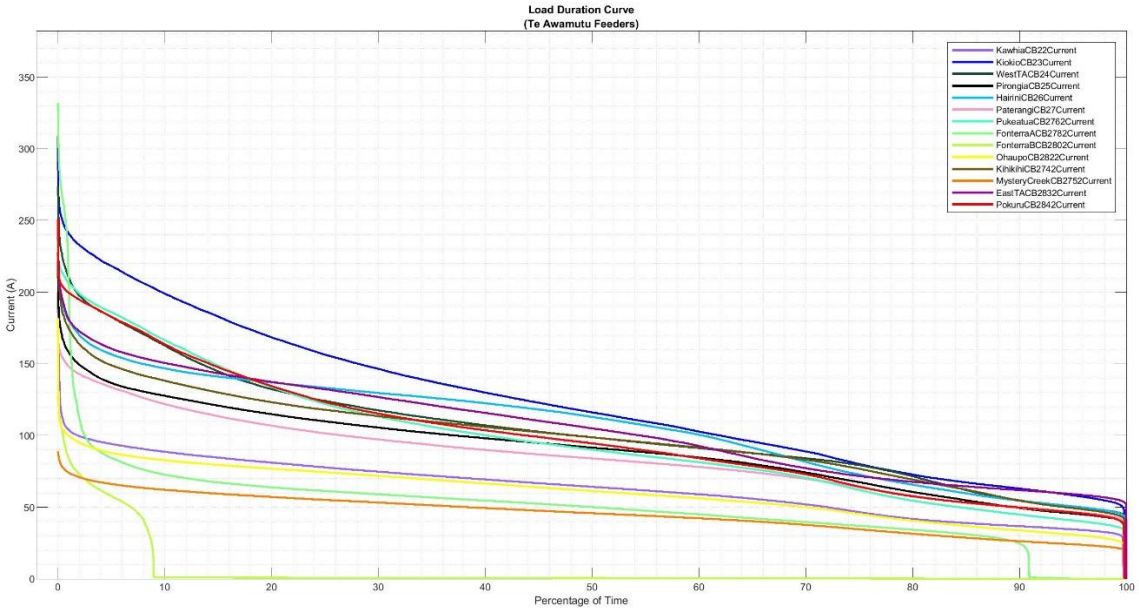
Waipa Feeder Load Duration Analysis

Using data collected over a period of 1 year between 1 April 2017 to 31 March 2018 the underlying MDs on all Waipa's feeders were determined by analysing each half hour load and eliminating

abnormal loads caused by total or partial switching of feeders for capital and maintenance works and for restoration of supply after a fault.

The underlying feeder MDs frequencies are shown on the following load duration graphs.





Te Awamutu GXP Transmission Supply

With the commissioning of the Hangatiki – Te Awamutu 110kV line in July 2016 Te Awamutu has a secure n-1 transmission line supply, including diversity of route and transmission system source. Waipa Networks sought a second transmission supply to Te Awamutu given longstanding issues with unplanned and planned transmission outages on the single Karapiro – Te Awamutu pole line. The unreliability of the transmission supply was unacceptable to Waipa's Te Awamutu customers.

The line was constructed and commissioned in July 2016 and has operated without incident since.

The new line from Hangatiki to Te Awamutu provides the needed security of supply (n-1) and will improve reliability. This line will be operated by the Transpower System Operator as part of the national grid but is owned by Waipa.

6.4 Policies on Distributed Generation

Waipa has welcomed all enquiries from consumers and other interested parties regarding the commercial and technical viability of a variety of distributed generation (coal/diesel, micro-hydro, wind and photo-voltaic, etc.) proposals.

Waipa's connection policy requires distributed generators to contribute to any network enhancements that are required to eliminate any input constraints caused by the distributed generator.

Applications and a description of the consenting process and associated legislation and technical requirements for distributed generation are available on the Company's website.

The Company's salient requirements for new generators are:

- Operators must ensure their generator operates safely and does not produce any adverse effects on the network or any other network consumers.
- Generators must not produce any voltages or harmonics outside regulatory limits, interfere with network protection systems or inject fault currents above network capabilities.
- Generator owners must provide protection against over and under frequency, overcurrent, phase to phase faults and phase to earth faults.
- Generators must comply with all relevant regulations, standards and codes of practice.
- Applicants who reduce the net reactive power supplied to Waipa's network by Transpower will be encouraged, while those who require excessive additional reactive power support will be declined or required to supply power factor correction.
- Generators must be tested fully before being connected.
- Connected generators will be disconnected; in emergency situations, if the generator has failed to pay any fees or charges, if there is a change or increase in distributed generation without Waipa's prior consent or if the generator fails to have an electricity retailer.
- Standard fees apply for applications and inspections.

Most of the distributed generation installations have been downstream of the consumer's metering point and generally photovoltaic applications. This type of distributed generation has had little effect on the network given low levels of penetration to date.

The existing 7.5MVA co-generator at Fonterra Te Awamutu dairy factory is directly connected to the Te Awamutu GXP via two 11kV dedicated feeder cables. This generator has no effect on other Company network assets, but it does impact on Transpower's Te Awamutu GXP assets and MD.

Standby generation of the order of 3 MVA will be connected to the new Waikeria Prison connection point to provide electricity when the network connection is unavailable for planned or unplanned outages.

Although Waipa encourages distributed generation on its network the Company continues to have only a few, small capacity connections each year, although the rate of connection is increasing. As at 31 March 2019 there is 2,021kW of predominately photovoltaic distributed generation connected to the network excluding Fonterra's cogeneration.

To date Waipa's experience has been that no committed distributed generation projects have had any impact on the Company's reticulation assets or network development plans.

Impact of Distributed Generation on Maximum Demand

Waipa has assumed for the purpose of forecasting MD that any existing or future distributed generation will have minimal effect on MD. Distributed generation, by nature, is not available 100% of the time. This is caused by periods of low generation, faults or maintenance on distributed generation or lines connecting it to the Company's network.

6.5 Policies on Non-network Solutions

Waipa encourages all forms of non-network solutions that are economically feasible and practical alternatives to conventional network augmentation, to address network constraints. Non-network solutions such as energy efficient lighting and heat pumps may reduce network MD and energy consumption by consumers within their installations.

Non-network capacity support is being implemented to support the Cambridge network during peak load periods from 2020 to 2025 until the new West Cambridge GXP is commissioned. A portfolio approach is being considered, including contributions from the following sources:

- Distributed Generation (DG) or diesel generation.
- Demand Response (DR) or load reduction with industrial and commercial customers.
- Distributed Energy Resources (DER) or Thermal storage systems for ice and chilled water storage to turn-off refrigeration at industrial processing plants.
- Distributed Energy Resources (DER) or battery storage to complement solar PV.

To further investigate the potential impact of new technologies on the network, the following Business Plan initiative commenced in 2016/17:

- Monitor the impact of the 100% PV St Kilda subdivision via metering the distribution transformers and analysing the effect on demand consumption, export, voltage and harmonic content from inverters. The St Kilda subdivision has covenants requiring the installation of at least 3kW of PV solar panels on every house. A similar aged subdivision has been monitored to provide a comparison for the analysis.

The St Kilda PV monitoring programme has produced some interesting results, including that St Kilda consumers still impose the same peak network demand in terms of morning and evening peaks, in spite of the solar PV generation connected to each house. The impact of DG on voltage rise on the LV network is still being investigated, theoretical modelling indicates that the LV design for this subdivision is reasonably robust for the intended level of PV penetration. Further investigation into the effect of Home Energy Management Systems (HEMS) on the self-consumption of solar PV generated electricity was completed using a trial of the NextIdea Power Genius HEMS.

Battery energy supply systems are an emerging technology that has potential to be a non-network solution to meeting peak demand or improving reliability to some customers. At present these systems are high cost and cannot compete economically with conventional network solutions. Waipa Networks will continue to monitor the economic performance of battery systems as a non-network solution.

Line Pricing Incentives

The Company offers controlled load, day/night and 8-hour supply kWh line pricing to all retailers to encourage consumers to reduce network MD at peak times. From 2016 new pricing has been phased in to provide for peak, shoulder and night periods as a pricing signal to reflect the impact on the network of demand at different times of the day. This pricing will fully take effect from 2020.

Embedded Generation

Waipa will consider using non-network solutions such as diesel generation to reduce network MD and delay conventional network capital expenditure where it is prudent and economic to do so.

Consumer Advice

The Company's web-site (Info for Customers/Energy Efficiency) contains suggestions for consumers to save power without adversely impacting on their lifestyle.

Virtual Smart Home

Waipa continues to provide information related to smart and energy efficient technology which can be found at www.virtualsmarthome.co.nz. The Company's aim was to provide ready access to the latest in smart and energy efficient home technologies for its customers. Waipa therefore developed the concept of a 'virtual' smart home on the internet where customers could easily access the technology and interact with it.

The smart home website goes beyond a typical demonstration of smart technology by also providing users with tips regarding energy safety and efficiency.

Power Factor

Waipa will continue to require consumers to install sufficient power factor correction at their installations to maintain a minimum power factor of 0.95 (lagging) to reduce reactive power loading on the Company's feeders. Transpower has not at this point enforced reactive power penalty charges related to off take power factor at Cambridge or Te Awamutu GXPs.

Transpower routinely advises the Company each year what the power factor at Cambridge GXP and Te Awamutu GXP has been during the previous year. To date Transpower has advised that power factor at both GXPs remain satisfactory.

Impact of Demand Management on the Maximum Demand

Waipa has a ripple control load management system that is able to control 10MW of connected load in Cambridge and 12MW of connected load in Te Awamutu over peak periods. The Company has assumed for the purpose of forecasting MD that its load control system is fully functional and that full load control is being exercised over lower North Island peak load periods as required.

The Company has assumed for the purpose of forecasting MD that any form of additional Demand Side Management will not have any material effect on reducing the MD. Currently, there is no quantitative evidence that retailer demand side management initiatives have been adopted.

As noted above, a portfolio approach to non-network capacity support is being considered to support the Cambridge network during peak load periods from 2020 to 2025 until the new West Cambridge GXP is commissioned.

6.6 Network Development Plan

Network Development Options Identified

As there is no significant Distributed Generation on Waipa's network and as there is no significant additional Demand Side Management initiatives driven by electricity retailers for consumers to take advantage of, the Company's pragmatic option is to pursue network solutions, supported by non-network capacity support where there is an economic case to do so.

Security of Transpower's GXPs

Cambridge GXP Transformers and 11kV Switchboard Assets

Two 40MVA (continuous) ODAF transformers were installed in July 2002 and provide a firm transformer capacity of 40 MVA continuous with 24-hour contingency ratings of 44.3MVA at Cambridge GXP. This is a protection limit and it may be able to be increased slightly, allowing a larger short-term contingency overload of the transformers. Both transformer 11kV incomers and busbar are rated at 47.6MVA.

The highest AMD on these transformers on this GXP was 42.7 MVA, in August 2019

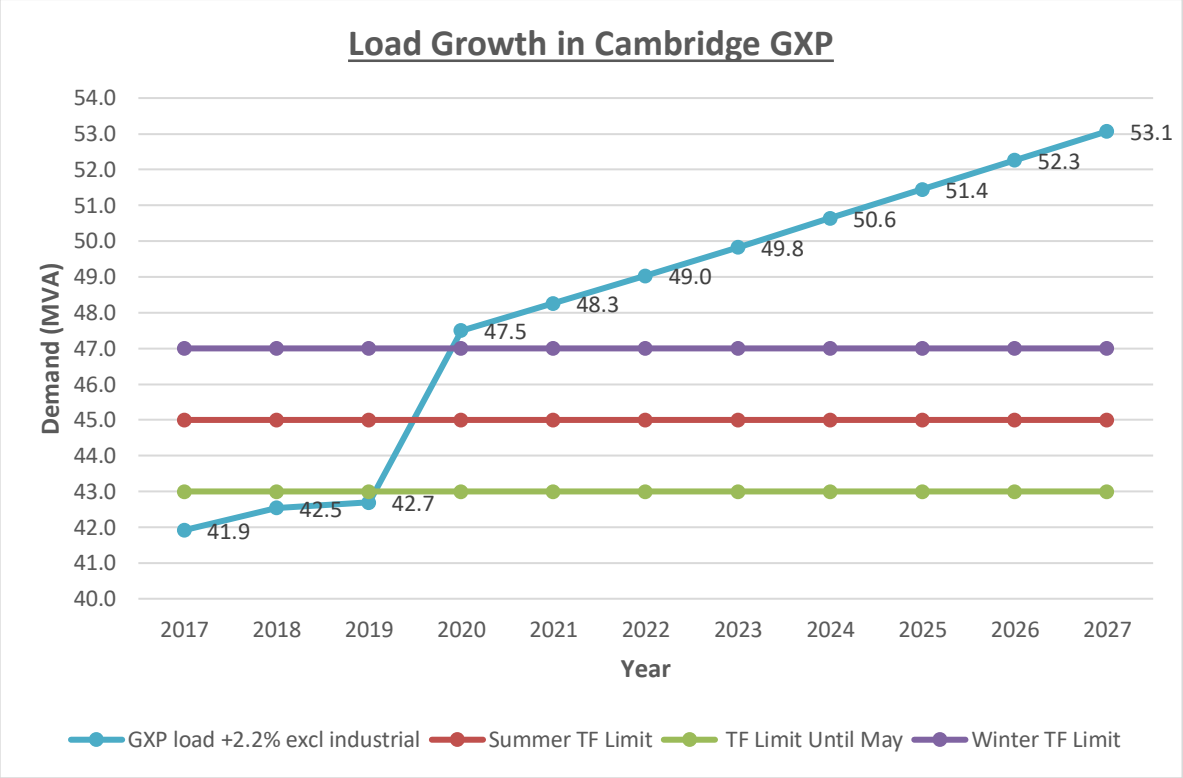
The total number of outgoing feeders supplied from Cambridge GXP 11kV switchboard is fourteen including the APL feeder and ripple plant supply.

In January 2007 the Fonterra Hautapu dairy factory contracted for 10MW for 2007/2008 and has indicated that some additional load growth may occur beyond 2022.

Assuming the dairy factory requires no more than 10MW and there is a 2.1% per year growth in underlying MD at Cambridge GXP and the APL step load increase occurs as forecast, the firm capacity of 44.3MVA will be exceeded in 2019, also assuming that load control tariffs or their equivalent continue to be offered and used by consumers. In May 2020 Transpower is installing a feeder load shedding scheme to automatically shed load if one of the Hamilton - Karapiro 110kV circuits or one of the Cambridge supply transformers trips. This scheme will operate to shed feeders if either a Hamilton – Karapiro 110kV circuit or Cambridge supply transformer trips and the concurrent demand exceeds the available remaining transformer overload capacity.

This means the applicable load limits are:

- Summer transformer rating 45 MVA
- Winter transformer rating 47 MVA
- Cambridge 11kV switchboard limit 47.6 MVA



Analysis of load duration curves indicates that in the August to early October period load in Cambridge will exceed the available Transpower capacity (due to planned outages due to a 110kV bus re-configuration at Karapiro. This situation will continue in the following five years, as shown by the 2% load growth forecast in the graph above.

Non-Network Capacity Support (NNCS)

To manage the interim period until the Cambridge GXP capacity can be reinforced, Waipa Networks is working with a partner to provide Non-Network Capacity Support (NNCS) to maintain peak loads within the available transmission capacity. Over the period a combination of solutions will be used to reduce winter peak loads, including

- Distributed diesel generation.
- Demand Response (DR) or load reduction with industrial and commercial customers.

- Distributed Energy Resources (DER) or thermal storage systems for ice and chilled water storage to turn-off refrigeration at industrial consumers.
- Distributed Energy Resources (DER) or battery storage to complement solar PV.

Cambridge GXP is deeply embedded in Transpower's Grid and has experienced only four unplanned transmission system outages since 2006 (Otahuhu "D" shackle 12 June 2006, lightning 9 July 2011, bird strike during a planned circuit outage 26 November 2017, protection mal-operation at Hamilton Substation 25 January 2018). A circuit breaker failure on the 11kV switchboard caused a complete loss of supply in 2013, leading to the switchboard replacement.

Transpower advise that the 110kV circuits supplying Cambridge GXP are likely to be constrained following another 5 MVA load increase, for periods of low Karapiro generation at peak times. The Hamilton-Cambridge section of the 110kV circuits is limited to 57MVA in summer and 72 MVA in winter, so further load increases at Cambridge in the medium term will not have 110kV circuit firm capacity at peak times. This has prompted Waipa Networks to investigate alternative transmission capacity options for the Cambridge GXP.

Cambridge GXP Development Plan
Development planning commenced in 2018 to investigate solutions to provide additional GXP capacity. Jacobs were commissioned to develop long-term sub-transmission development options to alleviate the existing and future projected network constraints and to develop a set of design concepts for each of the options and to estimate their implementation costs. The three sub-transmission options developed were aligned to three separate transmission development paths proposed by Transpower, and are described below.

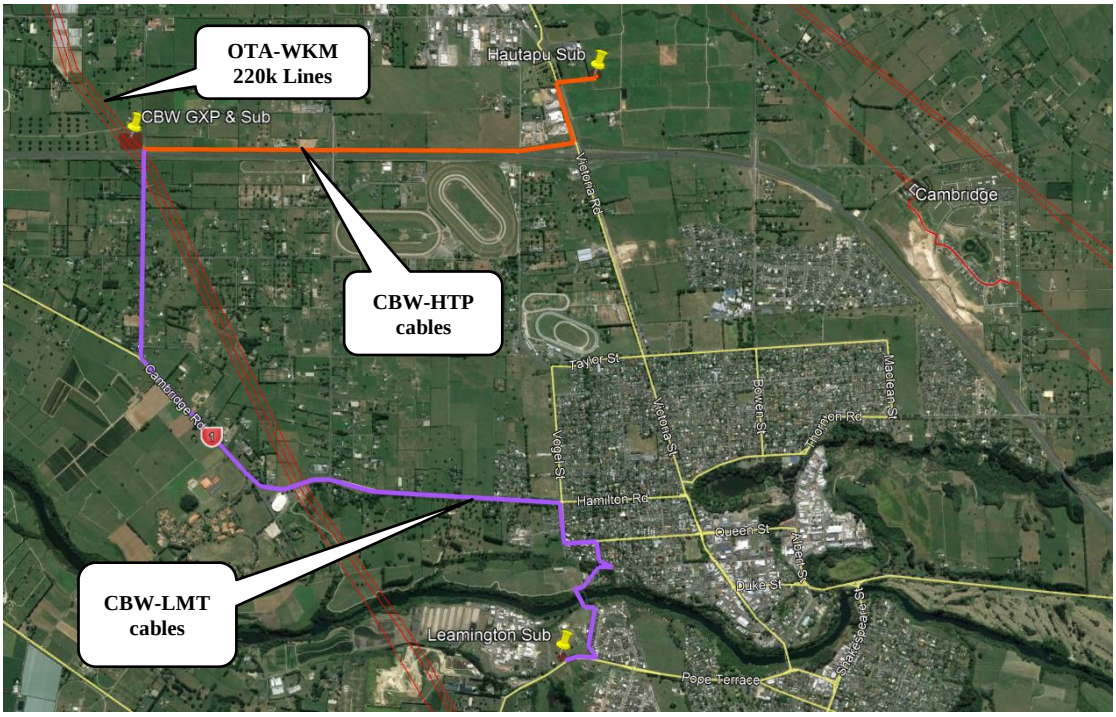
The long-term options identified are as follows:

- Option 1: New 220/33kV Cambridge West Substation: This option involves the construction of a new 220/33kV GXP substation (by Transpower) underneath or close-to the existing Otahuhu-Whakamaru 220kV lines to the west of the Cambridge township. Waipa would need to install three 33/11kV zone substations at Cambridge West, Hautapu and Leamington and the associated sub-transmission supply network. This option delivers significant diversity of supply into the Cambridge region due to the fact that the Waipa network would be supplied by two independent GXPs.

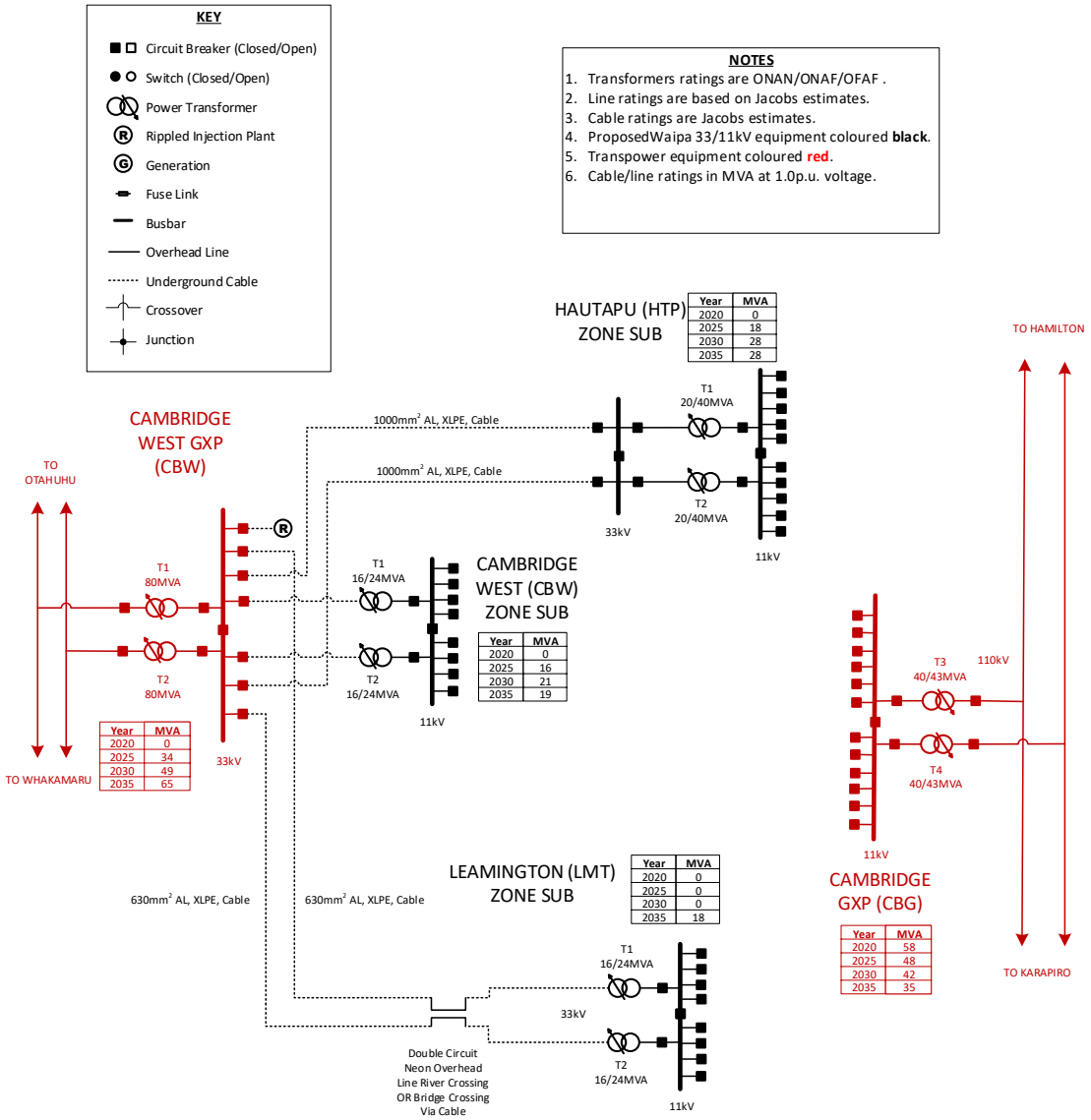
Option 1 Concept Network Design

A geographic and one-line diagram for Option 1 is illustrated below. The concept involves the construction of a new 220/33kV GXP immediately underneath/adjacent to the existing Otahuhu-Whakamaru 220kV lines (red lines in the geographical diagram below) and the staged construction of three new 33/11kV zone substations in Cambridge West, Hautapu and Leamington. The 33kV sub-transmission circuits interconnecting the zone substations would also need to be installed. The development proposed is as follows:

- **Cambridge West (CBW) GXP:** A new 220/33kV GXP preferably located on the south end of Hana Lane and north of SH1 Waikato Expressway. This would locate the new GXP directly under the OTA-WKM 220kV lines. The new GXP would contain 2 x 80MVA transformers in order to cope with future load growth in the area. The new GXP is expected to require a land area of approximately 80m × 100m.
- **Cambridge West Zone Sub (CBW):** A new 33/11kV zone substation established in Cambridge West, next to the new 220/33kV GXP. It would supply the future load growth in Tamahere and other areas in the north-west Cambridge region. The new zone substation would require a land area of approximately 40m × 40m.
- **Hautapu Zone Sub (HTP):** The Hautapu zone substation established in the Hautapu industrial zone. It would supply the Fonterra dairy factory, APL and other emerging industrial load in the area (again an area of at least 40m × 40m would be required).
- **Leamington Zone Sub (LMT):** The Leamington zone substation will be preferably located on the north-east corner of the intersection of Matos Segedin Dr and Cambridge Rd. In future, this zone substation will shift load off the Cambridge substation and supply the southern 11kV feeders (an area of at least 40m × 40m would be required).

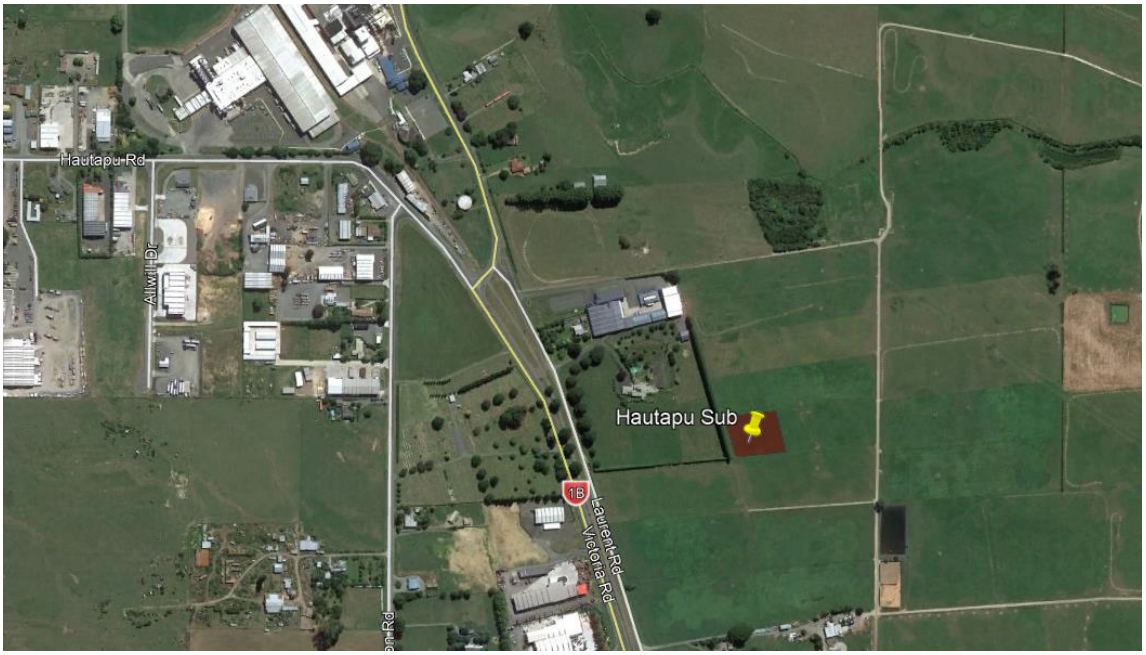


Option 1: Geographic Diagram: Cambridge West GXP and Zone Substations and 33kV Sub-transmission Circuits



Option 1: Geospatial Diagram: Cambridge West GXP and Zone Substations and 33kV Sub-transmission Circuits

Potential Location for Cambridge West GXP and Zone Substation (subject to Transpower site selection process and designation)



Proposed Location for Hautapu Zone Substation

Possible Location for Leamington Zone Substation

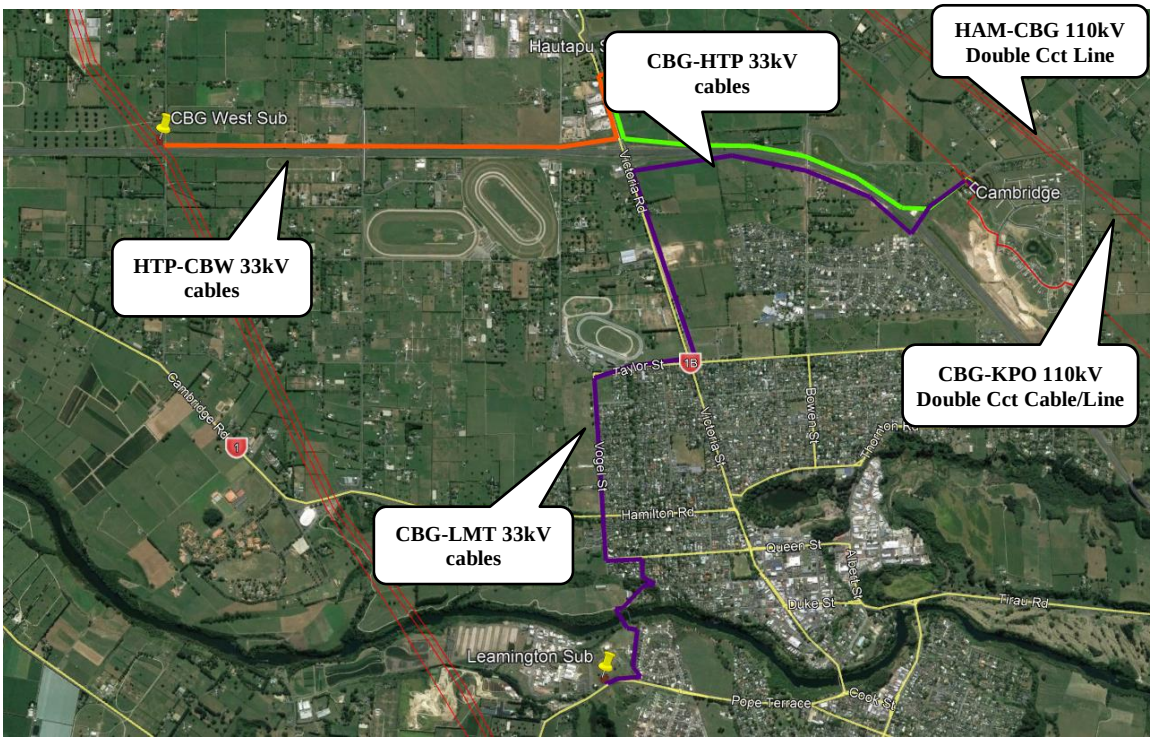
- Option 2: Upgrade Cambridge GXP: This option involves the upgrade of the existing Transpower Cambridge 110/11kV GXP with three winding transformers (110/33/11kV, 120/80/40MVA) and the upgrade of the existing Hamilton-Karapiro 110kV lines. Waipa would also need to install three 33/11kV zone substations at Cambridge West, Hautapu and Leamington. With this option, it is expected that significant capacity upgrade of the existing 110kV network is required.

Option 2 Concept Network Design

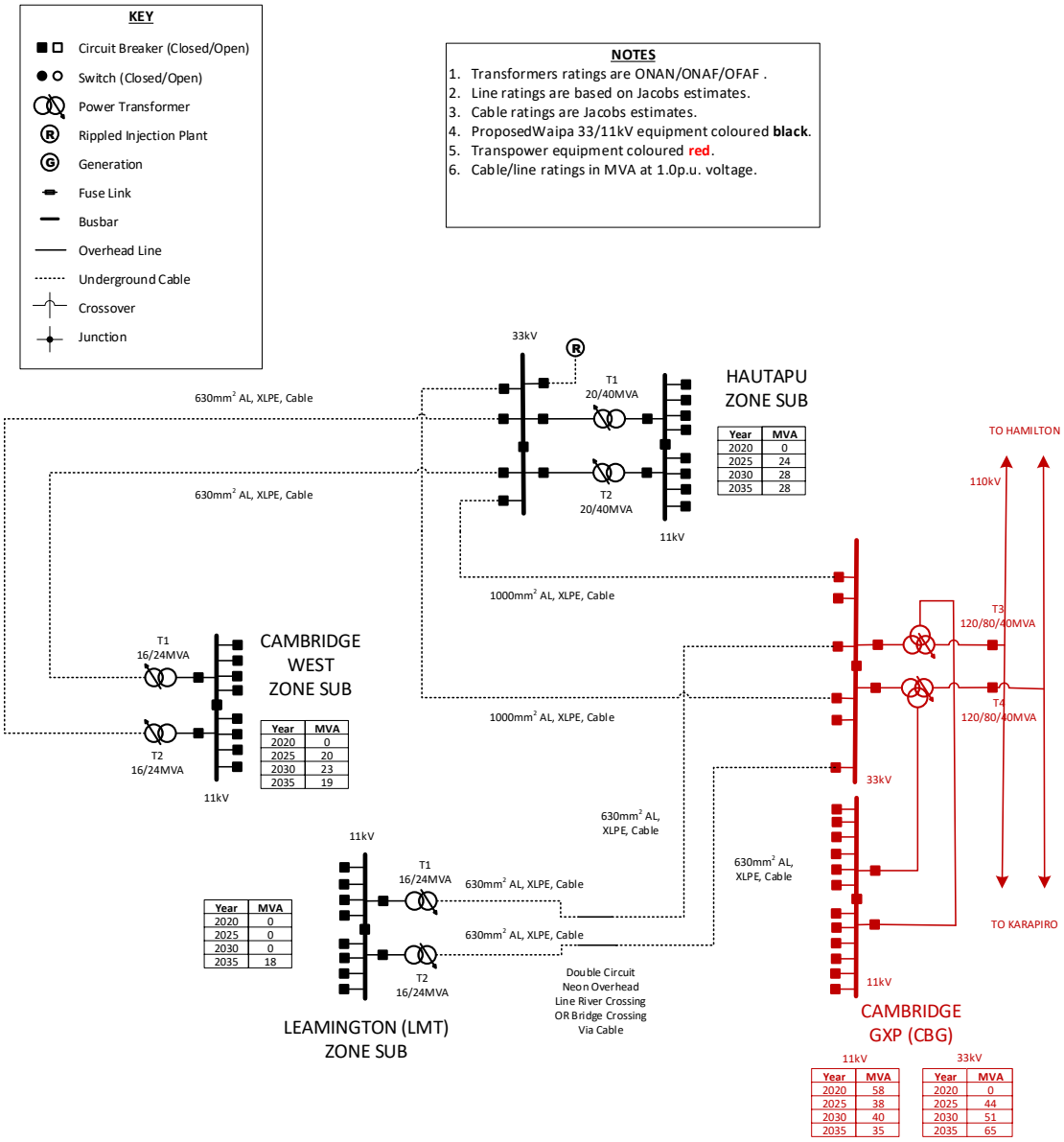
A geographic and one-line diagram for Option 2 is illustrated below. The concept involves:

- Upgrade of the existing 110kV lines/cables that run between Hamilton and Karapiro (HAM-CBG and CBG-KPO). These lines/cables include ≈28km of double circuit overhead line and ≈1.3km of double circuit underground cable (across a subdivision immediately south of the Cambridge GXP). Jacobs has assumed such a significant capacity upgrade of the existing 110kV network is feasible based on Transpower advice.

- Replacement of the Cambridge GXP transformers with 2 × 120/80/40MVA, 110/33/11kV, three winding transformers and the installation of a new 33kV indoor switchboard.
- Three new 33/11kV zone substations in Cambridge West, Hautapu and Leamington. The proposed locations for the new 33/11kV zone substations are shown below. Note that Option 2 does not consider establishing a new 220/33kV GXP in Cambridge West, therefore the overall land area required in that region is considerably less than Option 1. Again, the dimension of the new zone substation is expected to be at least 40 x 40m.
- New 33kV sub-transmission circuits connecting the upgraded Cambridge GXP to the Cambridge West, Hautapu and Leamington zone substations.



Option 2: Geographic Diagram: Cambridge West & Hautapu Zone Substations and 33kV Sub-transmission Circuits



Option 2: Geospatial Diagram: Cambridge West and Hautapu Zone Substations and 33kV Sub-transmission Circuits

Sub-transmission Circuit Routing

New 33kV sub-transmission circuits would need to be installed to supply the zone substations in Cambridge West, Hautapu and Leamington. The exact circuit routes would only be determined once the new zone substation sites have been confirmed, but the preliminary line/cable routes are shown in the geographic diagram above and are as follows:

Hautapu to Cambridge West circuits (orange line)

- Dual 3.7km, 33kV cable circuits from the Cambridge West substation via Waikato Expressway, Laurent Rd, Victoria Rd to the Hautapu substation. The proposed route would be the same as that for Option 1.

Cambridge GXP to Hautapu circuits (green lines)

- Dual 3.2km, 33kV cable circuit from the Cambridge GXP via Wells Place, Waikato Expressway, Laurent Rd to the Hautapu substation. In the future, this circuit will need to be upgraded when the combined load in Hautapu and Cambridge West exceeds the N-1 circuit limits.

Cambridge GXP to Leamington circuits (purple lines)

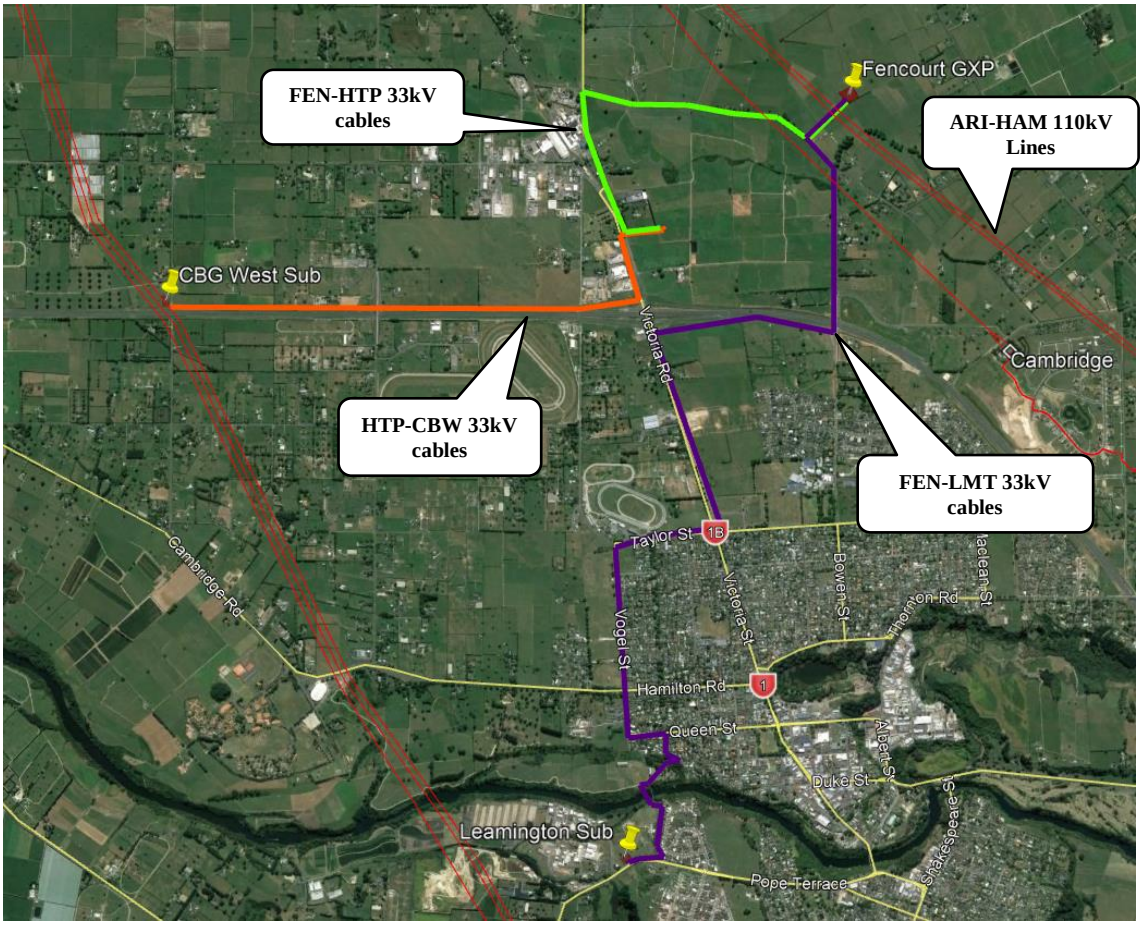
- Dual 0.7km, 33kV cable circuits from Cambridge GXP and Wells Place across the Expressway.
- Dual 5.7km, 33kV cable circuits via Waikato Expressway, Victoria Rd, Taylor St, Vogel St, Queen St, Hall St to Waikato River.
- A double circuit 33kV overhead line that transitions 150m across the Waikato River. Again, the exact river crossing methodology requires additional investigation.
- Dual 0.7m, 33kV cable circuits via Cambridge Rd to Leamington substation.

- Option 3: New 110/33kV Fencourt Substation: This option involves the construction of a new 110/33kV GXP substation (by Transpower) that connects to the existing Arapuni-Hamilton 110kV lines in the Fencourt area. Waipa would also need to install three 33/11kV zone substations and the associated sub-transmission supply network. This option would also enable the Waipa network to be supplied by two independent GXPs.

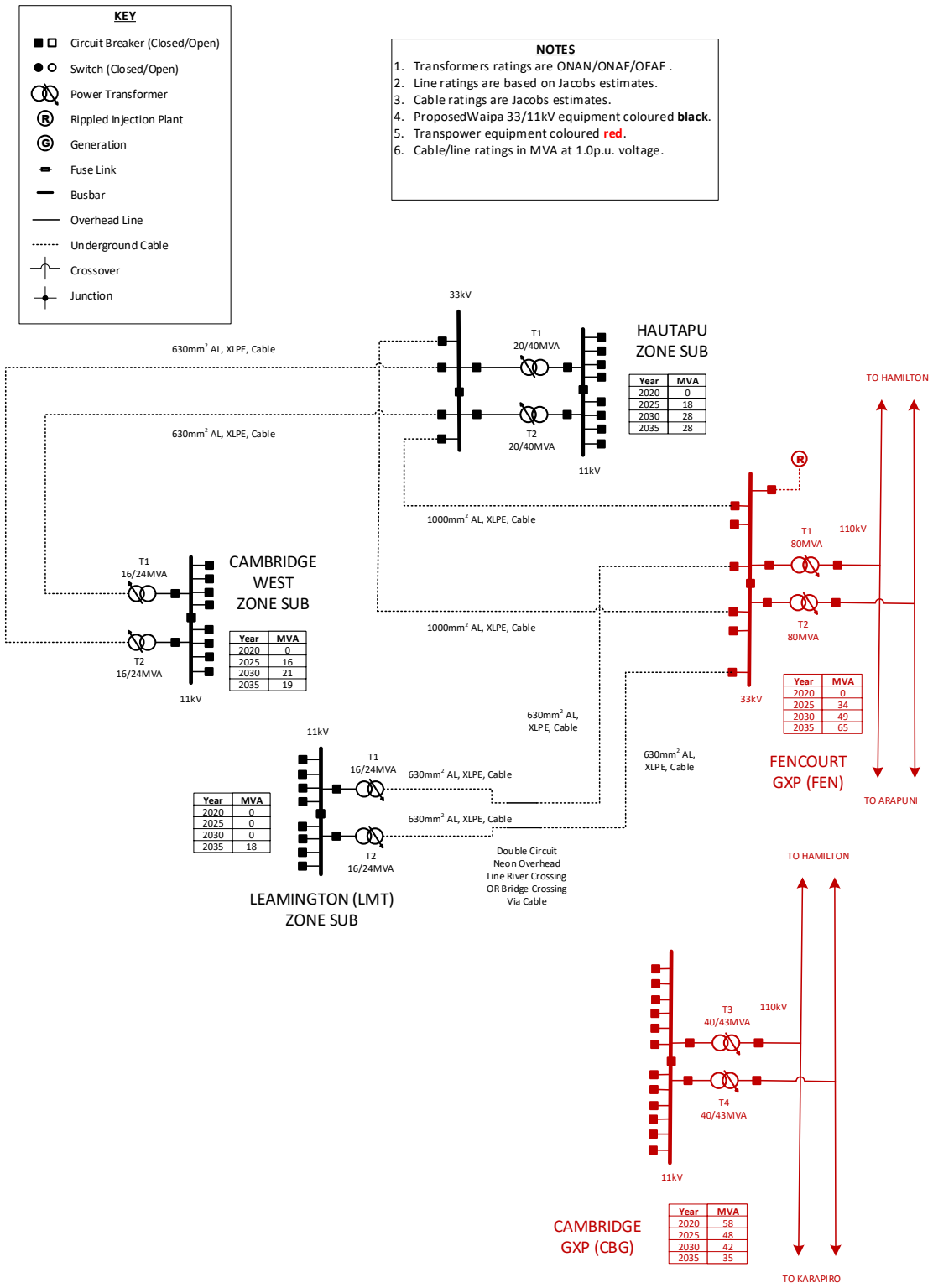
Concept Network Design

A geographic and one-line diagram for Option 3 is illustrated below. The concept involves:

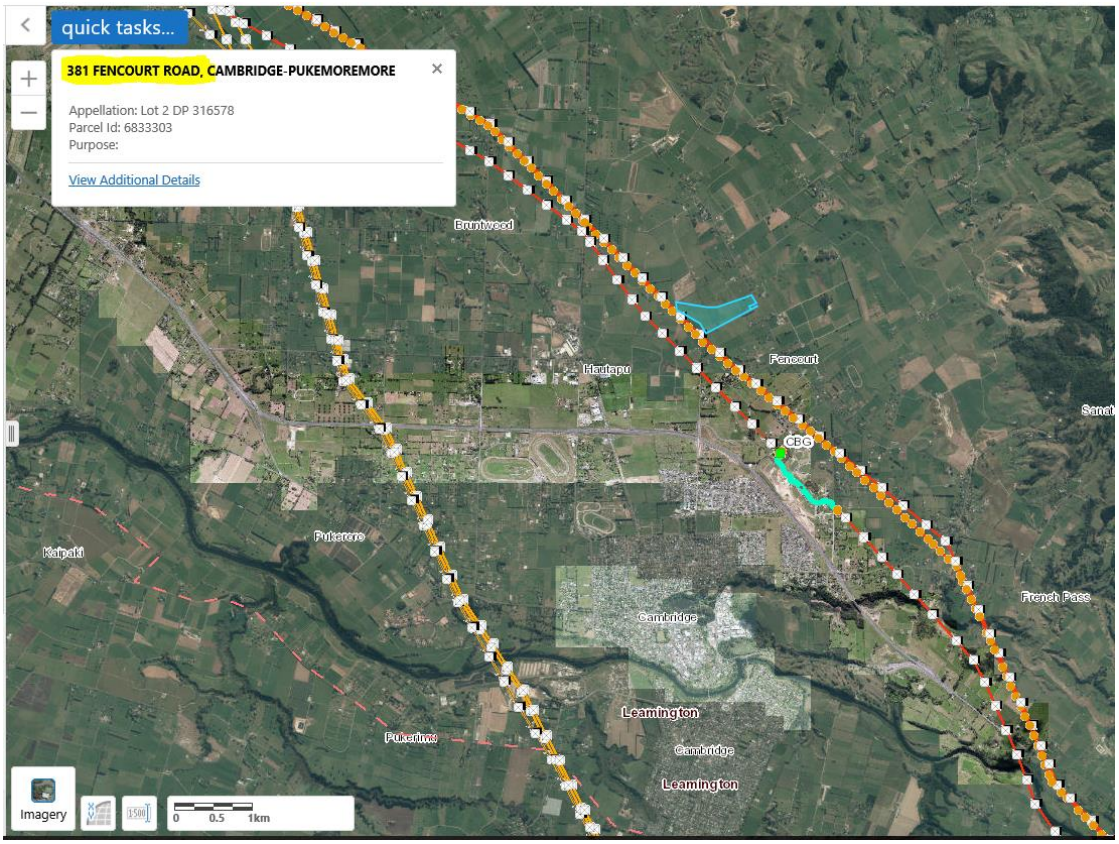
- Establish a new 110/33kV Fencourt (FEN) GXP which would contain two 110/33kV, 80MVA, transformers tee-connected off the existing ARI-HAM 110kV lines. The preferred location of the new GXP is shown below. The site is expected to require a land area of approximately 80m × 100m that would also include space for a 3rd future 110kV line bay and 110/33kV transformer.
- The staged construction of three new 33/11kV zone substations in Cambridge West, Hautapu and Leamington (i.e. same as Options 1 & 2).
- New 33kV sub-transmission circuits connecting the new 110/33kV GXP to the Cambridge West, Hautapu and Leamington zone substations.



Option 3: Geographic Diagram: New 110/33kV Fencourt GXP & Zone Substations and 33kV Sub-transmission Circuits



Option 3: Geospatial Diagram: New 110/33kV Fencourt GXP & Zone Substations and 33kV Sub-transmission Circuits



Potential Location of the new 110/33kV Fencourt GXP (Supplied by Transpower)

Sub-transmission Circuit Routing

New 33kV sub-transmission circuits would need to be installed to supply the zone substations in Cambridge West, Hautapu and Leamington. Again, the exact circuit routes would only be determined once the new 110/33kV GXP and zone substation sites have been confirmed, but a set of preliminary cable routes to the Hautapu, Cambridge West and Leamington zone substations are shown in the geographic diagram above and are as follows:

New 110/33kV GXP to Hautapu circuits (green lines)

- Dual 3km, 33kV cable circuits from the Fencourt GXP via Zig Zag Rd and Victoria Rd to the Hautapu substation. Again, this circuit will need to be upgraded when the combined load in Hautapu and Cambridge West exceeds the N-1 circuit limits in the future.

Hautapu to Cambridge West circuits (orange line)

- Dual 3.7km, 33kV cable circuits from the Cambridge West substation via the Waikato Expressway, Laurent Rd, Victoria Rd to the Hautapu substation. The proposed route would be the same as that for Options 1 & 2.

New 110/33kV GXP to Leamington circuits (purple line)

- Dual 6.7km, 33kV cable circuits from the Fencourt GXP to the Waikato River via Zig Zag Rd, Swayne Rd, Waikato Expressway, Victoria Rd, Taylor St, Vogel St and Hall St.
- A double circuit 33kV overhead line that transitions 150m across the Waikato River. Again, Jacobs has selected a river crossing location adjacent to an existing overhead 11kV line crossing. There is also the possibility to install cables across an existing bridge that crosses the Waikato River at this location. The exact river crossing methodology requires additional investigation.
- Dual 0.7km cable circuits via Cambridge Rd to the Leamington substation.

Note that, due to the lead times for the long-term options, a short-term 11kV supply option for APL, the associated 11kV feeder load shedding scheme and Non-network Capacity Support needs to be implemented prior to implementing one of the long-term options.
As is usually the case, the options are not easily comparable due to their different costs, risk profiles, visual impacts etc. Thus, in an effort to summarise the different facets of the long-term options that have been identified for the development of Waipa's Cambridge network, Jacobs has ranked the options in terms of the following significant project features:

- Visual Impact / Consents / Land acquisition / Public Opposition: the difficulties associated with securing the rights to build lines/substations/etc. The ranking ranges from 1 (difficult) to 5 (easy).
- Flexibility / Scalability: the ability of the supply network to be modified, expanded and cope with high growth. The ranking ranges from 1 (inflexible) to 5 (very flexible).
- Security / Resilience: the ability of the supply network to survive equipment outages and significant events (e.g. earthquakes). The ranking ranges from 1 (not resilient) to 5 (very resilient)
- Additional Capacity into the Region: the extent to which the option increases the capacity to supply electricity into the region. For this item Jacobs has provided a high-level estimate of the additional capacity each of the options delivers into the region. The values should only be viewed as indicative.
- Capital Cost: Includes network planning, project management, design, procurement and construction. The cost estimates are approximate and given the level of project definition are considered to be Class 4 estimates in accordance with Table A.1 in Appendix A.
- Project Timeline: Most of the projects will take a relatively long time to complete. In some cases, the consultation periods would be significant and thus project timelines would be long. Indicative project timelines have been estimated by Jacobs, which include the total project time from consenting through to commissioning.

A comparison between all the options is shown in the following table.

Comparison of Long-term Options

Feature	Option 1 New Cambridge West 220/33kV Substation	Option 2 Upgrade Cambridge GXP	Option 3 New Fencourt 110/33kV Substation
Visual Impact / Consents / Land Acquisition / Public Opposition	2	3	2
Flexibility / Scalability (future demand)	5	4	4
Security / Resilience	5	3	5
Additional Transmission Capacity into Region (MVA)	≈160	≈160	≈160
Capital Cost NPV@2020 (Waipa)[2]	**$16.8M**	**$19M**	**$19.4M**
Capital Cost NPV@2020 (TP)[3]	**$40.1M-$72.8M**	**$32M-$78.8M**	**$37M-$62.9M**
Capital Cost NPV@2020 (Total)	**$56.9M-$89.6M**	**$51M-$97.8M**	**$56.4M-$82.3M**
Project Time-line (years)	4-6	3-7	4-6

Given the information available, Jacobs has the following concluding observations:

- Option 1 will result in the lowest Waipa capital expenditure due to the lowest 33kV cable costs (shorter cable runs to the new zone substations).

[2] These estimates exclude consenting and land acquisition, which could be significant. The cost estimates are approximate and given the level of project definition are considered to be Class 4 estimates in accordance with Table A.1 in Appendix A.
[3] Transpower's NPV Calculation Sheet (NPV at 7% discount rate as per Transpower assumptions), supplied by Waipa on 5 November 2019

- Option 2 is considered to be the *"least optimal"* long term solution due to the risk associated with the 110kV network upgrade and the lower supply security/resilience than the other options.
- Option 1 delivers the "*most optimal*" long term solution due to the fact it provides slightly more future flexibility / scalability and there is not a significant cost differential in the total costs (Waipa's + Transpower's) between Options 1 and 3.
- As new information becomes available, we recommend that Waipa continue to review and refine the development options.
- For Options 1 & 3, we have assumed the new GXPs would be built on the sites that are close to the existing 220kV and 110kV lines. Additional costs may be incurred if new transmission lines need to be constructed to sites that are remote from the transmission lines.

Care is required in selecting the best long-term solution for GXP capacity, because of the relatively large investments required and the long timeframe and uncertainty related to demand forecasts that is involved, particularly with the influence of PV distributed generation and the possible future penetration of batteries. On the other hand, the potential uptake of electric vehicles may have significant impact on the demand in the region. The cost savings that Waipa Networks have been able to deliver to consumers by avoiding a sub-transmission network because of the GXP delivery voltage being the distribution voltage has been a long-standing benefit.

Transpower's economic modelling of the thee options outlined above shows that Option 1 West Cambridge 220/33kV Substation is the most economic option, and has been approved by the Waipa Networks Board and Trust to proceed.

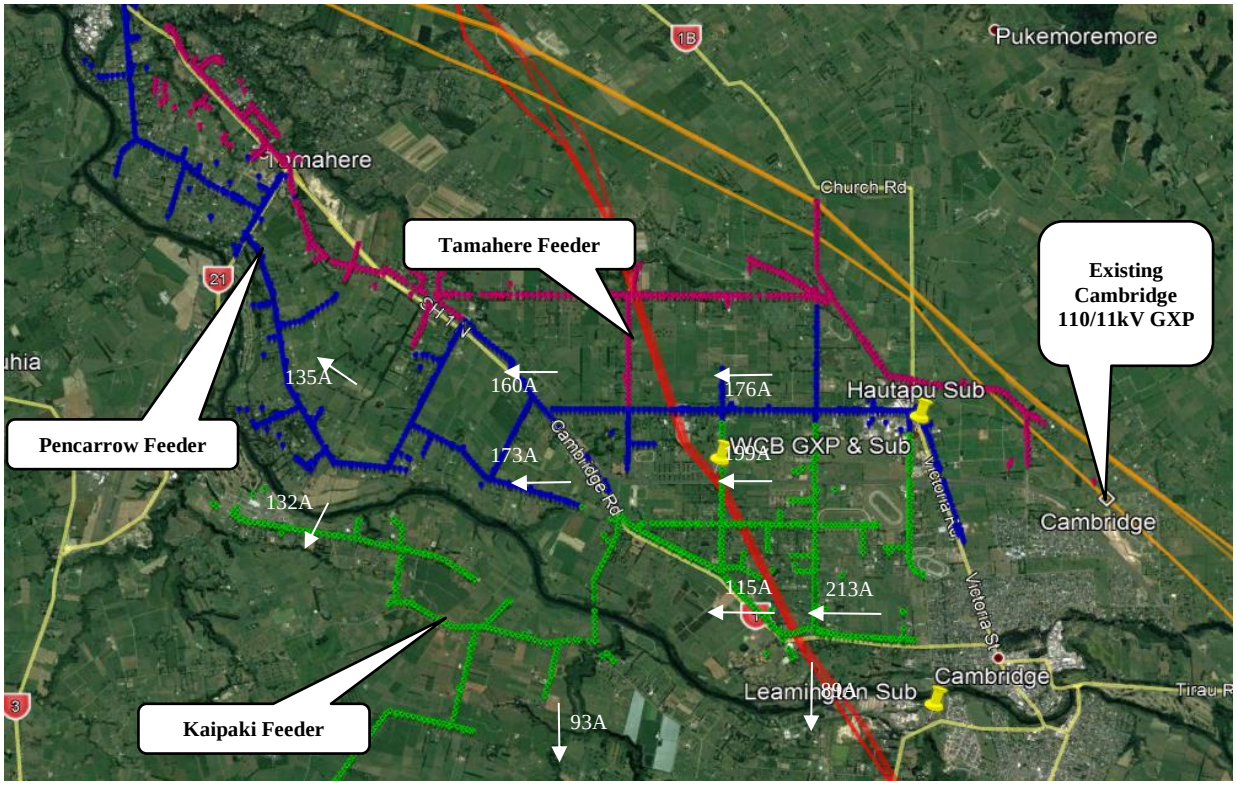
Cambridge West Zone Substation - 11kV Feeders Integration Plan

In order to assess the integration plan for the Cambridge West zone substation, Jacobs has used Waipa's ETAP model (original model) to perform power flow analysis and determine the distribution of current along the 11kV feeders. The distribution of loads on the 11kV feeders have been scaled (highlighted in yellow) in accordance with the 2019 forecast supplied by Waipa and the results are shown in the following **Error! Reference source not found.**.

Table 1: Waipa Forecast and Power Flow Results: Original and Scaled ETAP Models

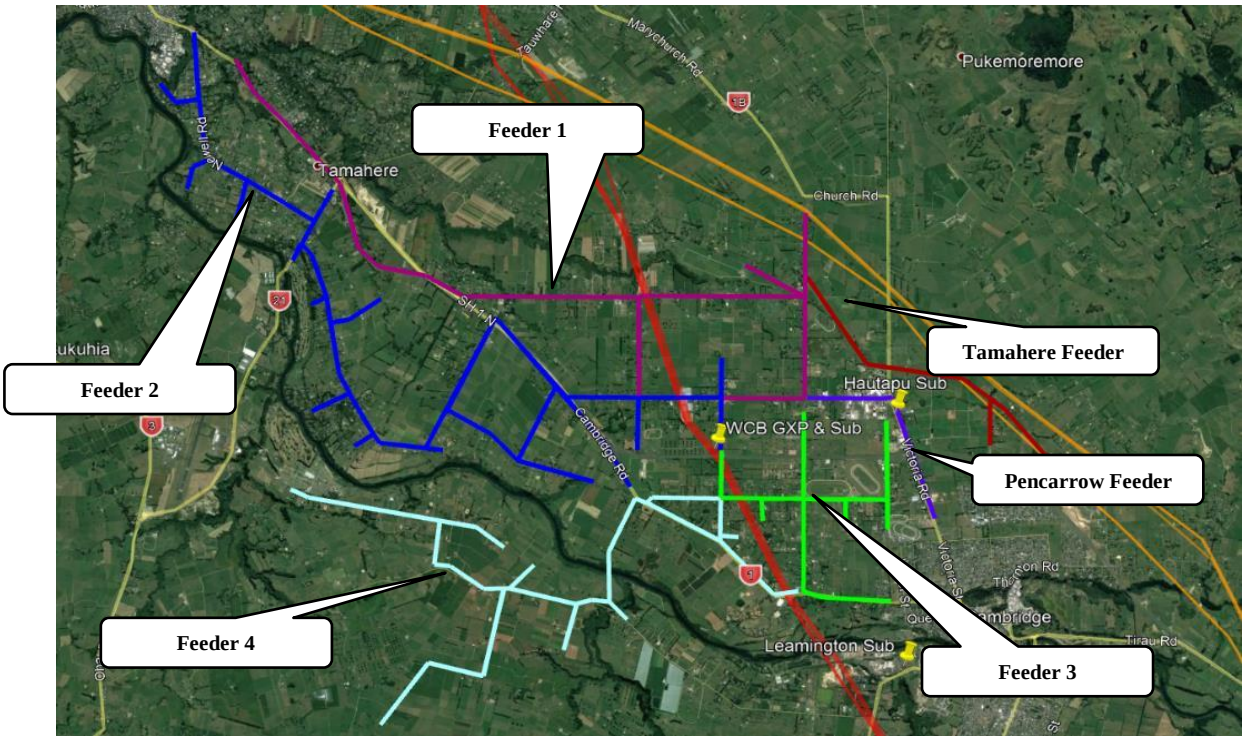
	C2702	C2712	C2862	C2842	C2772	C2722	C2802	C2832	C2852	C2732	C2742	C2762 & 2812
Feeders	Rotorangi	CBG North	Monavale	Tamahere	French Pass	Cambridge Town	Leamington	Cambridge East	St Kilda	Kaipaki	Pencarrow	Hautapu A & B
2019 Forecast	267	143	215	194	238	300	291	236	27	225	232	437
Original Model	291.2	147.8	305.2	109.9	225	318.7	314	266.6	12	225.5	279.8	304.9
Scaled Model	291.2	147.8	212.9	208.1	225	318.7	314	266.6	24	225.5	279.8	408.2

Jacobs has reviewed the power flow results and marked onto the diagram below the 11kV current flow at specific locations, with the objective of determining a plan to integrate a new Cambridge West zone substation into the existing 11kV network.



Power Flow Results for Tamahere, Pencarrow and Kaipaki 11kV Feeders

The diagram below illustrates a potential future configuration for the 11kV network associated with the proposed new Cambridge West zone substation after the installation of a new 220/33kV GXP. The configuration is based on the existing 11kV network and initially includes the installation of four 11kV feeders. The timeline is dependent consenting/design/procurement/construction/etc. but Jacobs has assumed best case that this configuration could be established circa 3-4 years from now (i.e. commissioning in summer 2022-2023).



Proposed new configuration of 11kV Feeders to be supplied by Cambridge West Zone substation

Hautapu - 11kV Feeders Integration Plan

The Hautapu zone substation will supply the existing and emerging industrial load at Hautapu, including Fonterra and APL. Jacobs expects that these large industrial consumers will inform Waipa of their maximum demand requirements on a regular basis. Jacobs has assumed a load of 18MVA/945Amps at the time when the Hautapu 33/11kV zone substation is commissioned. This figure includes the existing Fonterra dairy load as well as the projected APL load. In future, Jacobs understands that an aluminium extrusion plant is planned that will add significant load to the Hautapu substation which may, accompanied by other industrial load, exceed the (N-1) rating of the substation. However, given the uncertainty of the future industrial load Jacobs has not considered it and we expect that Waipa will investigate the future requirements as new information becomes available.

Jacobs has assumed the Hautapu zone substation will be equipped with 8 x 11kV breakers, which will supply the local industrial loads. For costing purposes, we have assumed, initially, that at the time of commissioning the substation would be equipped with 6 x 300mm^2 AL, 11kV feeder cables each of between 300-700m length to supply the Fonterra and APL plants.

Leamington - 11kV Feeders Integration Plan

The zone substation in Leamington will likely only be needed in the longer term when:

- The network load on the Cambridge West, Cambridge and Hautapu exceeds the (N-1) limits.
- The industrial and residential load on the south side of Cambridge develops beyond the capacity of the 11kV feeders.

Neither of the above is likely to become an issue before 2030. Jacobs understands there will be some residential development in the Leamington region. Apart from that, Jacobs is not aware of any potential large customers that might have a significant impact on the southern sections of Waipa's network.

The new feeder integration plan for Leamington depends on the actual load growth in Cambridge as well as the network configuration when the load exceeds the (N-1) limits. Given the distant time-line for the Leamington zone Jacobs has not investigated its 11kV feeder integration in detail. For costing purposes, we have estimated the 11kV cable costs would be the same as that for the Cambridge West zone substation.

Development Timeline

Jacobs was supplied with Waipa's load forecast and this included the maximum demand (MD) growth predictions for the 11kV feeders and the existing Cambridge GXP. Based on the MD growth predictions, the required timeline of the network development is as follows:

- Prior to 2025: A feeder load shedding scheme and non-network capacity support needs to be implemented at the Cambridge GXP to manage the post contingency overloading (tripping of HAM-KPO circuit or CBG transformer) of the transmission network.
- 2025: The new Cambridge West and Hautapu zone substations are commissioned. This time frame accounts for the time-line to consent/plan/design/procure/construct the substations (i.e. assuming best case scenario). The forecast maximum demand at Cambridge GXP in 2025 is projected to be 53MVA (2,781Amps at 11kV) which will be far beyond the (N-1) limits. The initial load shifted to Cambridge West and Hautapu are estimated to be 16MVA and 14.5MVA respectively. This will reduce the maximum demand at Cambridge from 53MVA to 22.5MVA.

- 2025-2033: During this period, Waipa will undertake minor works to re-configure/re-balance the 11kV feeder network so that the maximum demand at each of the substation loads are maintained within their (N-1) limits. Jacobs suspects the (N-1) constraint will be avoided for approximately 10 years based on the current growth predictions.

- 2033: A new zone substation at Leamington is commissioned to supply the southern feeders. Jacobs has assumed the Leamington substation will take an initial 17MVA of load from the Cambridge GXP, which is approximately 85% of the total load supplied by the southern feeders, including Leamington, Roto-o-rangi and Monavale, at that time.

- 2033 onwards: The demand is expected continue to grow and possibly violate the (N-1) protection constraints by ≈2050.

Te Awamutu GXP Transformers and 11kV Switchboard Assets

Two new 40MVA (continuous) OFAF transformers installed in July 2004 provide a firm capacity of 40MVA continuous with 24-hour contingency ratings of 40.7 MVA at Te Awamutu GXP. This is a protection limit and Transpower have advised that it may be increased, by upgrading incomer cables and switchgear to circa 55 MVA.

The highest AMD on these transformers on this GXP was 40.8 MVA in 2019. This corresponds to 39.6 MW at typical peak power factor of 0.97. This increase in load was due to the Fonterra Te Awamutu dairy factory operating with lower output from their on-site generator due to vibration issues.

The transformers feed two 11kV switchboards in parallel. The first 11kV switchboard installed in 1997 (Switchboard A) is in good order and currently supplies six feeders. The switchboard incomers, bus-coupler and bus bars are rated at 1250A, limiting the board to 24MVA under an n-1 contingency. The second 11kV switchboard rated at 47.9MVA was installed in June 2004 to supply four existing feeders. A further four additional feeders were installed on this parallel switchboard in March 2007.

The total number of outgoing feeders supplied from Te Awamutu GXP 11kV switchboard is fourteen excluding a ripple plant supply. In January 2007 the Fonterra Te Awamutu dairy factory contracted for 4.5MW for 2007/2008 and has given no further indication of future load growth. The factory is in the process of changing out their coal fired boiler for a wood pellet fired boiler during 2020.

Assuming Fonterra requires no more than 4.5MW, the Waikeria Prison upgrade proceeds (ultimate maximum load of 4 MVA at some future point) and there is a 1.1% per annum growth in underlying MD at Te Awamutu GXP, the firm capacity of 40.7MVA 24 hour post contingency rating will be exceeded in 2020, also assuming that load control tariffs or their equivalent continue to be offered and used by consumers. The future load increases at Waikeria Prison indicate it would be prudent to shift the new Kiokio and Waikeria feeders to new circuit breaker on the higher capacity Switchboard B. Transpower are investigating the feasibility and cost of this upgrade and will advise this during 2020. The intended timeframe is to complete this upgrade by 2022.

There was a partial failure of the 11kV switchboard in 2010. These types of failures pose a risk to continuance of supply to our customers, as switchgear failure can require a lengthy replacement period and back feeding the affected feeders at peak times can be difficult.

The Company's n-1 security level for Transpower's substation assets at Te Awamutu GXP has been met, however upgrades are required as outlined above to maintain n-1 security with the projected load growth.

Development planning will commence in 2020 to consider solutions for GXP capacity in Te Awamutu, given the likely voltage constraints of the 11kV southern feeders in particular driving the consideration of a 33kV sub-transmission network and zone substation. The investigation will consider the 110/33/11kV transformer configuration at the GXP and associated sub-transmission network to best meet the long term needs of the network.

11kV Feeder Reinforcement

The majority of Cambridge GXP and Te Awamutu GXP urban/suburban and rural feeders have been future proofed by normal 11kV reinforcement techniques so far, but this will need to be investigated in the coming years due to increasing loads.

While normal 11kV reinforcement techniques are economic, the network is running out of capacity due to voltage limitations on longer rural feeders and alternative solutions will continue to be investigated in 2020. The 11kV reinforcement has mainly involved traditional approach of:

- upgrading all under sized feeder conductors to remove capacity constraints and improve delivered voltage;
- relocating, enhancing, adding or removing voltage regulators or capacitors to ensure regulatory voltage is maintained at all times;
- establishing new 11kV feeders and reallocating load between the new and existing feeders; and
- relocating, adding or removing line auto reclosers, sectionalisers, disconnectors and dropout fuses to satisfy system operating needs.

Customer Connection

General Extensions

The quantity of subdivisions and other developments and the timing of their reticulation are driven by the developers of each site.

Over the past few years expenditure on reticulating subdivisions and new developments has been less compared to previous years primarily due to the on-going constrained economic environment.

However, recently customer driven activity has increased in Cambridge and Te Awamutu and their surrounding areas which is reflected in this AMP forecasts. This activity is augmented by planned increase in Waikeria prison load resulting from the prison upgrade.

Investment in new network extensions, driven by developer and consumer requirements will continue as required.

The cost associated with the activities below are identified as customer connection expenditure of the Capital Expenditure Budget in Section 10 of this AMP.

Kiokio/Waikeria

The 600 bed Waikeria Prison upgrade is under construction, and will require significant network and Transpower reinforcement to supply the additional 2 MVA load, with potential to expand to 4 MVA in future. Corrections has announced a new 600 bed facility at Waikeria to be developed by 2021, opening in February 2022. Since the Kiokio/Waikeria feeder is essentially at capacity, a new feeder to supply this load is under construction. The design requires the following works to enable supply, to be implemented in stages by 31 May 2020 and 31 January 2021:

- A new Waikeria feeder will supply the new prison load, comprising a new 4.5km cable to Kihikihi Rd, a new voltage regulator, an upgrade to the existing voltage regulator VR25 and conductor upgrades to the existing feeder.
- The existing Kiokio feeder will have conductor upgrades and a new cable section at the start of the feeder to ensure adequate voltage once the new prison is connected.

Further work to be completed by 2022 (readiness for potential 4 MVA load):

- Transpower to upgrade Switchboard B with two new circuit breakers provide additional capacity and connect the new Kiokio and Waikeria feeders.
- Transpower to upgrade the incomer cables and transformer cooling to allow the supply transformer rating to be increased to 55 MVA.

The cost associated with this activity is not identified as customer connection expenditure of the Capital Expenditure Budget in Section 10 of this AMP, because the work is being completed on behalf of the NZ Government, and the associated capital contribution revenue is drip fed from the balance sheet over the 40 year life of the assets created.

Transformer and Substation Additions

Installation of new transformers and substations, essential for network extensions, will continue to be driven by developer and consumer demand.

Ring Main Unit Switchgear Additions

Installation of new ring main units, essential for network extensions, will continue to be driven by developer and consumer demand.

Disconnector Switchgear Additions

Installation of new disconnectors, essential for network extensions, will continue to be driven by developer and consumer demand.

Dropout Fuse Switchgear Additions

Installation of new drop out fuses, essential for network extensions, will continue to be driven by developer and consumer demand.

General Relays Additions

Waipa will install additional ripple control relays each year for new customers or existing customers seeking a tariff change.

System Growth

Waipa's feeder load flow analysis of Cambridge feeders completed in 2016 has identified some low voltage constraints, under normal configuration at peak load and in back feed situations. Solutions to resolve these voltage constraints have been phased into the capital programme in order of priority. The future supply requirements for the Te Awamutu area will be investigated in more detail during 2020/21 and revised as necessary in the 2021 AMP.

The cost associated with non-network capacity support, voltage regulator and capacitor installations, cable upgrades and transformer and substation enhancements and communication systems are identified as system growth expenditure of the Capital Expenditure Budget in Section 10 of this AMP.

Cambridge Non-network Capacity Support

Waipa Networks will develop non-network capacity support for the Cambridge GXP until the West Cambridge GXP is commissioned. Initially this will take the form of a diesel peaking power station.

New Voltage Regulators

Waipa has a regulatory obligation to supply consumers' NCP within specified voltage limits not withstanding momentary fluctuations.

The Company's load profile is typical of most EDBs' with morning and evening peaks which occur for 6-8 hours each day.

For the remaining 16 to 18 hours Waipa's urban and suburban pole line feeders operate well within their current rating capacity and deliver statutory voltage.

However, during peak loading periods, the Company's rural pole line feeders without enhancement cannot deliver regulatory voltage. The cost-effective solution is to install voltage regulators on these rural lines so that regulatory voltage is maintained at NCPs over peak periods. The use of capacitors as an alternative method of voltage support to augment voltage regulators has also been introduced.

Waipa has established a programme for installing 3 can, 200A or 300A, 32 step, 0.625% per step type voltage regulators and 750 kVAr capacitors. Appendix B shows the proposed Voltage Regulator and Capacitor Programme. The need and timing of voltage regulator and capacitor installations proposed from 2020/2021 onward will be confirmed by the Company's ETAP network modelling software and actual load growth.

Pukeatua

An upgrade to VR12 is required (installing a third regulator can for capacity in 2020/21 and a voltage support capacitor is required in 2020/212020/21.

Kaipaki

Following the split of the Monavale and Kaipaki feeders in 2016/17, re-conductoring of 1.5km of overhead line on Racecourse Rd was required to configure the Kaipaki feeder in its final form. This is was completed in 2018/19.

In order to back feed the Monavale feeder, including the existing industrial load at Aotearoa Park, a 200A voltage regulator is required after ABS 936, to be installed in 2020/21.

Roto-O-Rangi

Low voltage has been modelled on the Roto-O-Rangi feeder at peak load. To solve this and to assist in back feeding either the Leamington feeder or portions of the Monavale feeder, a 300 A voltage regulator and one 750kVAr capacitor will be installed in 2020/21.

Leamington

Load flow modelling shows low voltage beyond X547, requiring a new 300A voltage regulator before A840 to be installed in 2020/21. The option of installed two capacitors was considered, while this is less cost, the superior back feed capacity for supplying the Roto-O-Rangi feeder makes the larger investment in a voltage regulator the preferred option.

Pencarrow

A 750kVAr capacitor has been budgeted for 2020/21 to support off-loaded sections of the Kaipaki and Monavale feeder when the Monavale feeder requires back feeding from Kaipaki.

French Pass

The French Pass feeder has been modelled with low voltage at peak load. The solution is to install a 750kVAr, budgeted for 2020/21.

Kiokio / Waikeria

The new feeder supply project for the Waikeria Prison upgrade requires a new 300A voltage regulator in McAndrew St in Kihikihi, and an upgrade to 300A cans for the existing VR25 in Waikeria Rd, both to be connected into the new Waikeria feeder in 2020/21. These will be funded by a capital contribution from the Department of Corrections, so will not form part of the System Growth capital budget.

Four unallocated voltage regulator additions have been budgeted in 2022/23, 2024/25, 2026/27 and 2028/29 to reflect the expected additional voltage support that will be required in future. Network modelling using the new feeder forecasts will be completed in 2020/21 to further define the future required voltage support investment.

Te Awamutu GXP Cable Upgrade

Investigation into the cable capacity of cables exiting the Te Awamutu GXP down the driveway and crossing the bridge on Racecourse Rd to multi-circuit cable termination poles has revealed that the

circa 1966 paper insulated lead coated (PILC) copper cables are significantly de-rated under the installation conditions and are under rated for the feeder loadings. There are eleven cables in close proximity and at below normal depth of burial, contributing to mutual heating that de-rates the cables. In situ testing of soil thermal resistivity and calculation of cable capacity has been completed by AECOM. Given the uncertainty around the actual cable ratings, there is some risk that cable failure may occur due to thermal stress. Since most of the cables have peak loadings in winter when soil conditions are expected to be moist and hence thermal resistivity would be lower, this risk is mitigated somewhat.

The original circa 1966 PILC cables are fifty years old, compared to the PILC cable standard life of 70 years. A recent partial discharge test on the feeder cables indicated only one cable with elevated partial discharge activity, so that is reassuring.

To address the cable capacity issue, a full cable thermal design will be completed for the feeder cables exiting the GXP, using thermally stabilised backfill and duct banks to achieve a reliable cable capacity. An estimated budget to replace the feeder cables exiting the GXP has been included in the 2020/21 budget.

Transformer & Substation Enhancements

Enhancements of existing transformers and substations will continue to be driven by consumer demand.

Te Awamutu Area Plan

In 2020/21 an area development plan will be completed for the Te Awamutu GXP and sub-transmission network to address the long-term capacity requirements when the voltage capacity of the 11kV feeders is exhausted. The budget and timing of expenditure will be added to AMP 2021.
However, the predicted load growth on Kawhia feeder has not eventuated to date. Currently, the load has reached a plateau. Any further voltage reinforcement for Kawhia will be investigated by the Te Awamutu GXP and Sub-transmission Area Plan and included in AMP 2021.

Communications

Data Network

Waipa Networks is considering converting our analogue communications network to digital. That will allow us to have a fast and reliable data network with the possibility of using the DNP3 communications protocol. The analogue communications network also suffers from interference and has coverage issues. The project will commence in 2020/21 with an independent consultant to review our communications network to determine the most appropriate solution to the above issues and scope the required investment. This will be followed by engagement with vendors and selection of equipment.

SCADA

SCADA Improvements

SCADA and network capability is further enhanced by upgrading the computer systems, adding text and email alerts, a gateway for the 5th Channel and deploying securelink for SCADA monitoring.

The master and backup computers have aged to the point where their capability to operate effectively has diminished as well as there is a steady increase in smart field devices in recent years. New SCADA PCs will have more capacity and faster processing times. These computers are mission critical for collecting data and controlling field equipment. It is important that more timely and accurate information are received from the field devices using faster computers with better visibility.

Adding text and email alerts to the SCADA system will allow it to notify key people for urgent (text) and non-urgent (email) messages with warnings, trippings, equipment in distress or equipment failures. This will enable quicker response time, better knowledge of the failure trends and what's happening in the field.

Gateway for the 5th channel was budgeted for in the 2017/18 budget but due to other priorities and insufficient engineering staff, it could not be completed. Therefore, it will be carried over to 2019/20 to allow the connection of the new SCADA repeater to the SCADA master station, connecting new field devices that have been deployed.

SCADA PCs at WEL are due for replacement and as part of the SCADA improvements, this is now included in 2019/2020.

Securelink is a remote access software suite for Abbey's SCADA Aspex. Budget was allocated for 3 securelink software packages which includes test master to provide the ability to view, test and check real time data. The data includes network status, current and voltage data, trends, and any alarms or warnings that may be active. This part of the SCADA improvements project has been completed in 2018/19.

A project to interface the Waipa Networks Abbey SCADA system to the WEL GE Power-on SCADA system is planned for 2020/21 using OPC server.

SCADA display and control will be required for the Cambridge Non-network Capacity Support project to provide control and visibility for the distributed generation, demand response and distributed energy resources required by that project. This will be developed using NNCS budget.

Engineering Access

Waipa has completed a pilot of Remote Engineering Access to intelligent electronic devices on the two RMUs associated with the APL Stage 1 supply. with preference given to any fast and reliable communication systems such as Ethernet based fixed IP links with point to point/multipoint DMR system or 3G/4G mobile network technologies. A pilot installation on the APL and Cambridge North remote controlled RMUs was completed in 2019/20. A five-year programme from 2020/21 to 2024/25 is planned to roll out remote engineering access to all reclosers on the network.

Asset Replacement and Renewal

The cost associated with asset replacement and renewal expenditure has been included in the Capital Expenditure Budget in Section 10 of this AMP.
All asset fleet count statistics in this section are as at 31 March 2019.

One Pole Transformer and Substation Structure Replacement

Waipa had 2,727 pole mounted transformer structures on the network. The visual asset condition survey is used to initiate maintenance or condition-based replacement for this type of asset.

The Company's experience is that the service life of pole mounted transformers is generally well in excess of the ODV 45 years standard life. While minor remedial work is carried out when a defect is detected, the asset is only replaced when it fails in service. This excludes replacing transformers due to load growth and replacing transformers during major line alterations.

This is an on-going activity and a budget provision based on the number of annual failures has been made to replace 15 per year.

Disconnector (ABS) Switchgear Replacement

Waipa had 641 air break switches in service on the distribution network. These air break switches are either open air break switches or the modern equivalent enclosed load break switch type used to segment and isolate lines and provide inter-ties between feeders.

Previously these disconnectors were removed from service and refurbished. However, the Company prefers to replace them because their most common mode of failure is to "freeze up" through infrequent use, their contacts weld together when they pass fault current or insulator failure occurs.

When a defective disconnector is identified a rigorous process is used to determine if the ABS disconnector is still required for network operations.

It is intended to replace deteriorated air break switches at the time the pole line is reconstructed or when they fail in service. This is an on-going activity and a budget provision has been made to replace 12 per year, at the cost of the modern equivalent asset, the Entec Ecoswitch. In 2020 we intend to develop a fleet asset management plan for air break switches, to determine a programme of renewal for the older types on our network, focusing on the more reliability critical units in urban areas.

Pad Mount Transformer Substation Structure Replacement

Waipa had 800 pad mounted transformer substations on the network. The visual asset condition survey is used to initiate maintenance or condition-based replacement for this type of asset.

The Company's experience is that the service life of pad mounted transformers is generally well in excess of the ODV 45 years standard life. While minor remedial work is carried out when a defect is detected, the asset is only replaced when it fails in service or defects related to its condition require replacement.

This is an on-going activity and a budget provision has been made to replace up to 7 per year.

Quality of Supply

The cost associated with quality of supply expenditure has been included in the Capital Expenditure Budget in Section 10 of this AMP.

Multi-circuit Single Mode Failure Risk Mitigation

In a number of locations on the network multiple feeder circuits have been erected on a single pole line. This has been driven by congested routes exiting the vicinity of GXPs and the desire to reduce cost. However, in a number of cases the feeders on a single pole line serve adjoining areas, restricting the ability to back feed significant network areas during planned maintenance or forced outages. The risk of being unable to supply a significant number of customers following a single car versus pole accident that takes out up to three feeders is real and concerning.

The Te Awamutu West, Pokuru and Kiokio Waikeria feeders are on a single pole line running from the Factory Rd/Racecourse Rd intersection up Tawhiao Street, College Street, Downes Street and Fairview Road to Puniu Road where the feeders disaggregate. Recent experience taking a planned outage overnight on this multi-circuit feeder to change a cracked pole illustrates how difficult it is to back feed all of the load with acceptable voltage even on a weekend overnight. Back feeding the Te Awamutu West feeder is not too difficult but the Pokuru and Kiokio Waikeria feeders cover large, adjoining rural areas and back feeding them following an unplanned outage on the multi-circuit section would involve significant loss of supply at peak times.

The new supply to the Waikeria Prison upgrade will require the first section of the new Kiokio feeder to be converted to cable along the route of the multi-circuit feeder, to improve voltage performance. This will reduce risk by removing one of the feeders from the multi-circuit, and providing a cable feeder to back up the overhead section of the other two feeders in the event of a fault. Hence the project budgeted for 2017/18 was cancelled.

The risk of failure of the overhead multi-circuit feeders will be managed by instigating an intensive maintenance regime, completing an acoustic and thermal survey of the lines to detect any incipient faults before failures occur. This additional maintenance cost has been added to the operational budget from 2018/19. The first survey completed identified a number of insulator and cross arm failures that were proactively replaced before an outage occurred. This risk mitigation removes the need to spend at least $2.22m in 2017/18 and 2018/19 on multi-circuit undergrounding projects.

Install Remote Controlled Auto Reclosers

The installation of remote controlled 11kV auto reclosers will increase feeder segmentation which will reduce the number of consumers impacted by faults and enable quicker supply restoration thereby improving reliability performance.

Waipa's target of no more than 200-300 consumers or 15-20km of 11kV line between remote controlled 11kV auto reclosers has been completed within the 2015/16 programme to install additional NOJA pole mounted remote controlled 11kV auto reclosers.

Install Automated Open Point Switches

With the completion of the recloser programme, the next step in improving reliability through automated network devices is to increase the speed of sectionalising faults and restoring sections of the network through remote controlled open point switches. This programme will install modern enclosed and motorised load break switches equipped for remote control at feeder open points and logical points for fault sectionalising. The programme will be designed to target the highest SAIDI feeders, where greatest benefit of remote restoration will be obtained and fault staff attendance is delayed due to distance.

The annual expenditure of $545k previously allocated to recloser and bypass disconnectors has been allocated to automated open point switches. The programme has been estimated at 14 switches per annum for four years; initial analysis during 2016/17 found that circa 32 switches could be found with reasonable reliability benefit. The switches installed in the first two years of the programme have delivered reliability benefits. The programme will continue to install these switches in 2020/21, with budget for 10 automated switches being included.

Install 11kV Dropout Isolation Fuses on Spurs & Services

Waipa's Cambridge and Te Awamutu pole lines were historically constructed with a minimum of isolation points installed between the main 11kV distribution lines and either 11kV distribution network spur lines or consumers' 11kV service mains.

As a consequence, when a fault occurs on an 11kV distribution network spur line or consumer 11kV service main all the distribution network up to the nearest protective isolation device is without power.

Continuing the installation of 11kV dropout fuse isolation points on network spurs and consumers' service mains will reduce the number of consumers impacted by phase to phase faults on these spur lines and provide easier disconnect points enabling quicker supply restoration to other consumers thereby improving reliability performance indices.

Approximately 35 additional two or three phase 11kV dropout isolation fuses will be installed on network feeder spurs and 35 additional two or three phase 11kV dropout isolation fuses will be installed on consumers' service mains each year to minimise the number of consumers affected by faults and improve fault isolation and restoration of supply times. This is an on-going activity and a budget provision has been made to install 70 per year.

Waipa Feeder Reliability

Waipa has a semi-rural network with relatively high consumer density on rural feeders. As a result, faults on rural feeders affect a larger number of consumers than other more typical rural and semi-rural networks. At the same time travel times to these faults can be longer than for urban networks.

Analysis has shown the average number of consumers affected by a fault on Waipa's network is substantially higher than for most other networks.

Waipa's objective is to continually improve the reliability performance of its network feeder assets to meet the Company's understanding of the growing expectations of consumers.

From 2006 the Company has exploited opportunities often created by customer driven works to split feeders at minimal cost to improve SAIDI minutes and reduce SAIFI. However, these opportunities are now diminishing as the majority of feasible splits have been completed.

St Kilda Feeder to Offload Roto-O-Rangi and French Pass

The St Kilda feeder will be under-utilised in terms of capacity and ICPs once the reticulation of the subdivision is complete, with only the residential area, the small commercial zone and the Bupa

retirement village being served by this feeder. Options were evaluated to make more use of this feeder. Other objectives include off-loading the Roto-O-Rangi feeder to free up capacity for the future residential zone C5 to the east of Leamington, to have more capacity available for back feed into the highly loaded Leamington feeder, and take some ICPs off the French Pass feeder, which has a high number of ICPs and suffers from high SAIDI.

The selected option is to extend the St Kilda feeder south down St Kilda Road, across Thornton Road and follow the Waikato Expressway southeast to the Tirau Road interchange. To prevent rural faults impinging on the reliability of the urban St Kilda subdivision, recloser 595 would be relocated to the end of the new cable to segregate the cable network from the rural overhead network. This would allow a section of the Roto-O-Rangi feeder beyond T20691 to be transferred to the St Kilda feeder. ABS 813 would be closed and recloser 568 would be opened, transferring the most remote section of the French Pass feeder to the extended St Kilda feeder. This will improve reliability for this formerly French Pass feeder section.

This project has been completed in 2019.

Te Awamutu Ripple Control RMU Alternative Supply

The Te Awamutu ripple control pant has a single supply from Transpower CB T0028. To reduce the risk of a circuit breaker or switchboard failure causing the loss of load control and street light control in Te Awamutu, a duplicate supply is required. This duplicate supply also allows Transpower to proceed with Switchboard A arc flash protection installation that requires outages of the switchgear. A project to install a new ABB Safering RMU and a duplicate supply to the ripple control plant from CB 2822 Ohaupo feeder will be completed in 2020/21.

Legislative and Regulatory

Waipa has not identified any capital expenditure on assets required to address any new legislator or legal requirements.

Other Reliability, Safety & Environment

Waipa Asset Safety & Environment

In reviewing the impact of existing distribution assets on safety and the environment and the requirements of the Electricity (Safety) Regulations 2010, the Public Safety Management System based on NZS 7901:2008 and the Electricity (Hazard from Trees) Regulations 2003 the Company had identified 3 major asset types that presented a significant public safety hazard.

These were oil-filled ring main units, non-compliant transformer substation enclosures and two pole transformer substation structures.

The last oil filled ring main unit was removed from service in 2014/15.
The last non-compliant transformer enclosure was removed from service in 2014/15.

Two Pole Transformer Substation Replacements

Waipa had 13 (as at 31 December 2019 two pole hardwood platform transformer structures that are over 40 years old. While the hardwood platforms have been maintained as required over the years these assets are approaching the end of their economic life.

Furthermore, this type of substation structure no longer conforms to modern industry standards and present an operating and maintenance risk for staff and contractors.

All of these two pole transformer structures will be replaced on a condition prioritised basis by either a single pole transformer substation or a pad mounted substation for staff and public safety in a programme to be complete by 2020/21.

The cost associated with this activity is identified as Other Reliability, Safety & Environment expenditure of the Capital Expenditure Budget in Section 10 of this AMP.

Network Monitoring – St Kilda & Cambridge Park Gridkey LV Monitoring

In St Kilda, Cambridge we have a 100% solar PV residential subdivision, with all dwellings required by covenant to have at least 3kW of solar PV generation installed. The Gridkey LV monitoring system allows visibility of the current and voltage at the distribution transformer and the power flows on individual LV feeders. This is expected to be useful not only for understanding the behaviour of the LV power flows associated with solar PV export, but also should the St Kilda residents adopt electric vehicles or batteries in large numbers, this will give a useful test bed for assessing the impact on the LV network. The Cambridge Park network is a contemporary subdivision but without mandated solar PV installation, so acts as a control group for comparison to St Kilda. This programme installs Gridkey LV monitoring on all St Kilda transformers and five control group transformers in Cambridge Park.

Soundproofing Cambridge Ripple Plant Building

A noise complaint from a neighbouring resident in the St Kilda subdivision (bordering the Cambridge Substation where Waipa Networks' ripple plant building is sited), noise monitoring in December 2019 confirmed that the ripple plant was not compliant with the Waipa District plan noise consent levels. This project will install sound proofing material into the building then repeat the noise monitoring to check compliance.

Relocation

Relocation of network assets is normally at the request of a third party, for example NZTA or the district councils, who typically pay a capital contribution to relocate the network assets. Hence a capital allowance for network relocation is not made for relocation of assets.

Non-Network Assets

Capital expenditure on Non-networks assets category covers: IT systems, asset management systems, office buildings, depots and workshops, office furniture and equipment, motor vehicles, tools, plant and machinery, and other items treated as non-system fixed assets under GAAP.

Te Awamutu Depot Extension
Growth in staff numbers related to increased levels of network maintenance and customer connection activity has put pressure on the available staff car parking; it is almost at capacity and there are insufficient visitor car parks. In addition, depot space for parking vehicles and storing network equipment and materials is under pressure. To provide for future depot storage requirements for the Cambridge sub-transmission network and additional contracting equipment, an extension to the Depot storage area and cark park is required. Budget has been included in 2020/21 for this purpose.

A provision has been made reflecting current levels of capital expenditure on non-network assets and the specific item of the Depot extension.

Fonterra Hautapu Dry-type Transformers
Fonterra Hautapu has a lease agreement with Waipa Networks for the transformers on their site; these are therefore classed as non-network assets. Fonterra have requested that the oil filled transformers located at the top of one of their buildings are replaced with two 1 MVA and one 300kVA dry-type transformers to reduce the risk of building damage should a transformer fault cause a fire. Purchase of these transformers are included in 2020/21, for installation in the June 2021 site shutdown.

7 Life Cycle Asset Management Planning

Whilst standard asset lives prescribed in the fourth edition Handbook for Optimised Deprival Valuation of System Fixed Assets of Electricity Lines Businesses March 2004 (ODV) range between 15 years for SCADA systems and 70 years for PILC cable, Waipa's experience is that in most cases a specific asset's "fitness for purpose" is reviewed several times during the course of its life.

Generally, asset enhancement or replacement is driven by increased load demand, the need to deliver electricity within statutory voltage limits, physical deterioration, or the discovery of a significant staff, contractor or public safety hazard.

Waipa prioritises network maintenance works by assessing the adverse impact of the respective network assets on:

Adverse Asset Impact	Priority Level*
Staff, Contractor or Public Safety	First Priority
Reliability	Second Priority
Fitness for Purpose	Third Priority

***Where finite Company and contracted resources constrain the completion of multiple projects.*

7.1 Maintenance Planning Criteria and Assumptions

Waipa manages its distribution assets through their various lifecycles to ensure the network:

- will not present a significant safety hazard,
- will be "fit for purpose" during the next 10-year planning period,
- will deliver voltage within statutory limits,
- will meet the security levels as determined by the Company in consultation with the shareholder and consumers,
- are maintained in accordance with the Company's investment and maintenance policies,
- will continually improve on targets for SAIDI and SAIFI, and
- are operated in a safe and prudent manner.

The Company will ensure that its staff, contractors and the public are safe from "step and touch" potential rise by complying with earthing standards.

Waipa will continue to drive distribution network maintenance from asset condition surveys and by the eliminating or mitigating the causes of faults and hazards.

The Company's main non-asset solutions to improve network SAIDI and SAIFI reliability performance are to:

- continue to use live-line techniques where it is safe to do so and
- encourage tree owners to manage vegetation impinging on power lines.

7.2 Routine and Corrective Maintenance Policies and Procedures

Maintenance programmes are driven by the Waipa's objective to provide a safe and reliable supply.

Identifying and completing preventative maintenance works on the network will also preserve the value of the Company's distribution lines.

Waipa will continue to maintain its 11kV and 400V distribution feeders, voltage regulators, line auto reclosers, SF_6 ring main units, disconnectors, distribution transformers and substation structures in accordance with the maintenance planning criteria and assumptions set out in section 7.1.

Asset Condition Surveys

Waipa has adopted the asset condition approach to prioritise routine and corrective maintenance expenditure.

Visual Survey

An independent contractor completed a visual survey of Waipa's pole line assets in January 2006. The second complete inspection of the network was completed by Waipa Networks staff in 2019. The assessment of network pole lines included:

- adequacy of pole structure,
- condition of transformers, cross arms and all line hardware,
- conductor tension, sagging and attachments,
- regulatory clearances, and
- vegetation within growth zones and out-of-zone tree fall distance on risk-assessment basis.

The external condition of 11kV and 400V distribution lines, transformers, voltage regulators, line auto reclosers and sectionalisers, disconnectors, 11kV dropout fuses, 400V fuse links, lightning arrestors and cable terminations has also been assessed.

This information was used by the Company to prioritise maintenance works to ensure:

- safety of staff, contractors, the public, live stock and property,
- regulatory requirements are maintained, and
- network supplying important consumers are ranked accordingly.

Waipa has monitored the causes of system faults over recent years and has found that very few identified asset defects have caused unplanned outages. Asset defects which have caused faults have generally been unidentifiable by survey, such as insulator or surge arrestor failures.

The Company commenced the third visual asset condition survey in 2019/2020 using internal resources. The third survey is expected to take 8 years to complete and feeders will be surveyed in the same order as the second survey. The programme is based on an even spread of kilometres of line being surveyed each year.

Preventative maintenance work packages and capital asset replacement work packages are developed by the surveyor to address equipment found to be defective or in poor condition and assessed as likely to fail within a five-year period.

Appendix D shows the proposed Visual Asset Condition Survey Programme.

The costs associated with these activities are identified as routine and corrective maintenance and inspection expenditure in the Operational Expenditure Budget, and, asset replacement and renewal expenditure in the Operational and Capital Expenditure Budgets in Section 10 of this AMP.

Waipa gains further asset condition information from;

- Asset thermal surveys using drones,
- Partial discharge surveys,
- Corona discharge surveys,
- Acoustic monitoring,
- A vegetation management programme,
- An earth testing and repair programme, and
- Planned maintenance programmes for ground mounted transformers, ring main units, reclosers, remote controlled load break switches and voltage regulators.

Thermal Surveys

Waipa will engage an external service provider with a drone to carry out an annual thermal survey at times of high load of arterial feeder disconnectors, lines, transformers, dropout fuses, cable pothead terminations and line connections. Thermal "hot spots" are treated as urgent and are repaired as soon as possible.

The cost associated with this activity is identified as System Management & Operations expenditure in the Operational Expenditure Budget in Section 10 of this AMP.

Partial Discharge Surveys

In 2005/2006 Waipa engaged an external service provider to carry out partial discharge surveys of all RMU equipment after two RMU units failed in service. The survey revealed that a number of RMUs had varying degrees of partial discharge originating from heat shrink cable terminations.
All switchgear partial discharge defects were treated as urgent and were repaired soon after.

The survey led to Magnefix, Andelect and ABB Series 1 RMUs being replaced as the safe and most cost-effective solution as these RMUs were no longer supported by their manufacturers.

No further partial discharge surveys are contemplated in this AMP. This does not preclude future partial discharge surveys as the need arises.

Corona Discharge

In 2005/2006 Waipa engaged an external service provider to carry out a corona survey by helicopter of Kawhia feeder which was plagued by persistent unidentified faults. This resulted in 33 contaminated polymer resin strain insulators being replaced. There has been no recurrence of the problem on Kawhia feeder or any other feeder to date.

No further corona surveys are contemplated in this AMP. This does not exclude future corona surveys as the need arises.

Multi-circuit Feeder Maintenance

The risk of failure of the overhead multi-circuit feeders will be managed by instigating an intensive maintenance regime. This will involve completing an acoustic and thermal survey of the lines to detect any incipient faults before failures occur. This additional maintenance cost was added to the operational budget from 2018/19.

Planned Maintenance Programme

Planned maintenance programmes have been defined for more complex equipment requiring more frequent checks that commenced from 2017/18 for the following equipment:

- Ground mounted transformers; three yearly inspections to ensure transformers are secure, read the maximum demand indicators, assess the transformer asset health and to identify defects.
- Ring main units; three yearly inspections to ensure RMUs are secure, assess the RMU asset health and to identify defects.
- Reclosers and remove controlled Load Break Switches; annual inspections to control pests (as necessary) in control boxes, identify defects, check batteries and test RTU and communications.
- Voltage regulators; annual inspections to control pests (as necessary) in control boxes, identify defects, check batteries and test RTU and communications.

Pillar Inspection Programme

A pillar inspection programme has been instigated to survey and replace poor condition low voltage pillars. This will address the public safety risk of insecure pillars and the staff safety risk of the "floating fuse" pillar type where the cable tap-offs are not terminated or secured in the pillar, but are "floating" with poor quality insulation tapes covering the joints. This is a risk to staff opening the pillars. The programme will inspect the pillars over a period of years, commencing in Cambridge where the bulk of the issues are. The maintenance cost of replacing pillars has been added for the next four years, based on the cost of pillar replacements undertaken to date.

Earthing Testing and Repair

Waipa will ensure that all its system earthing and bonding comply with AS/NZS 3000:2007 earthing standards and NZECP 35 New Zealand Electrical Code of Practice for Power System Earthing to ensure that Company personnel, contractors and the public are safe from "step and touch" potential rise.

The earth testing and repair programme is based on an even spread of earth banks requiring testing each year. The programme results in each system earth being checked every 8 years.

The Company has experienced a growing number of copper earth thefts consistent with recent industry trends. Stolen copper earths are replaced immediately once they are discovered. Waipa is investigating alternative materials for earthing that will have a lower scrap value.

In 2011/2012 Waipa began installing Copper Clad Steel Conductor on new sites in vulnerable areas and replacing stolen copper earths with Copper Clad Steel Conductor.

The cost of installing Copper Clad Steel Conductor earths is comparable with pure copper earths, but has significantly lower scrap value. Freshly cut Copper Clad Steel Conductor is visually similar to pure copper conductor and is likely to be identifiable by scrap metal dealers only, which it is hoped will act as a deterrent to thieves.

Appendix F shows the proposed Earth Testing and Repair Programme.

The cost associated with this activity is identified as Routine and Corrective Maintenance and Inspection expenditure in the Operational Expenditure Budget in Section 10 of this AMP.

7.3 Asset Replacement and Renewal Policies and Procedures

Waipa has established the following policies for asset replacement and renewal in accordance with the maintenance planning criteria and assumptions set out in section 7.1.

Acquisition of New Assets

Equipment will be purchased on the basis of its potential impact on public safety and its life-cycle costs including the capitalisation of electricity losses.

Conductor upgrading to reduce distribution losses will be based on an individual feeder cost/benefit analysis over 30 years (half of ODV specified life).

Waipa generally acquires all assets through a competitive tender process. Suppliers' offers are assessed on asset functionality, technical attributes, safety compliance, delivery times, product support and product price.

The purchase of "one off" or "orphan" assets is avoided where possible.

Adoption of New Technology

Waipa will employ new technology once it has become proven and provides an economic solution to a distribution problem or will improve the reliability of the distribution system.

New technology will be employed where it can economically increase productivity, improve safety or demonstrate other tangible benefits.

Disposal of Existing Assets

Waipa disposes of old assets in compliance with all environmental requirements.

Critical Spares and Surplus Assets

Waipa has established an inventory of critical distribution system spares. The inventory comprises stock with long delivery lead times, stock no longer manufactured and minimum level of stock required to re-establish supply. No significant assets were found to be redundant as part of the March 2004 ODV process, subsequent reviews or March 2011 stock take.

Redeployment and Upgrade of Existing Assets

Pole Line Hardware Policy

Waipa will continue its policy of not reinstalling recovered pole line hardware on the network. The Company's experience has been that reused cross arms pin and strain insulators and disconnectors fail within a relatively short period of time compared to the 60 years plus useful life of a concrete pole line.

Concrete Pole Policy

Waipa will continue installing only pre-stressed concrete poles on the network unless site access is extremely difficult and installation costs are considered excessive. The Company's 11kV and 400V feeders are predominately concrete pole lines.

Steel Cross Arms Policy

Waipa has adopted a policy to install only hot dipped galvanised steel cross arms on the network. As the only remaining organic pole line hardware, wooden cross arms were providing a "weak link" requiring replacement after just a portion of the useful life of a concrete pole line. It was observed that hot dipped galvanised steel cross arms on neighbouring networks had lasted well, with no signs of rust. Waipa considers hot dipped galvanised steel cross arms to be "tried and proven" technology.

Pole Line Reconstruction

Waipa intends to reconstruct sections of 11kV and 400V pole lines identified by visual survey as being not fit for purpose and expected to potentially fail before the next survey.

The cost associated with this activity is identified as either asset replacement and renewal expenditure in the Operational Expenditure Budget or asset replacement and renewal expenditure in the Capital Expenditure Budget in Section 10 of this AMP depending on the extent of work required.

Wooden Pole Replacement

Waipa intends to replace deteriorating hardwood and larch poles identified by the visual surveys as being not fit for purpose and expected to potentially fail before the next scheduled survey, preferably with concrete poles if access permits.

The cost associated with this activity is identified as Asset Replacement and Renewal expenditure in the Capital Expenditure Budget in Section 10 of this AMP.

Cross Arm Replacement

Waipa intends to replace defective wooden cross arms and pole hardware identified by the visual surveys as being not fit for purpose and expected to fail before the next scheduled survey.

The cost associated with this activity is identified as Asset Replacement and Renewal expenditure in the Operational Expenditure Budget in Section 10 of this AMP.

Auto Reclosers & Sectionalisers

Noja Auto Reclosers

Because auto reclosers have a significant impact on network operations they will be inspected for external corrosion and damage every year in addition to the asset condition survey of pole lines.

Repairs on existing Noja installations will be completed in a timely manner after deterioration is detected. Routine maintenance will be conducted in accordance with the manufacturer's recommendations and wear indication.

The cost associated with repairs are identified as Asset Replacement and Renewal expenditure in the Operational Expenditure Budget in Section 10 of this AMP.

Replacement of aged type RC01 recloser control units and complete recloser replacements where condition of the units has deteriorated is a programme within the Capital Expenditure Budget in Section 10 of this AMP. Refer to Appendix C for more details.

Ring Main Units

Waipa installs only SF_6 switchgear currently. The company expects that these RMUs will not require major maintenance over their useful lives. Waipa will install vacuum RMUs or solid dielectric RMUs if cost effective in the future.

"Solid insulated" vacuum Ring Main Units are becoming more readily available in New Zealand. However, their prices are not currently competitive. Waipa has installed a trial Halo Ring Main Unit in 2015/16 and this unit will be evaluated according to its on-going performance.

The cost associated with three-yearly inspection activities is identified as Asset Replacement and Renewal expenditure in the Operational Expenditure Budget in Section 10 of this AMP.

Disconnectors

The most common mode of failure for air break switch disconnectors is to "freeze up" through infrequent use, their contacts weld together when they pass fault current or insulator failure occurs.

The Company intends to replace defective air break switches when they fail in service or at the time the pole line is reconstructed.

Waipa has successfully trialled G&W SF_6 disconnectors on the network over the past 6 years. A recent cost review identified the Entec Ecoswitch with vacuum load break interrupters and solid resin insulation as being more cost effective than the SF_6 type. These types of disconnectors will be installed

in place of air break switches in future, since the incremental capital cost is not large and enclosed load break switches are expected to be more reliable and have longer life with less maintenance costs.

In 2020 fleet asset management plan for Disconnectors will be developed to produce a programme of renewal.

The cost associated with this activity is identified as Asset Replacement and Renewal expenditure of the Capital Expenditure Budget or Asset Replacement & Renewal expenditure of the Operational Expenditure Budget in Section 10 of this AMP depending on the extent of the works.

Transformers

Ground mounted transformers will be routinely inspected at three yearly intervals to ensure they are safe, secure and free of defects. Pole mounted transformer will not be routinely inspected; however, their external condition is assessed at the time of the visual asset condition survey. Subsequent repair and maintenance will be undertaken in a timely manner.

The pad mount transformers in urban areas are subject to vandalism. The Company will repair vandalism and remove graffiti as required.

The costs associated with these activities are identified as Asset Replacement & Renewal expenditure of the Operational Expenditure Budget in Section 10 of this AMP.

Voltage Regulators

Waipa does not have 66kV, 33kV sub-transmission lines or zone substations. To maintain regulatory 11kV voltage on its feeders Waipa has a significant number of voltage regulator units in service on the distribution network.

Because of their significant impact on network operations if they malfunction voltage regulators will be inspected for external corrosion and damage and SCADA and communications will be inspected every year in addition to the asset condition survey of pole lines.

Repairs on existing voltage regulator installations will be completed in a timely manner after deterioration is detected. Routine maintenance will be conducted in accordance with the manufacturer's recommendations and operations counter. Voltage regulator refurbishments have not been keeping pace with the number of tap change operations units have been completing and a backlog has built up. The cost budgeted for refurbishments have been increased for the ten-year period to clear the backlog.

The structural integrity of the two-pole voltage regulator structures has been found to be inadequate for seismic events. In 2020 a programme of structure rebuilds will commence to engineer this risk out over a five-year period ending in 2024/25. This has been incorporated into the capital budget from 2022/21.

In 2020 fleet asset management plan for Voltage Regulators will be developed to produce a programme of renewal and prioritisation of structure rebuilds to make the voltage regulator structures seismically compliant.

The cost associated with this activity is identified as Asset Replacement and Renewal expenditure in the Operational Expenditure Budget in Section 10 of this AMP.

Ripple Injection Plant and Relays

Waipa completed the Te Awamutu ripple relay change out program during 2015/16. All the 297Hz relays have been removed and replaced with 283Hz ripple relays. The Company has retuned the Te Awamutu 297Hhz coupling cell to 283Hz and has installed this coupling cell to replace the existing Cambridge coupling cell which was slightly overloaded. The replaced Cambridge ripple plant coupling cell will be sold or disposed of.

Waipa owns all the ripple relays installed at ICPs on the network. In compliance with the Electricity Participation Code 2010 a provision has been made for the 10-year inspection and recertification of Cambridge ripple relays. A similar provision has also been made for the inspection and recertification of Te Awamutu ripple relays commencing in 2022/23.

In 2019 the Cambridge ripple plant converter panel failed, resulting in a multi-day outage to the Cambridge network hot water ripple control. A contingency spare replacement panel was sourced from Landis and Gyr and a replacement panel ordered, being installed in January 2020. A service agreement that provides annual condition monitoring and access to a contingency spare replacement converter panel and other strategic spares was entered into with Landis and Gyr.

Replacement of the Te Awamutu ripple plant converter panel is planned for 2020/21, given the unit is of a similar age and condition as the Cambridge panel that failed.

The cost associated with this activity is identified as Routine and Corrective Maintenance expenditure in the Capital and Operational Expenditure Budget in Section 10 of this AMP.

7.4 Service Interruptions and Emergencies Policy and Procedures

Waipa has established the following policies and procedures for providing continual line services and dealing with emergencies in accordance with the maintenance planning criteria and assumptions set out in section 7.1.

The cost associated with these activities are identified as Service Interruption and Emergencies expenditure of the Operational Expenditure Budget in Section 10 of this AMP.

24/7 Fault Response Service

Waipa will continue to provide a 24/7 service to attend to:

- all distribution line and equipment faults,
- service main faults (if customer accepts cost of repairs),
- all water heating relay faults,
- faults caused by third party interference and wildlife,
- faults caused by lightning, adverse weather and adverse environment, and
- faults caused by trees.

Oil Leak Containment

All pad mounted transformers with capacity in excess of 750kVA will be constructed with bunding for oil containment as required by the Resource Management Act 1991.

Waipa's fault crews carry emergency oil containment and clean up kits. Larger kits and replacement materials are located at Waipa's Te Awamutu depot and at Transpower's Cambridge GXP and are available 24 hours per day.

Buildings, Fences and Grounds

Waipa owns buildings and grounds in or on which a variety of distribution network assets are installed. These buildings and grounds will be kept secure from inadvertent public entry, safe for Waipa's staff and contractors and neat and tidy as an expression of our good citizenship. Repair and maintenance work will be undertaken as required.

7.5 Vegetation Management Policy and Procedures

Waipa has established the following policies and procedures for vegetation management in accordance with the maintenance planning criteria and assumptions set out in section 7.1.

The Company has had an active vegetation management programme in place since 2001 whereby an entire feeder is surveyed and all trees impinging the distribution lines are either removed or trimmed depending on consultation with their owner.

Waipa established an internal vegetation management crew in 2007 to bring an added focus on clearing vegetation from its 11kV pole lines.

The Company offers tree owners an initial free cut/trim but insist that any tree contractor engaged by the tree owner is approved by Waipa Networks to ensure appropriate safety competency when working in proximity to the network.

Waipa's experience is that the Electricity (Hazard from Trees) Regulations 2003 has resulted in the Company incurring additional compliance costs and the maintenance budget reflects the increase in cost. The clearing of trees impinging on service mains remains the responsibility of the tree owner. The Company offers free temporary disconnection of a service main for the tree owner to clear the vegetation safely.

Waipa will either remove or attempt to trim trees so that they will not grow back into the Notice Zone (2.6m) between surveys. Tree "hot-spots" are dealt with reactively on a risk assessment basis as required.

Up until 2016/17 the vegetation programme was based on even spread of kilometres of line being surveyed and historical incidents of tree interference each year. The programme results in each feeder being systematically cleared either every 4, 6 or 8 years depending on growth rates and tree species on specific feeders. However, indications from the amount of reactive tree trimming required outside of the programme and reliability issues caused by tree faults are that the vegetation management expenditure is not sufficient for the high tree growth rates experienced. As a result, the annual expenditure on vegetation management has been increased from $500k to $1,000k (AMP dollars) from 2016/17, and resourced by an expansion of Waipa's internal vegetation management team, augmented by contractors where required. At this level of expenditure, a six-year rotational trimming programme is planned and is expected to reduce the volume of reactive trimming required over time.

Appendix E shows the proposed Vegetation Management Programme.

The cost associated with this activity is identified as Vegetation Management expenditure in the Operational Expenditure Budget in Section 10 of this AMP.

8 Risk Management

8.1 Natural Hazard Risk Management Assessment

Waipa is an active participant in the Waikato Lifeline Utilities Group as required by the National Emergency Management Agency (NEMA) and through consultation with other members of the group the Company has assessed the potential physical threats to its network assets posed by naturally occurring hazards of wind, lightning, floods, land erosion, earthquakes, volcanic eruptions, geothermal activity and adverse weather. The methods used to assess the risk of each natural hazard are listed in their respective sections.

Wind

Waipa's reticulation is in an area of New Zealand that has one of the lowest recorded average wind speeds. However, there are seasonal storms with winds that blow debris into the 11kV pole lines from time to time. Because of this, trees tend to be weak and easily damaged by stronger winds. The Company's vegetation management programme is intended to reduce the number of the incidents caused by wind-blown vegetation. The Company concludes that wind presents a high threat to network assets when significant storms are considered. While damage caused by wind borne debris is easily fixed under normal circumstances, a significant tropical cyclone could result in widespread network damage from downed trees, requiring a long period of time to reinstate and restore supply. Access to the network is likely to be complicated by wet ground conditions, further complicating supply restoration.

Waipa Networks is aware of the lessons learnt during the severe storm that affected Counties Power and Vector during 2018.

Lightning

Waipa's reticulation assets are regularly subjected to lightning strike. The majority of network assets affected by lightning are rural 11kV pole lines on which normal 11kV lightning protection devices are used to localise and minimise lightning damage. The Company considers lightning is not a major threat to the network.

Floods and Land Erosion

Waipa's reticulation area is subjected to frequent and often heavy rainfalls. There are numerous streams and rivers whose flow-paths change over time. The effect of such erosion on network assets is minimal affecting only one or two poles at any time which are relatively easy to reinstate. The Company is a member of the Waikato Lifeline Utilities Group and through participating in the group's risk assessment exercise considers floods and land erosion are not major threats to the network.

Earthquakes

Transpower have assessed the probability and consequences of earthquakes damaging their assets for all areas in New Zealand. Transpower have defined three seismic risk zones: Zone A (high risk), Zone B (medium risk) and Zone C (low risk).

Transpower have developed the following range of seismic risk factors that reflect the financial loading on construction works that will ensure the integrity of their equipment:

- the seismic risk factor for Zone C (low risk) is 1.00,
- the seismic risk factor range for Zone B (medium risk) is 1.01 to 1.06 and
- the seismic risk factor range for Zone A (high risk) is 1.02 to 1.14, depending on the equipment type.

Waipa's distribution networks are located entirely within a Zone B (medium risk) area. The Company's network assets are predominantly long rural 11kV pole lines. Waipa considers these assets fall into the category defined by Transpower as "Other Plant" and as such have a seismic risk factor of 1.01.

The Company considers this is an acceptable risk to manage because rural 11kV pole lines are relatively easy and an inexpensive network asset to repair if damaged by an earthquake. Based on the experience of Orion in the Christchurch earthquakes, cable assets are likely to be extensively damaged in a severe earthquake, requiring a lot of time and effort to repair, and increased failures and reduced useful life thereafter.

In 2014/15 Waipa engaged a structural engineer to assess the seismic adequacy of the Company's ripple plant building located at Transpower GXP site in Watkins Road Cambridge. The structural engineer recommended that the building's block walls should be strengthened by external pillars to make it comply with current seismic standards. Strengthening works to the building were completed in 2015/16.

Volcanic Eruption

There are no known active volcanoes in Waipa distribution area. The Mount Ruapehu eruption in 1995 had no adverse impact on the Company assets. If volcanic ash had been deposited over the rural 11kV pole lines then the Company would have continued to operate the distribution networks until there was clear evidence of insulation failure. A shortage of water to wash insulators from an ash fall is an expected risk, given that many parties will be attempting to wash plant and equipment at the same time.

Tsunami

The risk of network inundation from a tsunami event effecting the West Coast has been assessed, from the West Coast Tsunami Risk Study commissioned by Waikato District Council and WEL Networks.

The water level rise at the Aotea Harbour mouth resulting from the worst-case event is generated from an earthquake on the Puyseger Trench to the south and west of the South Island. The sea level rise at the heads of Aotea Harbour is a maximum of 2.5m, but it is attenuated to around 1.5m at the Aotea settlement. To gauge the risk to Waipa Networks equipment, the elevation of supply areas was checked using an online mapping application. Areas along Lawton Drive in Aotea are between 2m and 3m of sea level, so inundation shouldn't result even if the tsunami occurred at high tide, unless the event is larger than modelled. The network along Lawton Drive is overhead with pole mounted transformers and mostly overhead service main entry, so the likelihood of network issues if inundation occurred is unlikely. The water level rise is expected to be similar to a fast-rising tide not a "wall of water" so damage and erosion from the inrush of water is not expected.

Other tsunami events from the New Hebrides and Tonga-Kermadec trenches would produce a water level rise of 1 to 1.5m outside the harbour and 0.5m or less inside the harbour, so these are not expected to pose any risk to the network.

The West Coast tsunami risk study did not cover the Kawhia Harbour, but it could be reasonable assumed that the water level rise at the Kawhia Harbour heads would be similar to the 2.5m rise at Aotea for the Puyseger Trench event. The study author Jose Borrero commented that the maximum water level rise in Kawhia Harbour would be 2m, and could be less. In that case, there is a risk to network supplying Kaora St, Omimiti St and Motutara St on the Kawhia settlement waterfront. In these areas there are some pad mounted transformers and the LV reticulation is underground with pillar connections for consumers. Hence some flooding of pillars and pad mounted transformers may cause some supply disruption, requiring isolation until the event is over, then inspection and possibly cleaning or repair before relivening. There are also some low-lying areas on Kawhia Road and Kawhia Harbour Road that experience water level rise, depending on how much the water level rise is attenuated by the harbour mouth. However, the network in these areas is overhead distribution, so no supply issues are expected.

In terms of access for fault staff and repair crews, a number of road sections around Kawhia Harbour and Aotea Harbour are low lying and could be affected with rising water levels washing across the road. Depending on depth, this may delay access but damage to the road surface is not anticipated.

The impact on the network if this event was to occur is considered to be relatively minor, only a small number of connected customers on these waterfronts would be affected and it isn't clear if the water level rise will reach the network assets. When the likelihood of the tsunami event is also factored in (the return period for the Puyseger event cannot be determined but is considered very unlikely), the risk posed by tsunami to the Waipa network is not considered to be significant. At present there are no red, orange and yellow tsunami risk zones produced by Otorohanga District Council or Waitomo District Council for the Aotea and Kawhia areas. NEMA is doing further work on this including tsunami risk zones and this section of the AMP will be updated with that information once it is complete.

Geothermal

There is no significant geothermal activity in Waipa's reticulation area other than a hot water beach at Kawhia. Therefore, there is no corrosive atmosphere to contaminate the overhead lines or hot ground, gases or liquids constraining cable ratings or corrosive liquids damaging cable insulation and conductors. The Company concludes that there is minimal risk to the network from geothermal activity.

8.2 Details of Emergency Response and Contingency Plans

Network Operation

Waipa operates two relatively simple interconnected radial 11kV, predominately pole line, distribution systems extending out from Transpower's Cambridge and Te Awamutu GXPs.

Under normal conditions network operations are initiated through a control room and work is dispatched through a call centre. System switch status is recorded on a single line computer mimic diagram.

Under extraordinary conditions the Company expects the control room and call centre functions may be disrupted. During these emergencies network operations and fault dispatch functions will need to be performed by Waipa's own administrative staff and field crews.

In circumstances where the Company's SCADA, financial and business computer systems also fail, network information held in printed form will be used by the Company's Fault Staff and Field Supervisors to isolate, repair and operate the networks safely. During these emergencies Waipa expects normal telephone services will be disrupted and direct communications with consumers will be reduced due to the abnormal nature of the operation.

Waipa operates its own independent radio telephone system. Should one or more repeaters fail the system is capable of short-range point–to-point communications which will continue to function.

Power restoration will be inherently slow under these circumstances. The majority of repairs required on the networks would be identified by physically patrolling the pole line feeders.

The Company is a participant in the Waikato Lifelines Utilities Group and expects that Civil Defence in conjunction with other utility owners and local authorities will prioritise Installation Control Points for power restoration.

Emergency Response Capability

Waipa has not experienced storms of significance since Cyclone Drena 1997 and the “weather bomb” of June 2002. During both these events the Company contracted external resources to help repair the network. Since that time Waipa has built up its internal field crews and successfully reinstated the network during the February 2004, April 2011 and January 2018 storms. The Company has also formed a liaison with three other local Electricity Distribution Businesses and one contractor to make use of their field resources if required.

The Company carries sufficient spares in its store to construct several kilometres of pole line and could assemble sufficient internal and external resources to repair and continue to operate its network in emergency situations provided the event is not of such significant scale that people and resources are overwhelmed. Waipa Networks is experienced at self-managing its network restoration resources during storm conditions, and will interact and communicate with Civil Defence Emergency Management authorities and the public during these events.

Security of Supply Participant Rolling Outage Plan

Waipa has prepared a Security of Supply Participant Rolling Outage Plan in accordance with the Grid System Operator requirements.

Busbar Failure Contingency Plans

Te Awamutu

In January 2010, Waipa experienced an outage caused by a busbar fault at Transpower’s Te Awamutu GXP simultaneously occurring while maintenance was being carried out on one of the GXP’s transformers. This outage affected half of the Te Awamutu feeders.

Power was restored by emergency switching, with the network being placed at risk of damage or overloading by operators needing to make “on the spot” decisions during such a large switching operation.

The Company has developed detailed switching plans for any section of busbar at Te Awamutu GXP, should there be a similar busbar event in future. The Te Awamutu busbar contingency plans are internally available and form part of Waipa’s Business Contingency Plan.

Cambridge

The Company has developed a detailed contingency switching plan for either section of busbar of the newly commissioned 11kV switchgear at Cambridge. This busbar contingency plan will be modified to include the two new Pencarrow and Monavale feeders.

Business Systems Contingency

Waipa runs its financial and business systems (NCS Integrated Data Warehouse) on one server and runs its Windows based programs including AutoCAD (Geographic Asset Information) on another server which are located at the Company’s depot at 240 Harrison Drive Te Awamutu.

The Company holds sufficient spare IT hardware to reinstate financial and business systems and Windows based programs including AutoCAD in the event of a catastrophic event.

The financial and business systems and geographic asset information data is copied across from administration servers onto backup servers each day. A daily backup tape of financial and business information and Windows based AutoCAD information is held off site. The Company can recreate the information databases and business functionality after a catastrophic event.

Instructions for staff members to reinstate Waipa's computer systems are held in a fireproof cabinet in the Company's Te Awamutu depot.

Should Waipa's Te Awamutu depot be uninhabitable the Company's business systems can be recreated at Plan B's (an external service provider) premises in Hamilton.

Supervisory Control and Data Acquisition System Contingency

Waipa's SCADA system comprises a master station and a "hot standby" backup station located in the Company's Waipa's control room located at 240 Harrison Drive Te Awamutu and two remote operating terminals located in WEL Networks Control Centre at 114 Maui Street, Te Rapa, Hamilton.

The SCADA network configuration and operating schematics are copied across onto the Company's administration servers and back up servers each day. A daily backup tape of SCADA network configuration and operating schematics information is held off site.

The SCADA configuration is copied across onto the backup servers each day. A daily back up tape of the SCADA configuration is held off site. Waipa can recreate the SCADA network configuration and operating schematics after a catastrophic event.

The Company can purchase all component parts for the SCADA system from its SCADA supplier located in Wellington. Waipa moved into new premises several years ago and has demonstrated it can assemble and re-commission the master station, the "hot standby" backup station and communications hub equipment within 5 working days.

Should Waipa's Te Awamutu depot be uninhabitable the Company's SCADA systems can be recreated at WEL Network Control Centre at 114 Maui Street, Te Rapa, Hamilton or WEL Networks' emergency control room in Avalon Drive, Hamilton within a similar period of time.

During 2020 a complete review and update of Waipa Networks' Emergency Preparedness procedures will be completed. An exercise to test the emergency preparedness procedures using a significant cyclone event will be completed with the assistance of NEMA.

8.3 Network Risk Assessment

Network Risk

Waipa Networks has a robust risk assessment process. Risks are identified and the inherent (unmitigated) and residual risks are ranked according to the risk matrix. Appropriate controls are identified and actions identified.

The following asset categories are considered in the risk management assessment process:

- Overhead line failure and operations
- Overhead line environment and stakeholders
- Distribution substations, switchgear and underground
- Other failures and operations (includes SCADA, network interconnectivity, grid supply etc.)
- Other environment and stakeholder

The high focus risks are identified as a selection of the highest impact risks, from the categories above.

The following table shows the high focus risks, with the risk rankings and control measures. The risk action plans will be reviewed periodically and the actions progressed to mitigate the risk impacts.

Risk	Inherent Risk Rank	Residual Risk Rank	Level of Control	Current Actions
Overloaded Customer LV fuse bases causes pillar fire, public safety hazard	High	Serious	Improving	Budget pillar fuse base replacements into AMP. Estimate duration of programme.
Overhead line Vegetation Faults causing loss of reliability	High	Serious	Improving	Reactive trim of hot-spot feeders and continue cutting to spend allocated budget.
Inspection processes behind programme causing reliability risk and Health and Safety risk	High	Serious	Improving	Catch up on survey backlog over 4 years. Increased resources in place
Cable capacity out of Te Awamutu GXP	Serious	Serious	Improving	Complete thermal resistivity testing and cable rating calculations
Multi circuit feeders vehicle versus pole or equipment failure, widespread outage, HV to LV contact and customer equipment damage	High	Serious	Improving	Review risk across network. Consider back feed capacity. Maintain intensive maintenance programme for at-risk feeders.
GXP Firm capacity	Serious	Serious	Improving	Development planning required to determine most economic solution and timing. Apply probabilistic planning to determine level of treatment.
Overhead Line Wind or Tree Damage	Serious	Serious	Improving	8 year Network wide asset survey of design load against actual load. Line design standard update to AS/NZS7000 in progress. Vegetation spend over 4-5 years to control reactive cut requirements. Disaster Recovery Plan to be updated.
Land access to existing assets in storm conditions	High	Serious	Improving	Review major storm contingency planning and review 4WD truck capability required to respond.
Unlawful or unsafe network connection - service mains	Serious	Serious	Improving	Put in place a formal system, process and recording system for these instances.

Partial Transpower Outage - half switchboard outage or similar	Serious	Serious	Improving	Update switchboard contingency planning
Theft of copper causing Health and Safety risk	High	Serious	Effective	Current control appropriate.
Earthing Systems causing earth potential rise	High	Serious	Further Controls Needed	Earthing design review to latest design practice required.
Security of equipment not being up to standard with potential for unauthorised public access.	High	Serious	Improving	New LV Board design with Jean Mueller fusing restricts access to live equipment on LV side.
Distribution Equipment Earthquake Damage	Serious	Serious	Further Controls Needed	Understand seismic risk (magnitude, liquifaction) for our network area. Develop contingency plans for critical cables, critical transformers, consider transformer/RMU installed in buildings owned by others. Assess voltage regulators.
Theft of earthing systems copper	Serious	Serious	Effective	Current controls appropriate.

9.0 Evaluation of Performance

9.1 Financial and Physical Progress

Physical Progress Network Development

The following network enhancements, replacements and refurbishments proposed in AMP 2018 to be completed during 2018/19 were completed:

- The programme to install automated open point switches for reliability improvements commenced in 2016/17, and this programme has continued.
- The on-going installation of additional 11kV dropout isolation fuses on feeder spurs and consumers' service mains to minimise the number of consumers affected by faults and improve fault isolation and restoration of supply times was achieved.
- The on-going installation of ripple relays at consumers' installations to ensure that load management and tariff switching remains effective was achieved.
- The on-going installation of new transformers, substation structures and switchgear to meet consumers' requirements was achieved.
- The on-going installation of new network extensions were installed to meet developers' requirements was achieved.
- The relocation of an existing Pukeatua voltage regulator and capacitor was completed.
- Following the split of the Monavale and Kaipaki feeders in 2016/17, re-conductoring of 1.5km of overhead line on Racecourse Rd was required to configure the Kaipaki feeder in its final form. This was completed.
- The new communications repeater was completed.

The following network enhancements proposed in the AMP 2018 are on-going:

- install new Cambridge and Te Awamutu ripple relays,
- install 11kV fuses on network spur lines and service mains,
- install new voltage regulators as required,
- install additional 11kV switchgear as required,
- install new transformer substations and switchgear as required,
- install general network extensions as required,
- replace two pole substation structures,
- replace pole and pad mount transformer substations as required,
- replace 11kV disconnectors as required and,
- .
- The Te Awamutu GXP cable upgrade was not completed, due to the cable rating investigation being delayed.
- Voltage regulator projects for Kaipaki, Roto-o-rangi, Leamington and French Pass feeders and a capacitor for the Pencarrow feeder were not completed due to a lack of engineering resource.
- The replacement of analogue radios with digital radios on the voice network is ongoing, with the programme due to be completed in 2019/20.
- Initiatives for SCADA Improvements and Remote Engineering Access are ongoing.
- The St Kilda Feeder to Offload Roto-O-Rangi and French Pass project is ongoing, due to be completed in 2019/20.

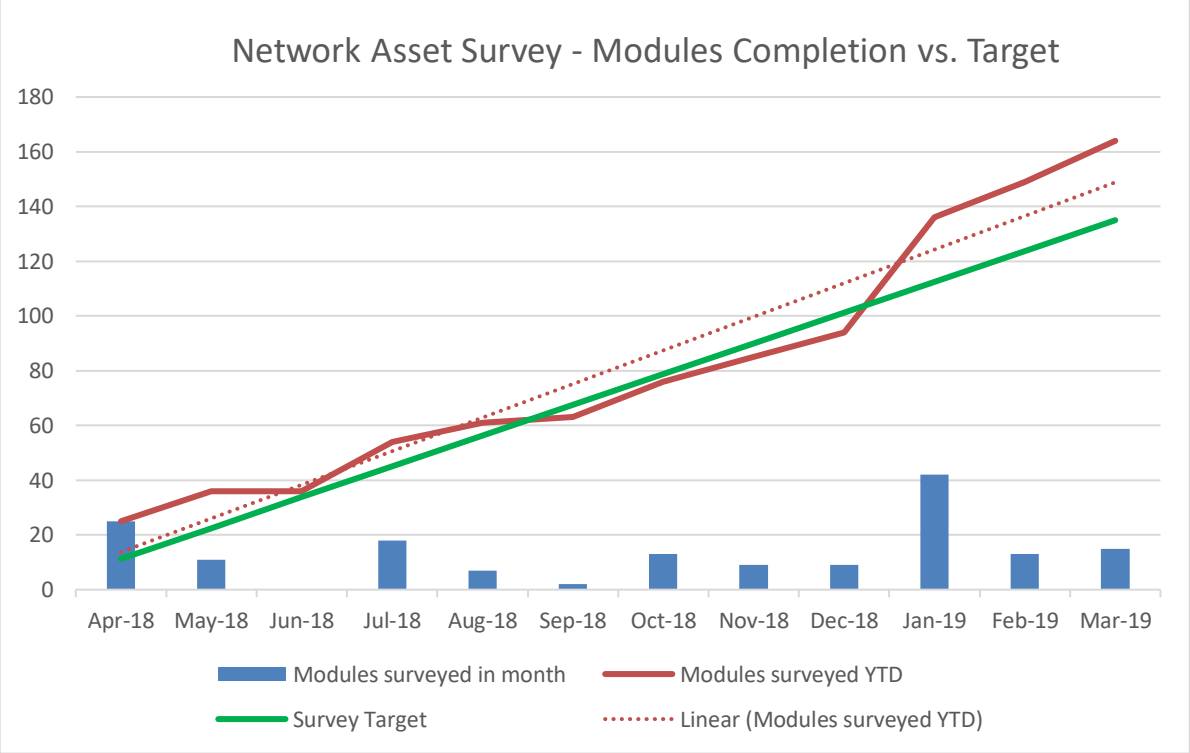
Physical Progress Network Maintenance

Asset Condition Survey Program

The Company continued its second asset condition survey in 2018/19.

Asset Condition Survey	Proposed 2017/18	Actual 2017/18
Hautapu A&B	3rd Survey	1 of 1 module completed
Leamington	2nd Survey	35 of 35 modules completed
Paterangi	2nd Survey	40 of 40 modules completed
Hairini	2nd Survey	12 of 12 modules completed
Mystery Creek	2nd Survey	18 of 18 modules completed
Te Awamutu West	2nd Survey	0 of 12 modules completed
Pirongia	2nd Survey	15 of 28 modules completed
Pukeatua	2nd Survey	48 of 48 modules completed
Te Awamutu East	2nd Survey	0 of 17 modules completed

The backlog of the network survey has been assessed in November 2017, and a defects action plan proposed to the Board to employ an additional staff member to progress the network survey. It is expected with the additional resource that the significant backlog of feeder modules to be surveyed will be eliminated within 4 years. The FY2018/19 survey work completed 121% of the required surveys to achieve this target, as shown in the graph below.



The following table shows the number of outstanding 11kV and 400V defects remaining on distribution assets as at 31 March 2018.

Asset Defects	Total as at 31 March 2019
Balance	881
11kV remaining	809
400V remaining	72

The number of defects has increased significantly during 2018/19, due to the accelerated progress on asset surveying, resulting in more defects being identified.

Earth Testing and Repair Programme

Progress against targets for Waipa's 2018/19 earth testing and repair program is shown in the following table.

Earth Testing and Repair	Proposed 2017/18	Actual 2017/18
Mystery Creek	2nd Test & Repair	17 of 18 modules completed
Hairini	2nd Test & Repair	10 of 11 modules completed
Te Awamutu West	2nd Test & Repair	11 of 12 modules completed
Pirongia	2nd Test & Repair	18 of 28 modules completed
Pukeatua	2nd Test & Repair	41 of 48 modules completed
Te Awamutu East	2nd Test & Repair	16 of 17 modules completed
Pencarrow	2nd Test & Repair	28 of 29 modules completed
French Pass	2nd Test & Repair	14 of 45 modules completed
Tamahere	2nd Test & Repair	13 of 13 modules completed

Waipa completed 57% of its earth testing and repair program for 2018/19 by engaging an external resource. Where a small number of modules remain on a feeder, this means that all testing has been completed and a small number of earth repairs remain for completion. Focus in FY2019/20 has been to close out the outstanding repairs as well as complete the earth testing programme.

Vegetation Management Programme

Progress against targets for Waipa's vegetation programme is shown in the following table. The tree legislation requiring EDBs to offer tree owners a 1st free cut then on the second cut the landowner meets the costs has resulted in an increasing number of trees being declared "no interest" by landowners on the second cut. At that point Waipa has a preference to completely remove the tree at our cost to avoid future issues rather than trimming the tree. The cost and time taken to remove a tree exceeds that taken to trim it and reduces the amount of network that can be cleared of trees without an increase in resources.

Removal has proven to be more costly and time consuming than trimming. However, the Company believes vegetation removal is a better long-term solution for improving network reliability.

Vegetation Management	Proposed 2017/18	Actual 2017/18
Tamahere	Cut 5	5 of 15 modules completed
KioKio/Waikeria	Cut 3	47 of 47 modules completed
Paterangi	Cut 2	40 of 40 modules completed

Pokuru	Cut 3	32 of 41 modules completed
Pencarrow	Cut 5	8 of 27 modules completed
French Pass	Cut 4	45of 45 modules completed
Kawhia (half of feeder)	Cut 3	0 of 25 modules completed
Pirongia	Cut 2	28 of 28 modules completed

A total of 94 modules were completed, 59% of the programme including carry-over from the previous year. Some external resource was contracted to assist in the programme, and 92% of the Vegetation Management budget was spent.

It is clear from experience over three years with the new rotation programme, that there is more vegetation maintenance required than we have budget or resources for. There is a combination of reactive trimming on other-than-programmed feeders, and more trimming on the programmed feeders than originally estimated. Hence the AMP programme is revised from the 2020/21 year to a six-year rotational trim. The AMP programme has been updated with this in the 2020 AMP, refer to Appendix E.

Financial Progress

The following table shows actual financial performance KPI over the past three years compared to Statement of Corporate Intent targets set for 2019/20.

	Actual 2016/17	**Actual 2017/18**	**Actual 2018/19**	**Target 2019/20**
Total Operational Expenditure per ICP	85	85	104	100

Waipa's financial business efficiency KPI slightly exceeded the target in 2018/19.

9.2 Service Level and Asset Performance

Customer Satisfaction Performance

The July 2017 consumer survey indicated an overall satisfaction rating of 97% (Target 95%). The results for length of shutdowns were 91% (Target 90%) and number of shutdowns was 91% (Target 90%).

These results include those who responded with "No Opinion" or Don't Know", which in the case of supply quality the Company believes to equate to satisfaction.

Waipa achieved all the customer satisfaction targets.

Reliability Performance

Waipa's actual SAIDI and SAIFI performance over the past three years compared with the Commerce Commission reliability threshold levels of 215 SAIDI minutes and 2.33 SAIFI (based on the average of the last five years performance plus one standard deviation) is shown in the following table.

Network Reliability Performance Indices	Actual 2016/17	Actual 2017/18	Actual 2018/19
SAIDI total	204	217	168
SAIFI total	1.86	1.81	1.37

Waipa achieved the reliability target for SAIDI and SAIFI for 2018/19.

Asset Delivery Performance

The following table shows actual asset delivery performance over the past three years compared to Statement of Corporate Intent target of <6.5% set for 2018/19.

Asset Delivery Efficiency Performance %	Actual 2016/17	Actual 2017/18	Actual 2018/19
Loss Ratio	5.45	5.09	5.48

Waipa's loss ratio asset delivery KPI was achieved in 2018/19.

9.3 Gap Analysis and Identification of Improvement Initiatives

Security

Waipa's objective of establishing n-1 security of supply for Te Awamutu GXP set in AMP 2013 was achieved in July 2016.

Waipa's objective of establishing n-1 security of supply for Cambridge GXP is forecast to be achieved in 2024. The strategic project Cambridge GXP Capacity Solution is intended to achieve this objective.

Non-Network Solutions

The Cambridge Non-network Capacity Support project is forecast to support Cambridge GXP capacity from 2020 to 2025.

Asset Defects

The Company is on track to complete the defects response plan approved by the Board in November 2017, with the intention of eliminating the network survey backlog within four years. Progress to date in 2019/20 has fallen behind the network survey scope required per annum to achieve this due to staff changes and the need to train new staff. This is expected to be recovered in 2020/21.

Earth Testing and Repair

Waipa completed only 57% of its earth testing and repair program for 2018/19, with external resources used to complete testing and repair works due to internal resources being already committed.

Vegetation Management

The Company completed only 59% of its vegetation management program for 2018/19 due to the budget being insufficient to trim the entire programme. Spending on vegetation management was 92% of the annual budget, with the shortfall due to difficulty in recruiting trained arborists.

Financial Performance

Waipa's financial business efficiency KPI Total Operational Expenditure per ICP for 2018/19 was not achieved. This is because of staffing increases and expenditure on consultants to investigate alternative solutions to the Cambridge GXP capacity issue.

Customer Satisfaction - Service Level and Asset Performance

The Company achieved Overall Satisfaction, Number of Outages and Length of Outages targets for 2018/19/18.

Reliability

Waipa achieved its reliability target for SAIDI and SAIFI in 2018/19.

Asset Delivery Performance

The Company's asset delivery KPIs for 2018/19 for Loss Ratio was achieved.

Constraints

The Company's objective of eliminating predicted feeder constraints were achieved by the timely implementation of network feeder enhancements identified in the network development projects of previous AMPs.

Quality of Supply

Voltage

Waipa's obligation to ensure regulatory voltage can be delivered was achieved by the timely implementation of network feeder enhancements identified in the network development programme of previous AMPs and the timely installation of voltage regulators. Waipa also acts promptly to resolve proven voltage complaints received from consumers.

Power Factor

The Company's network power factor has been greater than 0.95 (lagging) at times when Transpower has experienced its 100 Lower North Island peaks and when Waipa has incurred its 12 anytime maximum demands.

Interference

Waipa has received one complaint of interference from the Te Awamutu cinema, which was experiencing equipment damage related to total harmonic distortion. Waipa's investigation found that the issue was internal, and no further complaints have been received.

AMP Improvements

Asset Management Process

Waipa is confident that its:

- commitment to improve network safety and reliability,
- predictions on load growth,
- procedures to identify future network constraints and
- routine network assets surveys,

will provide the Company with adequate information to make appropriate asset management decisions regarding existing assets, non-asset solutions, additional asset and surplus assets.

The Company believes that further development of asset management systems and asset data will assist in making these asset management decisions, in particular further work is required in developing asset condition data, asset health indicators and forecasts of network equipment renewal expenditure. Planning to implement asset management process improvements commenced in 2018/19, with an external review of asset management practices. This resulted in the formulation of an Asset Management Improvement Plan (AMIP) to identify and prioritise areas for improvement.

Specific asset management improvements selected for implementation include:

Process and Systems:

- Further external stakeholder communication (as outlined in this AMP).
- Document key asset management processes (Asset Planning, Life cycle, AMP).)
- Complete Information Systems Strategic Plan (ISSP).)
- Continue review of contracting processes.
- Introduce a system for managing network load and voltage data to assist in network analysis (Completed 2019/20).

Reliability:

- Discuss the key components of a reliability plan and review the number of car-versus pole and third-party hits on the network including public education.
- Discuss guidance for coding adverse weather and unknown faults to maximise the data for analysis.
- Discuss reliability improvements due to automated devices being installed on the network and the reliability expected.
- Investigate optimising reliability-based maintenance and replacement spend.

Development

- Discuss a high-level capital planning process.
- Confirm the place of economic assessment and risk management approach to optimise growth capital for GXP development (Completed in 2019/20).
- Include regional growth forecasts and develop high, medium and low growth forecasts (In progress).
- Further develop point of supply plans (Cambridge GXP completed, Te Awamutu planned for 2020/21).

Maintenance and Replacement

- Complete the asset health indicators for all assets (Completed in 2019/20 based on age profiles and limited actual condition assessment).
- Develop simple fleet management plans.
- Document re-inspection processes for defects beyond their defect period.
- Discuss additional workforce if required for higher priority defects.

Asset Management Systems

Waipa believes that the asset management systems listed here have some drawbacks, namely they are discrete and unconnected systems and require manual interventions by staff and multiple data entries to update information:

- Abbey SCADA system,
- AutoCAD Geographic Asset Information system,
- Napier Computer Integrated Data Warehouse system and

- ETAP network modelling software.

Waipa intends to review its asset management process and systems to determine what gaps in functionality exist, and to prioritise new systems in order to match the information system capabilities to the requirements of:

- the size of the network,
- Company financial and administrative business needs,
- good practice in asset management,
- consumer needs and
- other stakeholders' requirements.

Formulation of an Information Systems Strategic Plan is underway. However, it is likely that Waipa Networks will proceed to implementing a Geographical Information System (GIS) to replace the current system of geographically based AutoCAD drawings for network assets. This will allow better asset data to be retained for network assets and greater levels of asset-based analysis to be achieved using the database structure related to the GIS. Combined with this will be a Milsoft Advanced Distribution Management System (ADMS) that will allow a single network model to be developed between the GIS, SCADA and network analysis (e.g. load flow and fault level analysis). Also provided by the ADMS will be improved faults dispatch, automated calculation of reliability statistics and improved customer records. Following on from the GIS and AMDS project would be an asset management system to manage network asset data and assist in forecasting renewal expenditure for all asset classes based on age and condition. A timeline for the ISSP and these projects will be determined in the coming year.

Stakeholders Input

Waipa welcomes any stakeholder feedback on the quality, clarity and completeness of its AMP. To date feedback has been received from Fonterra, engineering consultants and contractors who are interested in becoming involved in some of the projects and the Commerce Commission (or their agents). Waipa Networks continues to monitor input from the Commerce Commission regarding asset management practice, and seeks to implement improvements in line with this guidance over time.

10.0 Expenditure Forecasts, Reconciliations and Assumptions

10.1 Expenditure Forecast

Appendices H and I shows Waipa's Capital Expenditure projects and forecasts proposed over the next 10 years.

Appendix J shows the Company's Operational Expenditure forecasts proposed over the next 10 years.

10.2 Reconciliations

Appendix K shows the Company's Capital and Operational Expenditure Reconciliations for 2018/19/18.

Capital Expenditure

Waipa's materiality threshold is 10% for capital expenditure on any category of networks assets capital expenditure exceeding $250,000. Material projects are also those that span multiple years.

Projects are not normally individually identified for capital expenditure of less than $50k (with the exception of relay additions driven by customer connections and discreet assets types of disconnectors and drop out fuses) or niche engineering projects.).

Capital Expenditure on network assets was $6,052k which was $2,175k (26%) below the forecast of $8,227k set for the disclosure year (March 2019). This was due to an underspend on customer connection, system growth (deferral of a cable replacement project and voltage regulators) and underspend on quality of supply (reduce spend on remote controlled switches). Asset replacement and renewal was overspent compared to forecast due to higher renewal of transformers, switchgear and overhead lines.

System Growth: Expenditure was $222k which was 86% below the forecast of $1,642k. Expenditure covered a range of asset classes including distribution and LV circuits, transformers, fuses and switches. Projects to upgrade GXP cables and install new voltage regulators and capacitors were deferred due to a lack of resource. Less was spent on transformer enhancements, communications and SCADA than budgeted.

Asset Replacement and Renewal: Expenditure was $1,239k which was 108% above the forecast of $597k. Expenditure covered a range of asset classes including distribution and LV circuits, transformers, fuses, and switches. Replacement of transformers, fuses, reclosers, ring main units and switches was a major contributor to the increased expenditure.

Asset Relocation: Expenditure was $190k which exceeded forecast of $97k by $93k (96%) due to Local Council and NZTA road redevelopment and deviations.

Reliability, Safety and Environment (Quality of Supply): Expenditure was $857k which was below the forecast of $1,506k by $649k (43%). The project to install remote controlled switches in the network did not complete the majority of the annual scope, contributing to the underspend. A project to install a new cable to improve reliability to line-end feeder sections required less expenditure than budgeted.

Reliability, Safety and Environment (Other Reliability, Safety and Environment): Expenditure was $227k which was below the forecast of $519k by $292k (56%). This included replacing two pole substations, fusing spurs and services and undergrounding road crossings. The under expenditure was because the programme of replacing two pole substations was not completed due to focus on customer connection work and defect maintenance.
Expenditure on Non-Network Assets: Annual budget $105k, actual expenditure was $313k (198%). Three new vehicles were purchased, the budget only allowed for one vehicle ($150k versus budget of

$50k). Tools expenditure of $78k exceeded budget of $5k, due to one-off expenditure on GPS data loggers for line design and a protection relay test set.

Operational Expenditure

Overall Operational Expenditure was $8,018k which was $718k (10%) above forecast of $7,300k set for the disclosure year (March 2019). Additional expenditure of $353k was incurred in the Service Interruptions and Emergencies category due to more faults than usual and above average reactive maintenance, in particular irrecoverable car accidents. Asset replacement and renewal was overspent by $146k, resulting from increased spending on transformer, recloser and pillar box maintenance. Non-network operational expenditure was above forecast by 266k, this was due to higher expenditure on SCADA and switching, staff costs in Network Planning and consultants.

Service Interruptions and Emergencies: Expenditure was $1,043k which exceeded the forecast of $690k by $353k (51%) due to increased expenditure on faults and above average reactive maintenance, including irrecoverable car accidents causing damage.

Vegetation Management: Expenditure of $941k was below the forecast of $1,003k by $62k (6%) due a small shortfall in resources (unavailability of staff).

Routine and Corrective Maintenance and Inspection: Expenditure of $1,097k was above the forecast of $1,082k by $15k (1%) due to increased earth testing and repairs and proactive 11kV maintenance.

Asset Replacement and Renewal: Expenditure of $680k exceeded the forecast of $534k by $146k (27%) due to more maintenance on transformers, reclosers and pillar boxes.

Network Operational Expenditure: Expenditure was $3,761k which was 14% above forecast of $3,309k.

Non-Network Operational Expenditure: Expenditure was $4,257k which was 7% above forecast of $3,991k.

10.3 AMP Assumptions

A number of significant assumptions have been made in order to determine likely outcomes of Waipa's AMP. The key factors, assumptions, the basis on which they are made and the impact of their uncertainty is discussed in the following table.

Factor	Assumption	Basis for the Assumption	Potential Impact of Uncertainty	Potential Risk of Uncertainty
Legislative Environment Legislative and regulatory requirements could change, requiring the Company to achieve different service, design or security standards. Regulatory changes could also impact on the availability of funds for asset management.	The existing external legislative and regulatory requirements are assumed to remain unchanged throughout the planning period. Therefore, the external drivers which influence reliability targets, design, environmental, health and safety standards and industry codes of practice are assumed not to change.	Although the industry's regulatory and legislative environment has and will continually change the Company has no ability to predict future changes in regulatory requirements.	It is unlikely that the legislative and regulatory requirements will reduce. The most likely impact is an increase in forecast expenditure to meet increased overheads which will add costs with potentially no consumer benefits. It is not possible to quantify this potential impact.	High Probability Medium Impact
Business Ownership Waipa's ownership could change. New owners may have different service and financial objectives than those set out in this AMP.	For the purposes of this AMP it is assumed that Waipa will remain in Trust ownership. The thrust of Waipa's Vision and Mission continues for the planning period.	No changes are proposed to the existing ownership of Waipa and therefore all prospective information has been prepared consistent with the existing Waipa business ownership, structure and purpose Waipa's strategic planning documents, including the 2019/2019 Statement of Corporate Intent and the 2018/2019 Annual Business Plan and Budgets.	Different owners could have different service and expenditure objectives than those set out in the AMP, resulting in either higher or lower service targets and associated expenditures. Different owners could change development and maintenance requirements currently practiced which could impact on forecast expenditure.	Low Probability High Impact
Price/Quality Trade Off Connected consumers could change their demands for reliability or quality of supply or their willingness to pay for different levels of service.	Future levels of customer satisfaction and willingness to pay for improved reliability and quality of supply are consistent with those identified by customer surveys since 1996.	Interaction with customers and the community in relation to future developments within Waipa's network area. Bi-annual Waipa Customer Surveys (1996–2007) and annual Waipa Customer Surveys (2009-2018).	Customers could change their demands for service and willingness to pay resulting in either higher or lower service targets and associated expenditures.	Low Probability Medium Impact
Load Growth The magnitude of Waipa's underlying load (made up of predominately dairy, supporting industry and farming community) is expected to change over the planning period but the extent is not known with certainty. Connected consumers load patterns could change by the use of heat-pumps for example resulting in a movement from traditional winter peaks to higher summer peaks. Significant new loads not yet identified may require supply within the planning period of this AMP These drivers will affect the timing of network enhancements.	Underlying demand growth at each GXP is predicted to continue throughout the planning period at a rate consistent with the historical rate of growth. Dairy load will remain dominant in the region. Seasonal load profiles remain consistent with recent historical trends. The number of new consumers connecting to Waipa's network is predicted to continue at a similar level to historical rates over the planning period. Development of distributed generation is slow and its impact on network peaks is minimal.	These assumptions were made by analysing historical half-hourly maximum electricity demand at each GXP (excluding Fonterra), historical half-hourly maximum electricity demand on each feeder from Waipa's SCADA, population data and demographic forecasts from Statistics New Zealand Distributed generation is likely to be small PV in the Waikato due to poor wind resource. PV remains expensive but with falling prices, an increasing number are connecting, albeit off a low base. PV is not coincident with the network peak.	Higher demands require greater capacity across the system earlier than projected, requiring an acceleration of forecast expenditure. Seasonal shifts in demand could require planned capacity upgrades to be accelerated. The rate of new connections will impact on demand growth. Specific new investments may also be required to meet large new loads. Cost reflective pricing including TOU components may be necessary to send appropriate price signals to consumers.	Low Probability Medium Impact

Factor	Assumption	Basis for the Assumption	Potential Impact of Uncertainty	Potential Risk of Uncertainty
Hazard Management It is recognised that some network assets are inherently hazardous. The Regulator and Company stakeholders may alter their views on the importance and value of mitigating hazards presented by network assets. Regulator opposition to live line work methods may result in increased levels of planned outages to complete work de-energised.	The Company and Stakeholders want a network that does not present an unacceptable level of exposure to hazards to the general public, staff, property or animals. The network was originally designed and built to minimise exposure to these inherent hazards. The Company will readily identify new hazards as they arise. Waipa will not operate in a way that exposes the business to the liabilities associated with not taking all practicable steps to minimise and eliminate hazards.	The hazard assumption is based on people not wanting to get shocked or electrocuted or harmed – the human instinct of self-preservation. Waipa has renewal maintenance programmes in place to ensure that it operates a network with acceptable low levels of exposure to hazards. Waipa has identified a number of potentially significant hazardous assets on its network and has scheduled their removal. Waipa has on-going plans to monitor and reduce minor network hazards over the planning period.	Altering the importance of eliminating or mitigating exposure to hazardous assets will affect the amount of work and expenditure in the AMP Altering the importance of eliminating or mitigating exposure to hazardous assets will impact on the risk of injury or damage. Planned SAIDI would increase if live line work is restricted or banned. Customer complaints may increase as a result.	Low Probability High Impact
Mass Premature Failure Similarly, manufactured assets generally have similar life expectancies. If a significant group of similar assets fail prematurely this will impact on Waipa's asset renewal strategy.	Forecasts for the remaining life of assets are correct and mass premature failure of similar assets does not occur.	Any known group of assets that fail prematurely have been identified for remedial action or removal. The extent of unknown groups of assets that are going to fail prematurely in future is impossible to predict. Waipa uses only tried and proven assets, adopting a "leading edge, not bleeding edge" approach to new technologies.	If a significant group of widely used assets fail prematurely, they may have a significant impact on the reliability of the network.	Low Probability High Impact
Grid Catastrophe Waipa's network and/or Transpower's local Grid could experience a major natural disaster during the planning period.	Neither Waipa's network nor Transpower's local Grid will experience a major natural disaster during the planning period.	As described in Section 8.1 Disaster Risk Assessment Methodology, the Company has assessed the potential physical threats to its network posed by naturally occurring hazards of wind, lightning, floods, land erosion, earthquakes, volcanic eruptions, tsunami, geothermal activity and adverse weather and concluded that the network is built in a benign region.	High volume equipment repairs and replacements are not provided for.	Low Probability High Impact
Local Body Requirements Changes in the District Plans could require Waipa to alter its current reticulation practices (example installing new rural circuits underground rather than reticulating overhead)	Waipa assumes that current District Plans will not change significantly as to the Company's method of reticulation.	Local Body District Plans have been relatively stable over the past 10 years regarding reticulation practices. Changes are notified with the ability for Waipa to make submissions on proposed changes.	Changes are likely to result in higher costs for the Company and consumers.	Low Probability Medium Impact

Factor	Assumption	Basis for the Assumption	Potential Impact of Uncertainty	Potential Risk of Uncertainty
Inflation / Value of NZ dollar The value of the New Zealand Dollar and the cost of procuring resources are almost certain to change over the planning period.	All projections of expenditure are presented in real New Zealand Dollar terms as at 1 April 2019. In reality, over time input costs (including those sourced from outside New Zealand) for asset management activities will change at rates greater or less than the rate of general inflation.	As expenditure forecasts are updated annually, this approach is assumed acceptable and consistent with that prescribed. Experience of times when high copper and steel commodity prices in international markets pushing up equipment costs at a rate above NZ inflation. Inflation is expected to remain at moderate levels as required by the Reserve Bank.	Forward estimates are based without an inflation rate. Inflation will mean higher costs in dollar terms. Deflation will give the reverse. (The inflation referred to is that associated with the renewal and construction of distribution networks, not general inflation.	Medium Probability Medium Impact
Demand Side Management Significant demand side management may be commissioned or decommissioned in Waipa's network. This would impact on network design and timing of network enhancements.	No new significant demand side management is commissioned or decommissioned during the planning period.	There is no evidence of significant future customer demand side management initiatives being commissioned or decommissioned.	Changes to significant demand side management will impact on network design and timing of network enhancements. .	Low Probability Low Impact
Distributed Generation Significant distributed generation may be commissioned or decommissioned in Waipa's network. This would impact on network design and timing of network enhancements.	No new significant demand side management or significant distributed generation is commissioned or decommissioned during the planning period.	There has been only one application for significant hydro distributed generation within the last 5 years which did not eventuate. All other distributed generation commissioned have been small photo-voltaic installations behind the meter.	Changes to significant distributed generation will impact on network design and timing of network enhancements. Network enhancement to accommodate distributed generation will be funded by proponents.	Medium Probability Medium Impact
Land Use The District Councils may implement significant land zoning changes which could have a positive or negative impact on new developments in the region.	District Council zoning land use remains unchanged during the planning period.	Waipa, Otorohanga and Waitomo District Councils and the Waikato Regional Council planning information.	Land use zoning changes will impact either positively or negatively on new developments and demand. Network enhancement to accommodate distributed generation will be funded by developers.	Medium Probability Low Impact

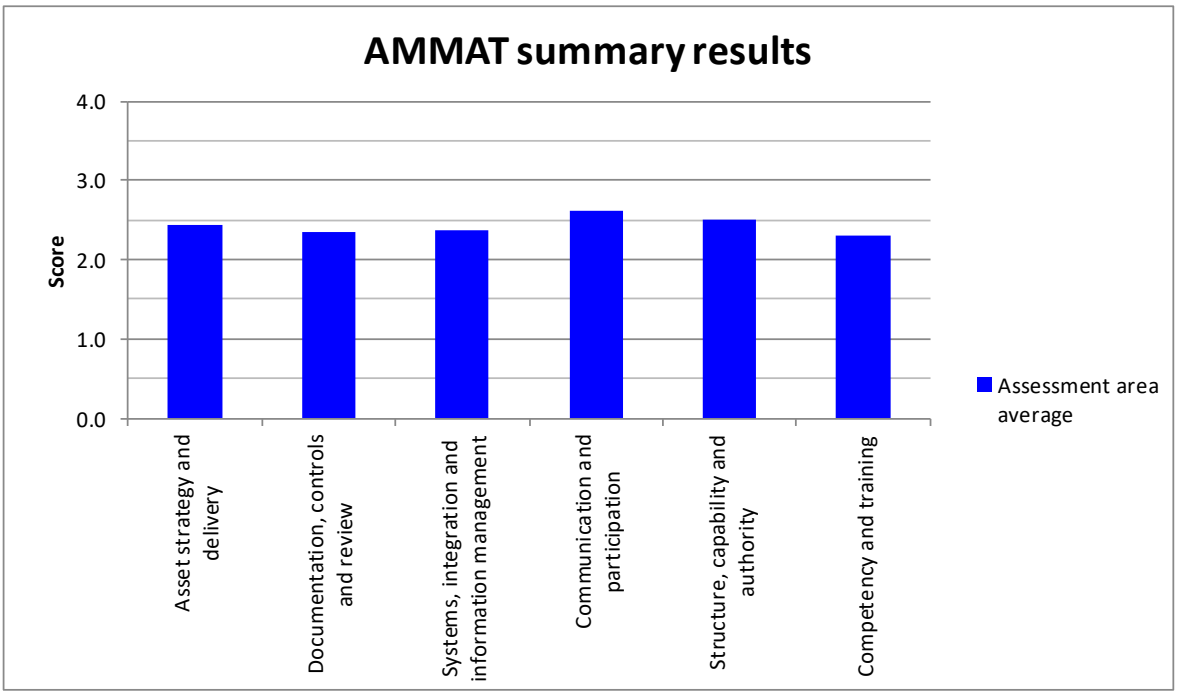
10.4 Changes Proposed where Information is not based on Existing Business

No changes are proposed to the existing business of Waipa. Therefore, all prospective information has been prepared consistent with the existing Waipa business ownership, structure and objectives.

11.0 Asset Management Maturity Assessment

In 2018/19 Waipa completed a fourth assessment of its asset management processes in accordance with the AMMAT in Schedule 13: Report on Asset Management Maturity attached. No update was made in 2019/20 because only minor changes in asset management practices have been implemented.

The following graph shows the Company's performance as determined by the AMMAT in 2018/19. Increases in scores have resulted for Asset strategy and delivery, Documentation, controls and review, Communication and participation, Structure, capability and authority and Competency and training. The score for Systems, integration and information management reduced.



Waipa considers its current asset management processes are in general adequate for its stakeholder's requirements and are provided at a cost acceptable to them. That said, there are areas identified within the AMMAT results that illustrate potential for improvement that would be of benefit to Waipa's asset management practice. An Asset Management Improvement Plan has been formulated, and action plans will be implemented over the next several years to put in place enhancements to asset management practices and systems and lift selected AMMAT scores.

12.0 Conclusion

Waipa believes its asset management process, predictions on load growth, procedures to identify future network constraints and routine network assets surveys will enable the Company to make informed asset management decisions regarding existing assets, non-asset solutions, procuring new assets and retiring assets.

The Company believes that further development of asset management systems and asset data will assist in making future asset management decisions. In particular, further work is required in developing asset condition data, asset health indicators and forecasts of network equipment renewal expenditure. Planning to implement these asset management process improvements will commence in 2019/20. Waipa intends to review the adequacy of the asset management information systems to determine priorities to enhance and update these systems in future.

Waipa is confident that its:

- commitment to provide appropriate levels of security of supply to Cambridge and Te Awamutu,
- commitment to continually improve network reliability,
- proposed network development plans and
- life cycle management of existing assets,

over the next 10 years will preserve the value of the network for the Company's shareholders and will provide our connected consumers and public with a network which has capacity for growth, is secure, reliable and safe.

13.0 APPENDICES

Appendix A: Network Feeder Asset Attributes (as at 31 March 2017)

Appendix B: Voltage Regulator Programme

Appendix C: Automated Open Point Switches Programme and Recloser Renewal Programme

Appendix D: Visual Asset Condition Survey Programme

Appendix E: Vegetation Management Programme

Appendix F: Earth Testing and Repair Programme

Appendix G: Asset Age Profile

Appendix H: Capital Works

Appendix I: Capital Expenditure Forecast

Appendix J: Operational Expenditure Forecast

Appendix K: Capital and Operational Expenditure Reconciliations for 2016/2017

Appendix A: Network Feeder Asset Attributes (as at 31 March 2019)

TPNZ CB	Feeder type	Waipa Feeder Assets	Total 11kV km	Overhead 11kV km	Underground 11kV km	Total 400V km	Overhead 400V km	Underground 400V km	Number concrete poles	Number wooden poles	Number transformers	Transformer capacity kVA
C2702	rural	Roto-O-Rangi	93.94	83.69	10.25	52.26	28.96	23.30	1,329	224	212	11,870
C2712	urban	Cambridge North	11.61	0.53	11.08	17.97	0.45	17.52	16	1	27	6,460
C2722	urban	Cambridge Town	11.21	3.44	7.78	19.63	4.77	14.86	173	30	47	13,750
C2732	rural	Kaipaki	42.03	35.96	6.07	26.21	17.56	8.64	620	69	137	14,891
C2742	rural	Pencarrow	50.48	37.31	13.17	36.76	15.33	21.44	688	65	189	16,121
C2762	urban	Hautapu A	7.05	5.99	1.06	0.08	0.00	0.08	44	1	1	30
C2772	rural	French Pass	96.20	87.44	8.76	44.72	30.24	14.48	1,266	239	262	12,884
C2802	urban	Leamington	20.93	11.64	9.29	41.88	14.95	26.93	396	101	58	11,280
C2812	urban	Hautapu B	7.64	5.86	1.78	0.00	0.00	0.00	42	0	-	-
C2832	urban	Cambridge East	14.57	6.53	8.03	37.95	16.04	21.91	391	137	35	8,000
C2842	rural	Tamahere	34.14	25.50	8.64	22.70	10.40	12.29	448	71	115	8,396
C2852	urban	St Kilda	2.97	0.00	2.97	7.91	0.00	7.91	0	0	148	10,187
C2862	rural	Monavale	45.74	34.47	11.27	27.64	10.73	16.91	589	32	164	14,125
		Subtotal	438.51	338.36	100.15	335.72	149.43	186.29	6,002	970	1,395	127,994
T0022	rural	Kawhia	198.56	195.44	3.12	54.46	43.19	11.27	2,368	178	298	12,018
T0023	rural	Kio Kio / Waikeria	111.49	108.86	2.63	42.86	37.74	5.12	1,736	13	275	14,798
T0024	urban	Te Awamutu West	20.50	14.85	5.65	51.95	24.22	27.73	452	91	67	10,325
T0025	rural	Pirongia	64.84	59.67	5.18	49.02	29.74	19.27	985	41	170	11,166
T2762	rural	Pukeatua	140.17	135.54	4.63	49.57	45.38	4.19	2,203	34	330	15,371
T0027	rural	Paterangi	104.82	103.08	1.74	50.27	44.98	5.29	1,760	25	260	12,042
T2742	rural	Kihikihi	40.76	37.94	2.82	43.88	31.33	12.54	948	88	112	10,435
T2752	rural	Mystery Creek	42.18	40.97	1.20	21.61	18.17	3.44	699	21	105	6,595
T0026	urban	Hairini	28.44	23.18	5.26	35.48	15.18	20	468	46	85	12,125
T2782	urban	Fonterra A	2.00	0.00	2.00	0.00	0.00	0.00	-	-	-	-
T2802	urban	Fonterra B	2.04	0.00	2.04	0.00	0.00	0.00	-	-	-	-
T2822	rural	Ohaupo	40.99	38.89	2.10	28.52	21.42	7.10	771	13	106	7,390
T2832	urban	Te Awamutu East	6.06	3.24	2.82	16.61	4.33	12.29	107	38	27	8,000
T2842	rural	Pokuru	129.45	128.68	0.77	43.75	42.10	1.66	1,971	24	295	14,080
		Subtotal	932.28	890.33	41.96	487.99	357.79	130.20	14,468	612	2,130	134,345
		Total	1,370.79	1,228.69	142.10	823.71	507.22	316.49	20,470	1,582	3,525	262,338

Appendix B: Voltage Regulator Programme

TPNZ CB	Feeder Type	Waipa Feeder Asset	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/2028	2028/29	2029/30
C2702	rural	Roto-O-Rangi	300A VR & 1 Cap									
C2712	urban	Cambridge North										
C2722	urban	Cambridge Town										
C2862	rural	Monavale										
C2742	rural	Pencarrow	750kVAr Cap									
C2762	urban	Hautapu A										
C2772	rural	French Pass		200A VR 1 Cap								
C2802	urban	Leamington	300A VR									
C2812	urban	Hautapu B										
C2832	urban	Cambridge East										
C2842	rural	Tamahere										
C2852	urban	St Kilda										
C2732	rural	Kaipaki	200A VR									
T0022	rural	Kawhia										
T0023	rural	Kio Kio / Waikeria	2 x 300A VR McAndrew St VR25 Upgrade Waikeria									
T0024	urban	Te Awamutu West										
T0025	rural	Pirongia										
T0026	urban	Hairini										
T0027	rural	Paterangi										
T2742	rural	Kihikihi										
T2752	rural	Mystery Creek										
T2762	rural	Pukeatua	VR12 Upgrade 1 Cap									
T2782	urban	Fonterra A										
T2802	urban	Fonterra B										
T2822	rural	Ohaupo										
T2832	urban	Te Awamutu East										
T2842	rural	Pokuru										
		Unallocated			300A VR		300A VR		300A VR		300A VR	
	Cost	$k per unit	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/2028	2028/29	2029/30
	150A VR	150										
	200A VR	161	206	161								
	300A VR	412	824		412		412		412		412	
	New 2 pole structure 200A	9	36	46	46	46	18					
	New 2 pole structure 300A	9										
	Fixed Capacitor	33	99	33								
	Switched Capacitor											
	Controller, SA Spares	39			39							
		Total $k AMP	1,165	239	497	46	430	-	412	-	412	-

Appendix C: Automated Open Point Switches & Recloser Renewal Programme

The Automated Open Point Switches Programme consists of 10 switches at a cost of $570k for 2019/20.

The following table sets out the renewal programme for the Noja recloser fleet, consisting of RC1 to RC10 controller upgrades and complete recloser replacements. This programme focuses on the initial two years of the ten-year period, and will be further updated in AMP 2021.

TPNZ GXP	TPNZ CB	Feeder Type	Waipa Feeder Asset	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/2028	2028/29	2029/30
Cambridge	C2702	rural	Roto-O-Rangi		RC10 Controller								
Cambridge	C2712	urban	Cambridge North										
Cambridge	C2722	urban	Cambridge Town	RC10 Controller									
Cambridge	C2862	rural	Monavale										
Cambridge	C2742	rural	Pencarrow										
Cambridge	C2762	urban	Hautapu A										
Cambridge	C2772	rural	French Pass	RC10 Controller	New Recloser								
Cambridge	C2802	urban	Leamington										
Cambridge	C2812	urban	Hautapu B										
Cambridge	C2832	urban	Cambridge East										
Cambridge	C2842	rural	Tamahere	New Recloser	New Recloser								
Cambridge	C2852	urban	St Kilda										
Cambridge	C2732	rural	Kaipaki										
Te Awamutu	T0022	rural	Kawhia	New Recloser	New Recloser								
Te Awamutu	T0023	rural	Kio Kio / Waikeria	New Recloser	New Recloser								
Te Awamutu	T0024	urban	Te Awamutu West										
Te Awamutu	T0025	rural	Pirongia										
Te Awamutu	T0026	urban	Hairini										
Te Awamutu	T0027	rural	Paterangi		New Recloser								
Te Awamutu	T2742	rural	Kihikihi										
Te Awamutu	T2752	rural	Mystery Creek		New Recloser								
Te Awamutu	T2762	rural	Pukeatua		RC10 Controller								
Te Awamutu	T2782	urban	Fonterra A										
Te Awamutu	T2802	urban	Fonterra B										
Te Awamutu	T2822	rural	Ohaupo	RC10 Controller									
Te Awamutu	T2832	urban	Te Awamutu East	RC10 Controller	RC10 Controller								
Te Awamutu	T2842	rural	Pokuru	New Recloser									
		Cost	$k per unit	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/2028	2028/29	2029/30
		RC1 to RC10	15	60	45								
		New Relcoser	35.5	213	213								
		DDO Isolation	10	40	60								
		Spares	75	75									
			Total $k	388	318	0	0	0	0	0	0	0	0

Appendix D: Visual Asset Condition Survey Programme

TPNZ GXP	TPNZ CB	Feeder Type	Waipa Feeder Asset	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2028/29
Cambridge	C2702	rural	Roto-O-Rangi	3rd								4th	
Cambridge	C2712	urban	Cambridge North			2nd							
Cambridge	C2722	urban	Cambridge Town				3rd						
Cambridge	C2862	rural	Monavale		3rd								4th
Cambridge	C2742	rural	Pencarrow	Carry-over						4th			
Cambridge	C2762	urban	Hautapu A			3rd							
Cambridge	C2772	rural	French Pass							4th			
Cambridge	C2802	urban	Leamington				3rd						
Cambridge	C2812	urban	Hautapu B			3rd							
Cambridge	C2832	urban	Cambridge East				3rd						
Cambridge	C2842	rural	Tamahere	Carry-over						4th			
Cambridge	C2852	urban	St Kilda				1st						
Cambridge	C2732	rural	Kaipaki		3rd								4th
Te Awamutu	T0022	rural	Kawhia	Carry-over							4th		
Te Awamutu	T0023	rural	Kio Kio / Waikeria	3rd								4th	
Te Awamutu	T0024	urban	Te Awamutu West						3rd				
Te Awamutu	T0025	rural	Pirongia						3rd				
Te Awamutu	T0026	urban	Hairini					3rd					
Te Awamutu	T0027	rural	Paterangi				3rd						
Te Awamutu	T2742	rural	Kihikihi		3rd								4th
Te Awamutu	T2752	rural	Mystery Creek					3rd					
Te Awamutu	T2762	rural	Pukeatua					3rd					
Te Awamutu	T2782	urban	Fonterra A										
Te Awamutu	T2802	urban	Fonterra B										
Te Awamutu	T2822	rural	Ohaupo		3rd								4th
Te Awamutu	T2832	urban	Te Awamutu East						3rd				
Te Awamutu	T2842	rural	Pokuru			3rd							
Feeder Length for Asset Condition Survey (km)				190	167	164	128	199	78	172	196	190	167
Budget for Maintenance - Survey Defects ($k)				$ 860	$ 860	$ 860	$ 860	$ 860	$ 860	$ 860	$ 860	$ 860	$ 860

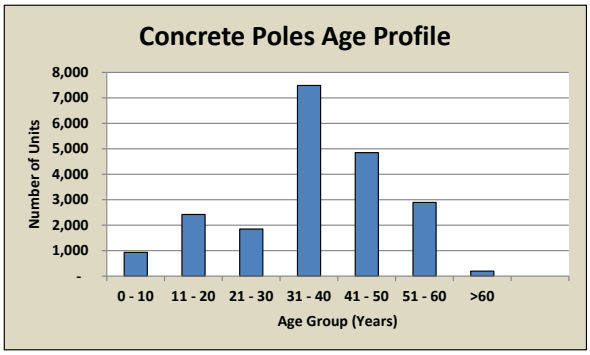
Appendix E: Vegetation Management Programme

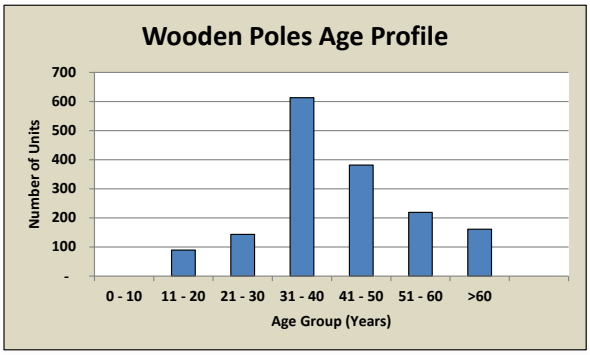
TPNZ GXP	TPNZ CB	Feeder Type	Waipa Feeder Asset	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30
Cambridge	C2702	rural	Roto-O-Rangi		Cut 3						Cut 3		
Cambridge	C2712	urban	Cambridge North			Cut 2							
Cambridge	C2722	urban	Cambridge Town			Cut 3							
Cambridge	C2732	rural	Kaipaki			Cut 3							
Cambridge	C2742	rural	Pencarrow	Carry over Cut 5					Cut 6				
Cambridge	C2762	urban	Hautapu A									Cut 4	
Cambridge	C2772	rural	French Pass	Carry over Cut 4					Cut 5				
Cambridge	C2802	urban	Leamington			Cut 3							
Cambridge	C2812	urban	Hautapu B									Cut 4	
Cambridge	C2832	urban	Cambridge East			Cut 3							
Cambridge	C2842	rural	Tamahere	Carry over Cut 5					Cut 6				
Cambridge	C2852	urban	St Kilda										
Cambridge	C2862	rural	Monavale									Cut 4	
Te Awamutu	T0022	rural	Kawhia	Carry over 0.5 Cut 3	0.5 Cut 3					0.5 Cut 4	0.5 Cut 3		
Te Awamutu	T0023	rural	Kio Kio / Waikeria					Cut 4					
Te Awamutu	T0024	urban	Te Awamutu West									Cut 3	
Te Awamutu	T0025	rural	Pirongia				Cut 3						Cut 4
Te Awamutu	T0026	urban	Hairini			Cut 4							
Te Awamutu	T0027	rural	Paterangi				Cut 3						Cut 4
Te Awamutu	T2742	rural	Kihikihi									Cut 4	
Te Awamutu	T2752	rural	Mystery Creek			Cut 3							
Te Awamutu	T2762	rural	Pukeatua									Cut 4	
Te Awamutu	T2782	urban	Fonterra A										
Te Awamutu	T2802	urban	Fonterra B										
Te Awamutu	T2822	rural	Ohaupo		Cut 3	Cut 3					Cut 4		
Te Awamutu	T2832	urban	Te Awamutu East		Cut 2						Cut 3		
Te Awamutu	T2842	rural	Pokuru					Cut 4					
Feeder Length for Vegetation Management (km)				247	226	164	160	237	150	98	226	171	160
Budget for Vegetation Management ($k)					$ 1,003	$ 1,003	$ 1,003	$ 1,003	$ 1,003	$ 1,003	$ 1,003	$ 1,003	$ 1,003

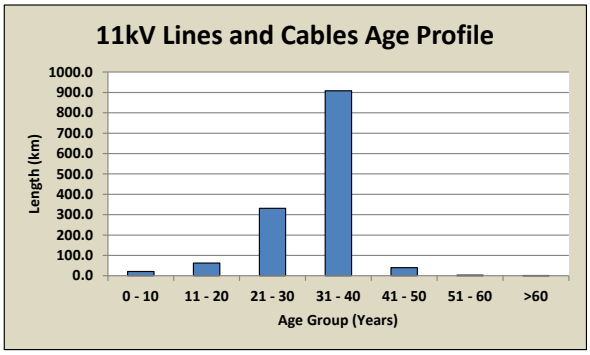
Appendix F: Earth Testing and Repair Programme

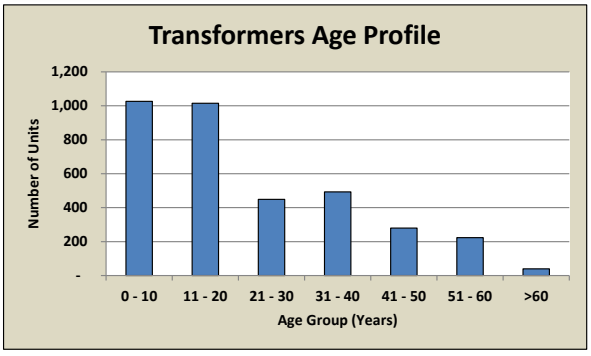
TPNZ GXP	TPNZ CB	Feeder Type	Waipa Feeder Asset	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30
Cambridge	C2702	rural	Roto-O-Rangi	T&R3								T&R4	
Cambridge	C2712	urban	Cambridge North			T&R2							
Cambridge	C2722	urban	Cambridge Town				T&R3						
Cambridge	C2862	rural	Monavale		T&R3								T&R4
Cambridge	C2742	rural	Pencarrow							T&R3			
Cambridge	C2762	urban	Hautapu A			T&R3							
Cambridge	C2772	rural	French Pass							T&R3			
Cambridge	C2802	urban	Leamington				T&R3						
Cambridge	C2812	urban	Hautapu B			T&R3							
Cambridge	C2832	urban	Cambridge East				T&R3						
Cambridge	C2842	rural	Tamahere							T&R3			
Cambridge	C2852	urban	St Kilda				T&R1						
Cambridge	C2732	rural	Kaipaki		T&R3								T&R4
Te Awamutu	T0022	rural	Kawhia								T&R3		
Te Awamutu	T0023	rural	Kio Kio / Waikeria	T&R2								T&R3	
Te Awamutu	T0024	urban	Te Awamutu West						T&R3				
Te Awamutu	T0025	rural	Pirongia						T&R3				
Te Awamutu	T0026	urban	Hairini					T&R3					
Te Awamutu	T0027	rural	Paterangi				T&R3						
Te Awamutu	T2742	rural	Kihikihi		T&R3								T&R4
Te Awamutu	T2752	rural	Mystery Creek					T&R3					
Te Awamutu	T2762	rural	Pukeatua						T&R3				
Te Awamutu	T2782	urban	Fonterra A										
Te Awamutu	T2802	urban	Fonterra B										
Te Awamutu	T2822	rural	Ohaupo		T&R3								T&R4
Te Awamutu	T2832	urban	Te Awamutu East						T&R3				
Te Awamutu	T2842	rural	Pokuru			T&R3							
Feeder Length for Earth Testing (km)				190	129	141	125	176	101	151	196	190	129
Earth Testing & Repair Budget ($k)				$ 191	$ 191	$ 191	$ 191	$ 191	$ 191	$ 191	$ 191	$ 191	$ 191

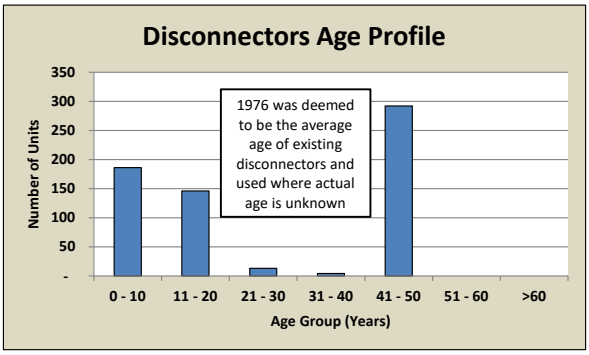
Appendix G: Asset Age Profiles

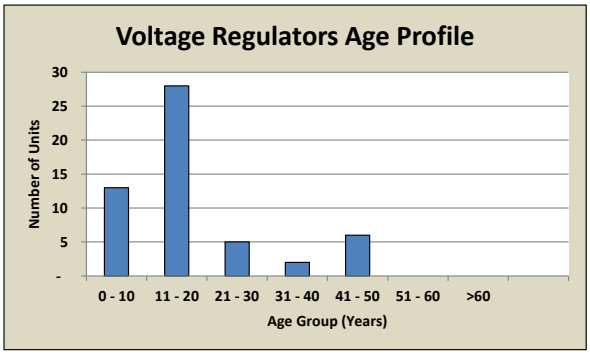


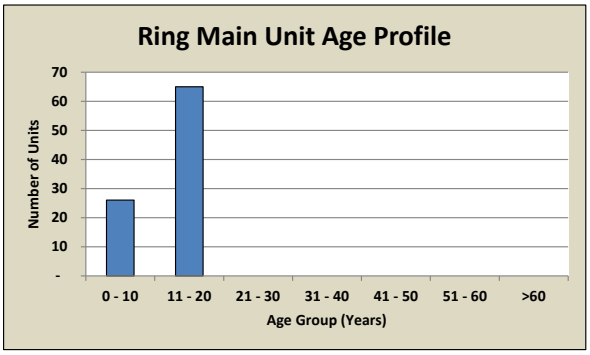


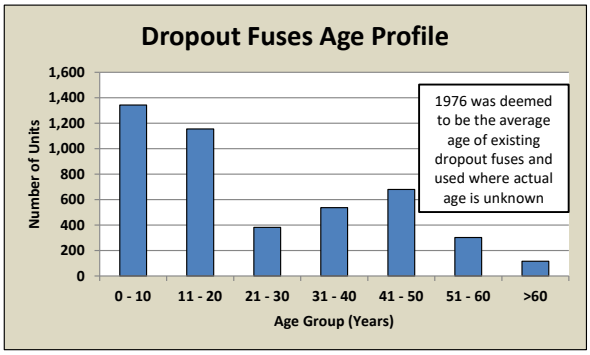


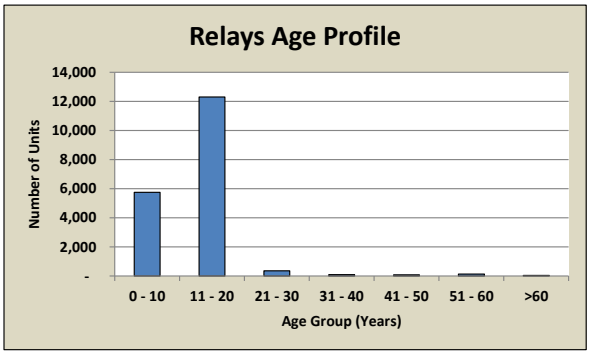












Appendix H: Capital Works

Capital Works	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	AMP Capital Category
General Relays Additions	10	10	10	10	10	10	10	10	10	10	Customer Connections
Transformer & Sub Additions	1,273	1,273	1,273	1,273	1,273	1,273	1,273	1,273	1,273	1,273	Customer Connections
General Extensions	2,252	2,252	2,252	2,252	2,252	2,252	2,252	2,252	2,252	2,252	Customer Connections
Ring Main Unit Switchgear Additions	143	143	143	143	143	143	143	143	143	143	Customer Connections
Disconnector Switchgear Additions	13	13	13	13	13	13	13	13	13	13	Customer Connections
Dropout Fuse Switchgear Additions	47	47	47	47	47	47	47	47	47	47	Customer Connections
Cambridge Non-network Capacity Support	1,403	-	694	694	694	-	-	-	-	-	System Growth
Cambridge West Zone Substation	-	-	-	2,875	4,313	-	-	-	-	-	System Growth
Hautapu Zone Substation	-	-	-	2,556	3,807	-	-	-	-	-	System Growth
Hautapu Zone subtransmission circuits	-	-	-	2,156	3,235	-	-	-	-	-	System Growth
Leamington Zone Substation land	-	46	-	-	-	-	-	-	-	-	System Growth
New Voltage Regulators & Capacitors	1,129	194	451	-	412	-	412	-	412	-	System Growth
Transformer & Sub Enhancements	214	214	214	214	214	214	214	214	214	214	System Growth
Te Awamutu GXP Feeder Cable Upgrade	1,536	-	-	-	-	-	-	-	-	-	System Growth
Replace One Pole Transformers and Sub Structures	455	455	455	455	455	455	455	455	455	455	Asset Replacement & Renewal
Switchgear Replacement Disconnectors	660	660	660	660	660	660	660	660	660	660	Asset Replacement & Renewal
Switchgear Replacement Noja Control Boxes & Reclosers	504	413	413	413	413	-	-	-	-	-	Asset Replacement & Renewal
Replace Ground Mounted Transformer Sub Structures	286	286	286	286	286	286	286	286	286	286	Asset Replacement & Renewal
Replace Te Awamutu Ripple Control Converter	145	-	-	-	-	-	-	-	-	-	Asset Replacement & Renewal
Replace powder type DDOs Te Awamutu	344	344	344	344	344	-	-	-	-	-	Asset Replacement & Renewal
SCADA Remote Engineering Access	32	32	32	32	32	-	-	-	-	-	System Growth
SCADA Improvements - Interface to WEL SCADA	26	-	-	-	-	-	-	-	-	-	System Growth
Comms Network Upgrades	201	97	65	-	-	-	-	-	-	-	System Growth
Install 11kV Dropout Fuses Spurs & Services	117	117	117	117	117	117	117	117	117	117	Quality of Supply
Te Awamutu Ripple Plant RMU alternate supply	787	-	-	-	-	-	-	-	-	-	Quality of Supply
Install Remote Control Switches	570	570	570	570	570	570	570	570	570	570	Quality of Supply
Replace Two Pole Transformers and Sub Structures	390	-	-	-	-	-	-	-	-	-	Other Safety, Reliability & Environment
Network monintoring - St Kilda & Cambridge Park Gridkey	84	32	6	6	6	6	6	6	6	6	Other Safety, Reliability & Environment
Soundproofing Cambridge Ripple Plant Building	13	-	-	-	-	-	-	-	-	-	Other Safety, Reliability & Environment
Siesmic strengthening of VR structures	36	45	45	45	18	-	-	-	-	-	Other Safety, Reliability & Environment
High Load Crossings - underground conversions	65	65	65	65	65	-	-	-	-	-	Other Safety, Reliability & Environment
NZTA & District Council relocations	178	178	178	178	178	178	178	178	178	178	Relocation
Total Capital Budget	12,913	7,486	8,333	15,404	19,557	6,224	6,636	6,224	6,636	6,224	
Motor vehicles, fleet and plant	1,282	350	350	350	350	350	350	350	350	350	
240 Harrison Drive Depot Extension	803	-	-	-	-	-	-	-	-	-	
Office furniture and plant	437	125	125	125	125	125	125	125	125	125	
Computer equipment	59	60	60	60	60	60	60	60	60	60	
Hautapu Dry Type Transformers	131	-	-	-	-	-	-	-	-	-	
Total Non-network Capital	2,712	535	535	535	535	535	535	535	535	535	

Appendix I: Capital Expenditure Forecast

Capital Expenditure Forecast	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30
	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000
Consumer connection	3,738	3,738	3,738	3,738	3,738	3,738	3,738	3,738	3,738	3,738
System growth	4,541	583	1,456	8,527	12,707	214	626	214	626	214
Asset replacement and renewal	2,394	2,158	2,158	2,158	2,158	1,401	1,401	1,401	1,401	1,401
Asset relocations	178	178	178	178	178	178	178	178	178	178
Reliability, safety and environment										
Quality of Supply	1,474	687	687	687	687	687	687	687	687	687
Legislative and regulatory	0	0	0	0	0	0	0	0	0	0
Other Reliability, Safety & Environment	588	142	116	116	89	6	6	6	6	6
Total Reliability, safety and environment	2,062	829	803	803	776	693	693	693	693	693
Expenditure on network assets	12,913	7,486	8,333	15,404	19,557	6,224	6,636	6,224	6,636	6,224
Non-network assets	2,712	535	535	535	535	535	535	535	535	535
Expenditure on assets	15,625	8,021	8,868	15,939	20,092	6,759	7,171	6,759	7,171	6,759

Appendix J: Operational Expenditure Forecast

Operational Expenditure Forecast	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30
Service interruption and emergencies	1,003,000	1,003,000	1,003,000	1,003,000	1,003,000	1,003,000	1,003,000	1,003,000	1,003,000	1,003,000
Vegetation management	1,060,000	1,031,000	1,031,000	1,031,000	1,031,000	1,031,000	1,031,000	1,031,000	1,031,000	1,031,000
Routine and corrective maintenance and inspection	1,478,000	1,632,000	1,632,000	1,666,000	1,632,000	1,632,000	1,666,000	1,632,000	1,632,000	1,666,000
Asset replacement and renewal	621,000	621,000	621,000	621,000	621,000	621,000	621,000	621,000	621,000	621,000
Network Opex	4,162,000	4,287,000	4,287,000	4,321,000	4,287,000	4,287,000	4,321,000	4,287,000	4,287,000	4,321,000
System operations and network support	2,437,000	2,473,225	2,508,813	2,546,771	2,584,102	2,621,814	2,660,911	2,700,400	2,740,286	2,781,575
Business Support	3,117,000	3,163,755	3,211,211	3,259,379	3,308,270	3,357,894	3,408,263	3,459,387	3,511,277	3,563,947
Non-network Opex	5,554,000	5,636,980	5,720,025	5,806,150	5,892,372	5,979,708	6,069,174	6,159,786	6,251,563	6,345,521
Operational Expenditure	9,716,000	9,923,980	10,007,025	10,127,150	10,179,372	10,266,708	10,390,174	10,446,786	10,538,563	10,666,521

Appendix K: Capital and Operational Expenditure Reconciliations for 2018/19

Company Name	**Waipa Networks Limited**
For Year Ended	**31 March 2019**

SCHEDULE 7: COMPARISON OF FORECASTS TO ACTUAL EXPENDITURE

This schedule compares actual revenue and expenditure to the previous forecasts that were made for the disclosure year. Accordingly, this schedule requires the forecast revenue and expenditure information from previous disclosures to be inserted.
EDBs must provide explanatory comment on the variance between actual and target revenue and forecast expenditure in Schedule 14 (Mandatory Explanatory Notes). This information is part of the audited disclosure information (as defined in section 1.4 of the ID determination), and so is subject to the assurance report required by section 2.8. For the purpose of this audit, target revenue and forecast expenditures only need to be verified back to previous disclosures.

sch ref

		Target ($000) [1]	Actual ($000)	% variance
7	**7(i): Revenue**			
8	Line charge revenue	29,609	26,744	(10%)
		Forecast ($000) [2]	**Actual ($000)**	**% variance**
9	**7(ii): Expenditure on Assets**			
10	Consumer connection	3,866	3,317	(14%)
11	System growth	1,842	222	(88%)
12	Asset replacement and renewal	597	1,239	108%
13	Asset relocations	97	190	96%
14	Reliability, safety and environment:			
15	Quality of supply	1,506	857	(43%)
16	Legislative and regulatory	-	-	-
17	Other reliability, safety and environment	519	227	(56%)
18	**Total reliability, safety and environment**	2,025	1,084	(46%)
19	**Expenditure on network assets**	8,227	8,052	(26%)
20	Expenditure on non-network assets	105	313	198%
21	**Expenditure on assets**	8,332	8,365	(24%)
22	**7(iii): Operational Expenditure**			
23	Service interruptions and emergencies	690	1,045	51%
24	Vegetation management	1,003	941	(6%)
25	Routine and corrective maintenance and inspection	1,052	1,097	1%
26	Asset replacement and renewal	554	680	27%
27	**Network opex**	3,309	3,761	14%
28	System operations and network support	1,367	1,891	38%
29	Business support	2,624	2,355	(10%)
30	**Non-network opex**	3,991	4,246	6%
31	**Operational expenditure**	7,300	8,007	10%
32	**7(iv): Subcomponents of Expenditure on Assets (where known)**			
33	Energy efficiency and demand side management, reduction of energy losses		-	-
34	Overhead to underground conversion		335	-
35	Research and development		-	-
36				
37	**7(v): Subcomponents of Operational Expenditure (where known)**			
38	Energy efficiency and demand side management, reduction of energy losses		-	-
39	Direct billing		N/A	-
40	Research and development		N/A	-
41	Insurance		-	-
42				
43	*1 From the nominal dollar target revenue for the disclosure year disclosed under clause 2.4.3(3) of this determination*			
44	*2 From the CY+1 nominal dollar expenditure forecasts disclosed in accordance with clause 2.6.6 for the forecast period starting at the beginning of the disclosure year (the second to last disclosure of Schedules 11a and 11b)*			

14.0 SCHEDULES

Schedule 11a: Report on Forecast Capital Expenditure

Schedule 11b: Report on Forecast Operational Expenditure

Schedule 12a: Report on Asset Condition

Schedule 12b: Report on Asset Capacity

Schedule 12c: Report on Forecast Network Demand

Schedule 12d: Report on Forecast Interruptions and Duration

Schedule 13: Report on Asset Management Maturity

Schedule 17: Certification for Year-beginning Disclosures

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**

SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

This schedule requires a breakdown of forecast expenditure on assets for the current disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms. Also required is a forecast of the value of commissioned assets (i.e., the value of RAB additions)

EDBs must provide explanatory comment on the difference between constant price and nominal dollar forecasts of expenditure on assets in Schedule 14a (Mandatory Explanatory Notes).

This information is not part of audited disclosure information.

sch ref													
7			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
8		for year ended	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**	**31 Mar 29**	**31 Mar 30**
9	**11a(i): Expenditure on Assets Forecast**		**$000 (in nominal dollars)**										
10	Consumer connection		9,294	3,738	3,813	3,889	3,967	4,046	4,127	4,210	4,294	4,380	4,467
11	System growth		1,622	3,138	595	793	8,312	12,886	236	705	246	733	256
12	Asset replacement and renewal		936	4,541	595	1,515	9,049	13,754	1,547	1,578	1,609	1,641	1,674
13	Asset relocations		178	178	182	185	189	193	197	200	204	209	213
14	Reliability, safety and environment:												
15	Quality of supply		507	1,474	701	715	729	744	759	774	789	805	821
16	Legislative and regulatory		-	-	-	-	-	-	-	-	-	-	-
17	Other reliability, safety and environment		377	588	145	121	123	96	7	7	7	7	7
18	**Total reliability, safety and environment**		884	2,062	846	835	852	840	765	780	796	812	828
19	**Expenditure on network assets**		12,914	13,657	6,029	7,217	22,369	31,720	6,872	7,473	7,149	7,775	7,438
20	Expenditure on non-network assets		840	4,442	1,090	1,112	1,134	1,157	1,180	1,204	615	627	639
21	**Expenditure on assets**		13,754	18,099	7,120	8,329	23,504	32,877	8,052	8,677	7,764	8,402	8,078
22													
23	*plus* Cost of financing												
24	*less* Value of capital contributions		8,482	2,926	2,985	3,044	3,105	3,167	3,231	3,295	3,361	3,428	3,497
25	*plus* Value of vested assets												
26													
27	**Capital expenditure forecast**		5,272	15,173	4,135	5,285	20,399	29,710	4,822	5,382	4,403	4,974	4,581
28													
29	Assets commissioned		5,272	15,173	4,135	5,285	20,399	29,710	4,822	5,382	4,403	4,974	4,581
30			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
31		for year ended	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**	**31 Mar 29**	**31 Mar 30**
32			**$000 (in constant prices)**										
33	Consumer connection		9,294	3,738	3,738	3,738	3,738	3,738	3,738	3,738	3,738	3,738	3,738
34	System growth		1,622	3,138	583	762	7,833	11,905	214	626	214	626	214
35	Asset replacement and renewal		936	4,541	583	1,456	8,527	12,707	1,401	1,401	1,401	1,401	1,401
36	Asset relocations		178	178	178	178	178	178	178	178	178	178	178
37	Reliability, safety and environment:												
38	Quality of supply		507	1,474	687	687	687	687	687	687	687	687	687
39	Legislative and regulatory		-	-	-	-	-	-	-	-	-	-	-
40	Other reliability, safety and environment		377	588	142	116	116	89	6	6	6	6	6
41	**Total reliability, safety and environment**		884	2,062	829	803	803	776	693	693	693	693	693
42	**Expenditure on network assets**		12,914	13,657	5,911	6,937	21,079	29,304	6,224	6,636	6,224	6,636	6,224
43	Expenditure on non-network assets		840	4,442	1,069	1,069	1,069	1,069	1,069	1,069	535	535	535
44	**Expenditure on assets**		13,754	18,099	6,980	8,006	22,148	30,373	7,293	7,705	6,759	7,171	6,759
45													
46	**Subcomponents of expenditure on assets (where known)**												
47	Energy efficiency and demand side management, reduction of energy losses		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
48	Overhead to underground conversion		-	-	-	-	-	-	-	-	-	-	-
49	Research and development		-	-	-	-	-	-	-	-	-	-	-

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**

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
	for year ended	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26	31 Mar 27	31 Mar 28	31 Mar 29	31 Mar 30
	Difference between nominal and constant price forecasts	$000										
	Consumer connection	-	-	75	151	229	308	389	472	556	642	729
	System growth	-	-	12	31	479	981	22	79	32	107	42
	Asset replacement and renewal	-	-	12	59	522	1,047	146	177	208	240	273
	Asset relocations	-	-	4	7	11	15	19	22	26	31	35
	Reliability, safety and environment:											
	Quality of supply	-	-	14	28	42	57	72	87	102	118	134
	Legislative and regulatory	-	-	-	-	-	-	-	-	-	-	-
	Other reliability, safety and environment	-	-	3	5	7	7	1	1	1	1	1
	Total reliability, safety and environment	-	-	17	32	49	64	72	87	103	119	135
	Expenditure on network assets	-	-	118	280	1,290	2,416	648	837	925	1,139	1,214
	Expenditure on non-network assets	-	-	21	43	65	88	111	135	80	92	104
	Expenditure on assets	-	-	140	323	1,356	2,504	759	972	1,005	1,231	1,319

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
	for year ended	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25
	11a(ii): Consumer Connection						
	*Consumer types defined by EDB**	**$000 (in constant prices)**					
	Customer Connection	3,738	3,738	3,738	3,738	3,738	3,738
	Waikeria Prison feeder upgrade	4,118					
	APL Stage 1 supply	1,438					
	*include additional rows if needed						
	Consumer connection expenditure	9,294	3,738	3,738	3,738	3,738	3,738
less	Capital contributions funding consumer connection	8,393	2,837	2,837	2,837	2,837	2,837
	Consumer connection less capital contributions	901	901	901	901	901	901
	11a(iii): System Growth						
	Subtransmission					2,156	3,235
	Zone substations			46		5,431	8,012
	Distribution and LV lines						
	Distribution and LV cables	649	1,536	-	-	-	-
	Distribution substations and transformers	214	214	214	214	214	214
	Distribution switchgear						
	Other network assets	759	1,388	323	548	32	444
	System growth expenditure	1,622	3,138	583	762	7,833	11,905
less	Capital contributions funding system growth	-	-	-	-	-	-
	System growth less capital contributions	1,622	3,138	583	762	7,833	11,905

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**

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

11a(iv): Asset Replacement and Renewal

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**
	$000 (in constant prices)						
	Subtransmission					2,156	3,235
	Zone substations		-	46	-	5,431	8,120
	Distribution and LV lines						
	Distribution and LV cables		1,536				
	Distribution substations and transformers	741	214	214	214	214	214
	Distribution switchgear	195					
	Other network assets		2,791	323	1,242	726	1,138
	Asset replacement and renewal expenditure	936	4,541	583	1,456	8,527	12,707
less	Capital contributions funding asset replacement and renewal	-	-	-	-	-	-
	Asset replacement and renewal less capital contributions	936	4,541	583	1,456	8,527	12,707

11a(v): Asset Relocations

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**
	*Project or programme**	**$000 (in constant prices)**					
	NZTA and District Council Relocations	178	178	178	178	178	178
	**include additional rows if needed*						
	All other project or programmes - asset relocations						
	Asset relocations expenditure	178	178	178	178	178	178
less	Capital contributions funding asset relocations	89	89	89	89	89	89
	Asset relocations less capital contributions	89	89	89	89	89	89

11a(vi): Quality of Supply

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**
	*Project or programme**	**$000 (in constant prices)**					
	Install 11kV Dropout Fuses Spurs & Services	117	117	117	117	117	117
	Install Remote Control Switches	390	570	570	570	570	570
	Te Awamutu Ripple Plant RMU alternate supply	-	787	-	-	-	-
	**include additional rows if needed*						
	All other projects or programmes - quality of supply	-	-	-	-	-	-
	Quality of supply expenditure	507	1,474	687	687	687	687
less	Capital contributions funding quality of supply	-	-	-	-	-	-
	Quality of supply less capital contributions	507	1,474	687	687	687	687

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**

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

11a(vii): Legislative and Regulatory

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**
	*Project or programme**	**$000 (in constant prices)**					
	Nil						
	include additional rows if needed						
	All other projects or programmes - legislative and regulatory						
	Legislative and regulatory expenditure	-	-	-	-	-	-
less	Capital contributions funding legislative and regulatory						
	Legislative and regulatory less capital contributions	-	-	-	-	-	-

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

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**
	*Project or programme**	**$000 (in constant prices)**					
	Replace Two Pole Transformers and Sub Structures	377	390	-	-	-	-
	Network monintoring - St Kilda & Cambridge Park Gridkey		84	32	6	6	6
	Soundproofing Cambridge Ripple Plant Building		13	-	-	-	-
	Siesmic strengthening of VR structures		36	45	45	45	18
	High Load Crossings - underground conversions		65	65	65	65	65
	include additional rows if needed						
	All other projects or programmes - other reliability, safety and environment	-	-	-	-	-	-
	Other reliability, safety and environment expenditure	377	588	142	116	116	89
less	Capital contributions funding other reliability, safety and environment	-	-	-	-	-	-
	Other reliability, safety and environment less capital contributions	377	588	142	116	116	89

11a(ix): Non-Network Assets

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**
	Routine expenditure						
	*Project or programme**	**$000 (in constant prices)**					
	Motor vehicles, fleet and plant	319	1,282	350	350	350	350
	Office furniture and plant	124	437	125	125	125	125
	Computer equipment	397	59	60	60	60	60
	include additional rows if needed						
	All other projects or programmes - routine expenditure	-	-	-	-	-	-
	Routine expenditure	840	1,778	535	535	535	535
	Atypical expenditure						
	*Project or programme**						
	240 Harrison Drive Depot Extension		803	-	-	-	-
	Hautapu Dry Type Transformers		131	-	-	-	-
	Cambridge Non-network Capacity Support		1,730	534	534	534	534
	include additional rows if needed						
	All other projects or programmes - atypical expenditure						
	Atypical expenditure	-	2,664	534	534	534	534
	Expenditure on non-network assets	840	4,442	1,069	1,069	1,069	1,069

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**

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 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**	**31 Mar 29**	**31 Mar 30**
9	**Operational Expenditure Forecast**	**$000 (in nominal dollars)**										
10	Service interruptions and emergencies	797	1,003	1,023	1,044	1,064	1,086	1,107	1,130	1,152	1,175	1,199
11	Vegetation management	1,003	1,060	1,052	1,073	1,094	1,116	1,138	1,161	1,184	1,208	1,232
12	Routine and corrective maintenance and inspection	1,203	1,478	1,665	1,698	1,768	1,767	1,802	1,876	1,875	1,912	1,991
13	Asset replacement and renewal	539	621	633	646	659	672	686	699	713	728	742
14	**Network Opex**	3,542	4,162	4,373	4,460	4,585	4,640	4,733	4,866	4,924	5,023	5,164
15	System operations and network support	1,929	2,437	2,163	2,231	2,303	2,376	2,452	2,530	2,611	2,695	2,782
16	Business support	2,818	3,117	3,227	3,341	3,459	3,581	3,707	3,838	3,974	4,114	4,259
17	**Non-network opex**	4,747	5,554	5,390	5,572	5,761	5,957	6,159	6,369	6,585	6,809	7,041
18	**Operational expenditure**	8,289	9,716	9,762	10,033	10,347	10,597	10,893	11,235	11,510	11,832	12,205

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 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**	**31 Mar 29**	**31 Mar 30**
21		**$000 (in constant prices)**										
22	Service interruptions and emergencies	797	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003
23	Vegetation management	1,003	1,060	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031	1,031
24	Routine and corrective maintenance and inspection	1,203	1,478	1,632	1,632	1,666	1,632	1,632	1,666	1,632	1,632	1,666
25	Asset replacement and renewal	539	621	621	621	621	621	621	621	621	621	621
26	**Network Opex**	3,542	4,162	4,287	4,287	4,321	4,287	4,287	4,321	4,287	4,287	4,321
27	System operations and network support	1,929	2,437	2,120	2,145	2,170	2,195	2,221	2,247	2,273	2,300	2,328
28	Business support	2,818	3,117	3,164	3,211	3,259	3,308	3,358	3,408	3,459	3,511	3,564
29	**Non-network opex**	4,747	5,554	5,284	5,356	5,429	5,503	5,579	5,655	5,733	5,812	5,892
30	**Operational expenditure**	8,289	9,716	9,571	9,643	9,750	9,790	9,866	9,976	10,020	10,099	10,213
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	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**	**31 Mar 29**	**31 Mar 30**
41	**Difference between nominal and real forecasts**	**$000**										
42	Service interruptions and emergencies	-	-	20	41	61	83	104	127	149	172	196
43	Vegetation management	-	-	21	42	63	85	107	130	153	177	201
44	Routine and corrective maintenance and inspection	-	-	33	66	102	135	170	210	243	280	325
45	Asset replacement and renewal	-	-	12	25	38	51	65	78	92	107	121
46	**Network Opex**	-	-	86	173	264	353	446	545	637	736	843
47	System operations and network support	-	-	42	87	133	181	231	283	338	395	454
48	Business support	-	-	63	130	200	273	349	430	514	603	695
49	**Non-network opex**	-	-	106	216	332	454	581	713	852	998	1,149
50	**Operational expenditure**	-	-	191	390	597	807	1,027	1,259	1,490	1,734	1,992

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**

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)							
8	Voltage	Asset category	Asset class	Units	H1	H2	H3	H4	H5	Grade unknown	Data accuracy (1–4)	% of asset forecast to be replaced in next 5 years
10	All	Overhead Line	Concrete poles / steel structure	No.	-	0.80%	0.80%	58.50%	39.90%	-	3	4.90%
11	All	Overhead Line	Wood poles	No.	0.20%	34.80%	55.90%	6.30%	2.80%	-	3	1.70%
12	All	Overhead Line	Other pole types	No.							N/A	
13	HV	Subtransmission Line	Subtransmission OH up to 66kV conductor	km							N/A	
14	HV	Subtransmission Line	Subtransmission OH 110kV+ conductor	km				2.50%	97.50%	-	3	-
15	HV	Subtransmission Cable	Subtransmission UG up to 66kV (XLPE)	km							N/A	
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							N/A	
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.							N/A	
25	HV	Zone substation Buildings	Zone substations 110kV+	No.							N/A	
26	HV	Zone substation switchgear	22/33kV CB (Indoor)	No.							N/A	
27	HV	Zone substation switchgear	22/33kV CB (Outdoor)	No.							N/A	
28	HV	Zone substation switchgear	33kV Switch (Ground Mounted)	No.							N/A	
29	HV	Zone substation switchgear	33kV Switch (Pole Mounted)	No.							N/A	
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.							N/A	
33	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (ground mounted)	No.							N/A	
34	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (pole mounted)	No.							N/A	

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**

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**	**H1**	**H2**	**H3**	**H4**	**H5**	**Grade unknown**	**Data accuracy (1–4)**	**% of asset forecast to be replaced in next 5 years**
39	HV	Zone Substation Transformer	Zone Substation Transformers	No.							N/A	
40	HV	Distribution Line	Distribution OH Open Wire Conductor	km	0.50%	4.20%	73.20%	20.80%	1.30%	-	3	0.50%
41	HV	Distribution Line	Distribution OH Aerial Cable Conductor	km							N/A	
42	HV	Distribution Line	SWER conductor	km							N/A	
43	HV	Distribution Cable	Distribution UG XLPE or PVC	km	2.40%	6.30%	14.80%	21.40%	55.10%	-	1	1.50%
44	HV	Distribution Cable	Distribution UG PILC	km	-	-	72.10%	15.40%	12.50%	-	1	1.50%
45	HV	Distribution Cable	Distribution Submarine Cable	km							N/A	
46	HV	Distribution switchgear	3.3/6.6/11/22kV CB (pole mounted) - reclosers and sectionalisers	No.	-	2.70%	-	69.30%	28.00%	-	3	2.70%
47	HV	Distribution switchgear	3.3/6.6/11/22kV CB (Indoor)	No.							N/A	
48	HV	Distribution switchgear	3.3/6.6/11/22kV Switches and fuses (pole mounted)	No.	3.60%	6.30%	22.60%	52.10%	15.40%	-	1	3.60%
49	HV	Distribution switchgear	3.3/6.6/11/22kV Switch (ground mounted) - except RMU	No.							N/A	
50	HV	Distribution switchgear	3.3/6.6/11/22kV RMU	No.	-	-	-	-	100.00%	-	3	-
51	HV	Distribution Transformer	Pole Mounted Transformer	No.	-	12.50%	28.70%	18.80%	40.00%	-	3	4.20%
52	HV	Distribution Transformer	Ground Mounted Transformer	No.	-	1.10%	17.40%	13.00%	68.50%	-	3	1.10%
53	HV	Distribution Transformer	Voltage regulators	No.	-	16.00%	26.00%	48.00%	10.00%	-	3	6.38%
54	HV	Distribution Substations	Ground Mounted Substation Housing	No.							N/A	
55	LV	LV Line	LV OH Conductor	km	-	2.00%	77.10%	20.80%	0.10%	-	3	0.50%
56	LV	LV Cable	LV UG Cable	km	1.30%	10.40%	16.10%	21.30%	50.90%		1	-
57	LV	LV Streetlighting	LV OH/UG Streetlight circuit	km	0.40%	8.70%	46.10%	16.10%	28.70%	-	1	-
58	LV	Connections	OH/UG consumer service connections	No.	19.00%	18.60%	18.90%	17.20%	26.30%	-	1	2.50%
59	All	Protection	Protection relays (electromechanical, solid state and numeric)	No.	-	-	-	72.00%	28.00%	-	1	3.00%
60	All	SCADA and communications	SCADA and communications equipment operating as a single system	Lot	-	-	100.00%	-	-	-	1	2.00%
61	All	Capacitor Banks	Capacitors including controls	No.							N/A	
62	All	Load Control	Centralised plant	Lot	-	-	100.00%	-	-	-	1	
63	All	Load Control	Relays	No.	0.30%	1.60%	46.80%	39.60%	11.70%	-	1	2.00%
64	All	Civils	Cable Tunnels	km							N/A	

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**

SCHEDULE 12b: REPORT ON FORECAST CAPACITY

This schedule requires a breakdown of current and forecast capacity and utilisation for each zone substation and current distribution transformer capacity. The data provided should be consistent with the information provided in the AMP. Information provided in this table should relate to the operation of the network in its normal steady state configuration.

sch ref

12b(i): System Growth - Zone Substations

	Existing Zone Substations	Current Peak Load (MVA)	Installed Firm Capacity (MVA)	Security of Supply Classification (type)	Transfer Capacity (MVA)	Utilisation of Installed Firm Capacity %	Installed Firm Capacity +5 years (MVA)	Utilisation of Installed Firm Capacity + 5yrs %	Installed Firm Capacity Constraint +5 years (cause)	Explanation
9	Transpower GXP Cambridge (AMD 2016/17)	43	40	N-1	-	107%	40	132%	Transpower	Firm capacity is exceeded in <5 years. Large step change in industrial load expected within 1 year. Transpower's transformers have a short term overload rating of 45/47MVA (Summer/Winter) which will assist with sustained peak demands until 2024. A special protection scheme will be installed in May 2020 to avoid cascade tripping of supply transformers. Waipa Networks has committed to peaking generation to manage peak demand and a new 220/33kV GXP for the Cambridge area, expected completion Dec 2024.
10	Transpower GXP Te Awamutu (AMD 2016/17)	41	40	N-1	-	102%	55	79%	No constraint within +5 years	Firm capacity is exceeded in 2019 due to the increase of Fonterra load, and will be further exceeded by connection of the new Waikeria Prison upgrade. Transpower's transformers will be upgraded by replacing cables and cooling enhancement to allow 55MVA capacity. Two new circuit breakers on Switchboard B will be required to remove a thermal constraint on Switchboard A. This will ensure capacity is adequate for beyond the load forecast period.
11						-			[Select one]	
12						-			[Select one]	
13						-			[Select one]	
14						-			[Select one]	
15						-			[Select one]	
16						-			[Select one]	
17						-			[Select one]	
18						-			[Select one]	
19						-			[Select one]	
20						-			[Select one]	
21						-			[Select one]	
22						-			[Select one]	
23						-			[Select one]	
24						-			[Select one]	
25						-			[Select one]	
26						-			[Select one]	
27						-			[Select one]	
28						-			[Select one]	

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

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**

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 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**
*Consumer types defined by EDB**							
Residential		503	503	503	503	503	503
General		92	92	92	92	92	92
Unmetered		2	2	2	2	2	2
11kV		-	-	-	-	-	-
Connections total		597	597	597	597	597	597

**Distributed generation*

include additional rows if needed

Number of connections		159	159	159	159	159	159
Capacity of distributed generation installed in year (MVA)		0	0	0	0	0	0

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 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**
GXP demand		84	89	91	93	96	98
plus Distributed generation output at HV and above		-	-	-	-	-	-
Maximum coincident system demand		84	89	91	93	96	98
less Net transfers to (from) other EDBs at HV and above		-	-	-	-	-	-
Demand on system for supply to consumers' connection points		84	89	91	93	96	98

Electricity volumes carried (GWh)							
Electricity supplied from GXPs		420	494	509	529	544	604
less Electricity exports to GXPs		-	-	-	-	-	-
plus Electricity supplied from distributed generation		1	1	1	1	1	1
less Net electricity supplied to (from) other EDBs		1	1	1	1	1	1
Electricity entering system for supply to ICPs		420	494	509	529	544	604
less Total energy delivered to ICPs		397	467	481	500	514	571
Losses		23	27	28	29	30	33
Load factor		57%	63%	64%	65%	65%	70%
Loss ratio		5.5%	5.4%	5.4%	5.4%	5.4%	5.4%

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Network / Sub-network Name	**Waipa Networks Limited**

SCHEDULE 12d: REPORT FORECAST INTERRUPTIONS AND DURATION

This schedule requires a forecast of SAIFI and SAIDI for disclosure and a 5 year planning period. The forecasts should be consistent with the supporting information set out in the AMP as well as the assumed impact of planned and unplanned SAIFI and SAIDI on the expenditures forecast provided in Schedule 11a and Schedule 11b.

sch ref		*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
9	for year ended	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**
10	**SAIDI**						
11	Class B (planned interruptions on the network)	64.0	80.0	80.0	80.0	80.0	80.0
12	Class C (unplanned interruptions on the network)	125.0	159.0	159.0	159.0	159.0	159.0
13	**SAIFI**						
14	Class B (planned interruptions on the network)	0.26	0.28	0.28	0.28	0.28	0.28
15	Class C (unplanned interruptions on the network)	1.71	2.30	2.30	2.30	2.30	2.30

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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	The Asset Management Policy was developed and authorised by the CEO as the overriding statement on asset management of Waipa Networks for reference when preparing the Asset Management Plan. This policy has been promulgated by placement in reception for visitors, Company intranet and internal notice boards for all staff, web-site for other stakeholders, interested parties and Commerce Commission.	The Network Asset Manager was responsible for completing this question assessment. Organisational respondents included input from; Management Team comprising CEO, Finance Controller/IT Manager, Company Secretary/Human Resources Manager, Customer Services Manager, Network Asset Manager, Health, Safety and Quality Manager (11% of Company personnel), Operations Committee comprising Network Asset Manager, Customer Services Manager, Field Services Supervisor, Customer Connections Supervisor, Construction & Maintenance Supervisor, Vegetation Supervisor, Health, Safety & Quality Manager, Purchasing Officer, Network Information Officer and Planners (18% of Company personnel), and the	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	The annual SCI and KPIs form the "contract" between Company Directors and Consumer Trust. The AMP is borne out of the Company's Annual Strategic Planning Meeting where Directors and Executive Management construct an Annual Business Plan and strategies to achieve specified outcomes in the SCI. The outcomes of the Strategic Planning Meeting and Business Plan are promulgated to staff and available on the Intranet. The AMP will be available for	The Asset strategies are now explicitly discussed as they relate to organisation strategies.	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?	2	Refer to AMP, Sec 7.0 Life Cycle Asset Management Planning, Sec 7.1 Maintenance Planning Criteria and Assumptions, Sec 7.2 Routine and Corrective Maintenance Policies and Procedures, Sec 7.4 Service Interruptions and Emergencies Policy and Procedures, Sec 7.5 Vegetation Management Policy and Procedures, Sec 9.1 Financial and Physical Progress (Review of previous AMP).	Further improvements to fleet management are planned.	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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

26	Asset management plan(s)	How does the organisation establish and document its asset management plan(s) across the life cycle activities of its assets and asset systems?	2.5	Refer to AMP, Sec 13.2 Appendix B: Voltage Regulator Programme, Sec 13.3 Appendix C: Remote Controlled Auto Recloser Programme, Sec 13.4 Appendix D: Asset Condition Survey Programme, Sec 13.5 Appendix E: Vegetation Management Programme, Sec 13.6 Appendix F: Earth Testing and Repair Programme, Sec 13.8 Appendix H: Capital Works and Expenditure Forecast, Sec 13.9 Appendix I: Operational Expenditure Forecast.	Progress in asset health indicators has been made and further work is planned.	The asset management strategy need to be translated into practical plan(s) so that all parties know how the objectives will be achieved. The development of plan(s) will need to identify the specific tasks and activities required to optimize costs, risks and performance of the assets and/or asset system(s), when they are to be carried out and the resources required.	The management team with overall responsibility for the asset management system. Operations, maintenance and engineering managers.	The organisation's asset management plan(s).

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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?	2.5	Refer AMP Sec 3.5 Accountabilities and Responsibilities for Asset Management. The Network Asset Manager has overall responsibility for the Asset Management Plan implementation. The Network Asset Manager delegates appropriate Sections of the AMP works program to appropriate planning and engineering staff and supervisors for implementation. The Network Asset Manager's Position Description includes the responsibility for implementation of the Asset Management Plan and KPIs. The Network Asset Manager reports at all Board Meetings on progress against the Asset Management Plan	A Network Planning Manager has been appointed to focus on asset management improvement.	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?	2.5	Refer to AMP Sec 3.5. Resourcing Asset Management. The Company believes there is a national shortage of experienced personnel with asset management skills. It has recruited a number of staff who had potential for this role all of whom have left the Company over the past 5 years. The Company has appointed an Electrical Engineer who is in the process of being trained with the appropriate asset management skills. All other functions of the Company are currently adequately resourced. Detailed programming of AMP works have not been rigorously resource forecast in terms of human resource	Additional resources are planned to enable further documentation of processes.	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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

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)	2.5	The Network Asset Manager delegates appropriate Sections of the AMP works program to planners. The Company holds monthly Operational Meetings for all Supervisors to co-ordinate implementation of the Asset Management Plan . Planners prepare "Orange" project folders for all capital and maintenance works identified in the current AMP. Project folders are implemented by field staff through the Supervisors.	The understanding and engagement of staff through senior management communication is demonstrated in improvements made in the AMP.	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?	2.5	Refer AMP Sec 3.5 Resourcing Asset Management. WEL Networks for Control Room Services, Call Care for customer enquiry and dispatch services and Abbey for SCADA services have contracts which include performance KPI's. All works performed by service providers for SCADA, Radio Systems, Traffic Management on State Highways and directional drilling are contracted on an as required basis and are managed directly by Company Supervisors.	There has been an external review of efficiency and programming. Increased resource to both inspect and repair defects has been budgeted.	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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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)?	2.5	Refer AMP Sec 3.5 Accountabilities and Responsibilities for Asset Management. The Network Asset Manager has overall responsibility for the Asset Management Plan implementation. The Network Asset Manager delegates appropriate Sections of the AMP works program to appropriate planning and engineering staff and supervisors for implementation. The Network Asset Manager's Position Description includes the responsibility for implementation of the Asset Management Plan and KPIs. The Network Asset Manager reports at all Board Meetings on progress against the Asset Management Plan	A planning Manager has been appointed to focus on asset management improvement.	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?	2.5	Refer to AMP Sec 3.5. Resourcing Asset Management. The Company believes there is a national shortage of experienced personnel with asset management skills. It has recruited a number of staff who had potential for this role all of whom have left the Company over the past 5 years. The Company has appointed a graduate Planning Engineer who is in the process of being trained with the appropriate asset management skills. All other functions of the Company are currently adequately resourced. Detailed programming of AMP works have not been rigorously resource forecast in terms of human resource.	Additional resources are planned to enable further documentation of processes.	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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

42	Structure, authority and responsibilities	To what degree does the organisation's top management communicate the importance of meeting its asset management requirements?	2.5	The Network Asset Manager delegates appropriate Sections of the AMP works program to planners. The Company holds monthly Operational Meetings for all Supervisors to co-ordinate implementation of the Asset Management Plan . Planners prepare "Orange" project folders for all capital and maintenance works identified in the current AMP. Project folders are implemented by field staff through the Supervisors.	The understanding and engagement of staff through senior management communication is demonstrated in improvements made in the AMP.	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?	2.5	Refer AMP Sec 3.5 Resourcing Asset Management. WEL Networks for Control Room Services, Call Care for customer enquiry and dispatch services and Abbey for SCADA services have contracts which include performance KPI's. All works performed by service providers for SCADA, Radio Systems, Traffic Management on State Highways and directional drilling are contracted on an as required basis and are managed directly by Company Supervisors.	There has been an external review of efficiency and programming. Increased resource to both inspect and repair defects has been budgeted.	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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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)?	2.5	During the budget process a GAP analysis is completed to ensure appropriate resources are available either internal or external. The Company Training Matrix and Individual Personal Development Plans are used to increase skills of current staff as a first option and secondly employing additional staff for long term needs or contractors for short term.	An Asset Management Improvement Plan has been developed and an ISSP is in development. Resources are planned to enable implementation.	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?	2.5	The Company Training Matrix and Individual Personal Development Plans are used to identify maintain and increase skills of current staff. However, an Asset Management competency framework has not been developed to guide training requirements.	Processes are in place to insure additional resources are trained appropriately.	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	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?	2	As per our Heath, Safety and Environmental requirements all contractors are inducted to work on our network. The Company does not assess the competence of service providers under its direct control in any other way other than observing the quality of the work performed. Competencies for fault staff to operate on the network are defined and new fault staff are assessed and signed off.	The employment of well trained staff as planning officers who prepare and mange job packs, review quality and conduct inspection including packaging, leads to good outcomes. Competent contractors are engaged. Review of contract management frameworks may be useful.	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	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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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?	2.5	AMP Service Levels, Financial Targets and works programmes are communicated to Company Trust members, Directors, Managers and Supervisors by way of hard copy. The AMP is accessible on the Company intranet for all staff and web-site for other stakeholders, interested parties and Commerce Commission. The Company has internal planning, procurement, stores and field crew resources. Planners prepare "Orange" project folders for all capital and maintenance works identified in the AMP. Materials are procured by the stores team. Work is undertaken by the field crews. Project quality and costs are audited and reported on when jobs are completed. The financials of network projects are reported on at Directors' monthly Board Meetings.	Further stakeholder engagement is planned.	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?	2	Refer to whole of AMP . The Design Manual which has been issued in hard copy to all Manager, Supervisors, Planners and Foreman and has been placed on the intranet for all staff and on the web-site for contracted services providers, other stakeholders, interested parties and Commerce	The Asset Management Improvement Plan details documentation improvements.	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?	2	Refer AMP Sec 3.6 Asset Management Systems, Processes and Information. The Network Asset Manager and Network Information Officer determine the data that is held in the Asset Management Enterprise Information Systems. When new requirements are identified the Network Asset Manager and Network Information Officer request improvements that are designed and implemented by IT and the Operations Committee offers feedback in this iterative process.	The development of an ISSP is in progress.	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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

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?	3	Refer AMP Sec 3.6 Asset Management Systems, Processes and Information. The Network Information Officer populates the Asset Equipment Data Bases and inputs are audited for errors and irregularities. The Network Asset Manager and Network Information Officer request improvements that are designed and implemented by IT and the Operations Committee offers feedback in this iterative process.	Data in multiple locations is effectively managed but is a risk for the future.	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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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	Refer AMP Sec 3.6 Asset Management Systems, Processes and Information. The Network Asset Manager and Network Information Officer request improvements that are designed and implemented by IT and the Operations Committee offers feedback in this iterative process.	An ISSP is being developed.	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?	2.5	Refer to AMP Sec 8.1. Disaster Risk Management Assessment, Sec 8.2 Details of Emergency Response and Contingency Plans. Refer to AMP Sec 7 Life Cycle Asset Management Planning, Sec 7.1 Maintenance Planning Criteria and Assumptions, Sec 7.2 Routine and Corrective Maintenance Policies and Procedures, Sec 7.3 Asset Replacement and Renewal Policies and Procedures. Refer to Public Safety Management System Sec 2 Safety Management System, Sec 3 Asset Description, Sec 4 Identification and Control of Significant Hazards, Sec 5 Safety and Operating Processes and Information, Sec 6 Performance Monitoring. Refer to "minutes" of Health, Safety & Environment Committee monthly meetings where incidents and accidents are analysed (F.I.M). Refer to	An integrated risk management system compliant with ISO31000 has been introduced. With the documentation of some risk areas such a fleet plans WN will have practical risk managements systems. The risk management system is consistent with the H&S system organisation wide risks to be considered on a similar basis.	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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

79	Use and maintenance of asset risk information	How does the organisation ensure that the results of risk assessments provide input into the identification of adequate resources and training and competency needs?	2	Refer AMP Sec 7. Life Cycle Asset Management Planning, Sec 7.1 Maintenance Planning Criteria and Assumptions, Sec 7.2 Routine and Corrective Maintenance Policies and Procedures, Sec 7.3 Asset replacement and Renewal Policies and Procedures, Sec 7.4 Service Interruptions and Emergencies Policy and Procedures, Sec 7.5 Vegetation Management Policy and Procedures. Refer to Company Training Matrix and Personal Development Plans. Refer to Company Hazard Register. Refer to Health and Safety at Work and Environmental Management System. Refer to "minutes" of Health, Safety & Environmental Committee (20% of Company personnel monthly meetings. Refer to "minutes" of Operations Committee monthly meetings. Refer to regular Field Crew	The linkages from the risk management system to key plans is evolving. WN has recognised the need for more sophisticated growth planning and condition monitoring processes and this is part of the Asset Management Improvement Plan.	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?	2.5	Refer AMP Sec 3.4 Stakeholder Interests, Sec 5.4 Targets for Asset and Electricity Distribution Business Performance (containing legislative and regulatory requirements). We rely on industry organisations and regulatory bodies to keep us informed of changes. Waipa Networks has started using ComplyWith web enabled software to assess compliance with legislative and regulatory requirements, involving questionnaires completed by a variety of staff determined by a matrix of the registry of requirements within the ComplyWith software. This produces a six-monthly declaration of compliance that is reported to the Board.	WN monitors that it's AMP complies with the requirements of the Comm Comm and ComplyWith is a good process. The external public safety audit has shown relatively few gaps in compliance. WN have introduced a Safety by Design process and are jointly reviewing high risk safety areas with another EDB.	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

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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?	2.5	Refer AMP Sec 4.4 Asset Selection Policy. Waipa's asset selection policy is to use only tried and proven products. The Company adopts a position of being "leading edge not bleeding edge". When new modern equivalent assets are considered, their performance and lifecycle cost are evaluated by Waipa's Operations Committee before they are installed on the network. All new assets are sized appropriate for their intended use and life. Refer Design Manual for construction and commissioning policies and procedures.	The design manual is being updated. The appropriate use of the Powerco standards is being considered.	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?	2	Refer AMP Sec 9.1. Financial and Physical Progress, Sec 9.3 Gap Analysis and Identification of Improvement Initiatives. Safety and Quality audits are conducted on a sample basis to monitor performance. Progress against AMP and Finances is a standard report to the Board. Progress with programmes is reported monthly and annually in the AMP including Appendix D Visual Asset Condition Survey Programme, Appendix E Vegetation Management Programme, Appendix F Earth Testing and Repair Programme. Defects raised and closed out as tracked and reported	The external public safety auditor views procedures as needing further development. The Asset Management Improvement Plan includes improvements in documentation of processes.	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?	2.5	The Company monitors network performance and reports monthly on SAIDI, SAIFI, CAIDI, planned and unplanned outage causes. Refer to AMP 2016 Sec 7.2 Routine and Corrective Maintenance Policies and Procedures Asset Condition Surveys and Earth Testing and Repair. Sec 9.1 Financial and Physical Progress shows progress with asset condition survey programme, defects outstanding, earth testing and repair, vegetation management. Sec 9.2 Service Level and Asset Performance, Sec 9.3 Gap Analysis and identification of Improvement	The external reviewer of the public health and safety management system commented favourably on the use of lead and lag indicators.	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).

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

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?	2.5	Incidents and emergency situations are managed by the Control Room Operators who are authorised and responsible for assigning staff to respond by making safe and carry out repairs. Contracts with 3rd parties describe responsibilities and performance measures. The Network Asset Manager is responsible for investigating all network asset failures and performance of the network as per job description. The Public Safety Management System and the Health, Safety and Environmental Manual ensure Identification and Control of Significant Hazards which are included in the Company Hazard Register. Duty Supervisors and HSQ Manager respond immediately to safety incidents, and the HSQ Manager investigates the incidents. Recommendations	The external review of the public health and safety system commented that incident review systems are active. Exercising the emergency management systems is planned.	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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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	Waipa's AMP's asset management systems and processes developed by the Network Asset Manager, the Financial Controller and the Network Information Officer are subject to internal review by Executive Management. Waipa's Health, Safety and Quality Manager audits Waipa's field crews and contractor's for work site safety and compliance with Waipa's design criteria. Paperwork audits are completed to assess quality and compliance with requirements for work management, equipment and testing records and documentation. Telarc routinely audit a selection of Waipa's works for public safety and compliance with industry best practice. Enviro-Mark audit Waipa's environmental policies and practices. ACC have audited Waipa's	An Asset Management Improvement Plan has been prepared. The outcomes of asset inspection condition monitoring have been reviewed.	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?	2.5	The Network Asset Manager is responsible for investigating all network asset failures and performance of the network as per job description. The Public Safety Management System and the Health, Safety and Environmental Manual ensure Identification and Control of Significant Hazards which are included in the Company Hazard Register. Any equipment or design hazards identified and assessed as requiring replacement to manage network risk are replaced in a planned	WN has recognised the need to put more focus on the AMP document itself. Failure investigation and improvement is evident and documentation improvements are planned. The ICAM system is used which is a good system for root cause analysis. Network related equipment faults are under the industry norms demonstrating long term maintenance and replacement processes have been active.	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

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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 .

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?	2.5	Refer AMP Sec 7. Life Cycle Asset Management Planning, Sec 7.1 Maintenance Planning Criteria and Assumptions, Sec 7.2 Routine and Corrective Maintenance Policies and Procedures, Sec 7.3 Asset replacement and Renewal Policies and Procedures, Sec 7.4 Service Interruptions and Emergencies Policy and Procedures, Sec 7.5 Vegetation Management Policy and Procedures. These AMP Sections set the Company's criteria of risk and performance against which optimal (the cost of) continual improvement is measured. Sec 9.1 Financial and Physical Progress and Sec 9.2 Service Levels and Asset Performance assesses performance against AMP objectives.	Improvements in risk management have been made and optimal growing planning is occurring at GXPs. Continued improvement in asset health indicators is planned as well as asset process documentation. This will enable further optimisation of cost and risk.	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?	2.5	Company Management and Supervisors who manage and operate network assets regularly participate in EEA, Connexis and Transpower conferences, exhibitions and industry forums at which they are able to update themselves on new asset options and experiences others have had with existing network assets. The work of the EEA Asset Management Group is monitored for developments. Company Management and Supervisors regularly liaise with other EDBs and the Suppliers of assets concerning the adoption of new products and problems with existing assets. New equipment is evaluated on a cost and quality basis with life cycle performance in mind. Pilots to trial new equipment and gain experience with new technology are used in some	With additional specialist staff, an improvement programme, the development of an ISSP and coordination with other EDBs an appropriate technology future path will be determined.	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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

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.

Company Name	**Waipa Networks Limited**
AMP Planning Period	**1 April 2020 – 31 March 2030**
Asset Management Standard Applied	**Based on PAS 55**

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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.

Waipa Networks Limited

For Year Ended 31 March 2020

Schedule 14a Mandatory Explanatory Notes on Forecast Information

(In this Schedule, clause references are to the Electricity Distribution Information Disclosure Determination 2012 – as amended and consolidated 3 April 2018.)

1. This Schedule requires EDBs to provide explanatory notes to reports prepared in accordance with clause 2.6.6.

2. This Schedule is mandatory—EDBs must provide the explanatory comment specified below, in accordance with clause 2.7.2. This information is not part of the audited disclosure information, and so is not subject to the assurance requirements specified in section 2.8.

Commentary on difference between nominal and constant price capital expenditure forecasts (Schedule 11a)

3. In the box below, comment on the difference between nominal and constant price capital expenditure for the current disclosure year and 10 year planning period, as disclosed in Schedule 11a.

Box 1: Commentary on difference between nominal and constant price capital expenditure forecasts

Waipa Networks reviews and refines the capital forecasts of expenditure on network assets every year. We have used the midpoint of the Reserve Banks inflation target for our indexation, currently 2% p.a.

Commentary on difference between nominal and constant price operational expenditure forecasts (Schedule 11b)

4. In the box below, comment on the difference between nominal and constant price operational expenditure for the current disclosure year and 10 year planning period, as disclosed in Schedule 11b.

Box 2: Commentary on difference between nominal and constant price operational expenditure forecasts

Waipa Networks reviews and refines the operational expenditure on networks assets every year. We have used the midpoint of the Reserve Banks inflation target for our indexation, currently 2% p.a.

Waipa Networks Limited

For Year Ended 31 March 2020

Schedule 15 Voluntary Explanatory Notes

(In this Schedule, clause references are to the Electricity Distribution Information Disclosure Determination 2012 – as amended and consolidated 3 April 2018.)

1. This schedule enables EDBs to provide, should they wish to-

   1.1 additional explanatory comment to reports prepared in accordance with clauses 2.3.1, 2.4.21, 2.4.22, 2.5.1 and 2.5.2;

   1.2 information on any substantial changes to information disclosed in relation to a prior disclosure year, as a result of final wash-ups.

2. Information in this schedule is not part of the audited disclosure information, and so is not subject to the assurance requirements specified in section 2.8.

3. Provide additional explanatory comment in the box below.

Box 1: Voluntary explanatory comment on disclosed information

Schedule 17: Certification for Year-beginning Disclosures

Clause 2.9.1 of section 2.9

We, Richard Thomas Francis and Simon Matthew Fleisher, being directors of Waipa Networks Limited certify that, having made all reasonable enquiry, to the best of our knowledge:

a. The following attached information of Waipa Networks Limited prepared for the purposes of clause 2.4.1, clause 2.6.1, 2.6.3, 2.6.6 and 2.7.2 of the Electricity Distribution Information Disclosure Determination 2012 in all material respects complies with that determination.

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

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

Richard Thomas Francis **Simon Matthew Fleisher**

24 March 2020