Marlborough Lines

Asset Management Plan

March 2010

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Marlborough Lines

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1 Summary

1.1 Plan objectives & background

By its very nature an Asset Management Plan has to be a dynamic document and will be reviewed from time to time consistent with changing customer requirements and the company's ongoing maintenance and surveillance of the network.

This Asset Management Plan (AMP), along with Marlborough Lines' other plans, demonstrates that Marlborough Lines is responsibly managing its electricity network assets to best-practice levels. Preparation of the AMP in this format also assists in complying with Section 24 and Schedule 2 of the Electricity Information Disclosure Requirements 2004 and subsequent amendments.

This report was approved by the Board of Marlborough Lines on 31 March 2010.

The next report is expected to be prepared and issued in January 2011.

The AMP primarily interacts with Marlborough Lines' strategic plan and a range of strategic drivers that influence the way assets are managed, and considers a 10 year planning period from 1 April 2010 to 31 March 2020.

Marlborough Lines uses a range of systems and processes for managing network information. Most of these are IT-based and are available to staff via an intranet.

1.2 Details of assets

Marlborough Lines' assets are spread over the Marlborough area on the broad flat plain surrounding Blenheim, into the valleys of the surrounding hills and into the uniquely rugged and isolated Marlborough Sounds.

In 2008/2009, Marlborough Lines conveyed 372 GWh of electricity to 23,900 consumer connections with an after-diversity maximum demand of 70.1MW. Marlborough Lines' consumers are predominantly domestic and small-to-medium commercial – the largest industrial installation consumes less than 4% of the total energy volume.

Marlborough Lines' sub-transmission network is based on a radial topology around the Blenheim GXP which supplies fourteen 33/11kV zone substations that in turn supply 3,720 distribution substations which range from pole-mounted 5kVA units to ground-mounted 1,000kVA units.

The assets in service are those required to provide the levels of service that consumers require. The age of assets ranges from new to over 80 years old with most assets being in a very good to excellent condition and all being in fair to excellent condition.

1.3 Proposed service levels

Aside from the assets themselves the company has to have regard to the potential interference to the network by trees and access to lines particularly in the Marlborough Sounds areas where not only is vegetation controlled in relation to lines themselves but also in respect of access tracks which are essential if customer expectations in relation to the reliability of the lines are to be maintained.

The proposed primary service levels using the methodology prescribed in the Electricity Information Disclosure Requirements are as follows:

Projected performance is summarised below in the table below:

Measure	Actual 2009	Target 2008/09 and beyond
Class B SAIDI	109	90
Class C SAIDI	164	120
Total SAIDI	273	210
Class B SAIFI	0.36	0.35
Class C SAIFI	1.64	1.44
Total SAIFI	2.00	1.79
Class B CAIDI	276	251
Class C CAIDI	74	81
Total CAIDI	105	115

The principal reliability target for 2010 is 210 SAIDI minutes per customer per annum. This is justified on the basis of the level of service consumers require and what the assets can reasonably provide. Surveys indicate that consumers are generally happy with Marlborough Lines and the direction the company is taking.

Ideally this target could be lower but it is important to recognise that approximately 690 km of lines are located in the Marlborough Sounds and can typically only be reached by helicopter but under storm conditions can only be accessed by four wheel drive, boat and in many instances by foot and this inherently increases outage times. It is for this reason that the company focuses on the prevention of outages themselves in recognition that restoration of supply is time consuming and can be expensive.

Customer surveys are undertaken from time to time and it is apparent that there is general satisfaction with the level of service particularly by customers in remote areas who are cognisant of the difficulties in providing supply where there are long lengths of radial lines which in economic or practical terms cannot readily be duplicated.

1.4 Development & lifecycle plans

Marlborough continues to enjoy strong growth in load with the key planning driver being installed distribution transformer capacity and the resulting after diversity feeder demands and zone substation demands. The energy delivered by the Network has increased by about

3.0% per year over the last decade and is expected to continue to increase at this rate for the planning horizon.

Marlborough Lines has a maintenance program in place that is detailed in section 7 of this document. The expected operational expenditure for 2010/2011 is $5,950,000.

The budgeted capital expenditure for 2010/2011 is $13.725 million. Key development activities that Marlborough Lines expects to undertake this financial year include the completion of Waters substation, upgrading of portions of the 33kV lines to Riverlands and Havelock/Linkwater/Rai Valley, undergrounding of the lines from Canterbury St to the Elevation in Picton and the installation of new 33kV feeders from Transpower.

1.5 Risk management

Marlborough Lines' business is the conveyance of electricity which has a very low tolerance to risk.

To ensure this exposure remains within acceptable levels, Marlborough Lines has adopted the systemic approach to risk identification and control outlined in the Australian/New Zealand Standard on Risk Management (ASNZS 4360 :2004).

A detailed review of the risks relevant to Marlborough Lines has concluded that:

1. The overall post treatment network- related risk profile of Marlborough Lines is presently constrained to acceptable levels.

2. Marlborough Lines faces a broad range of network- related risks, but the technical expertise and longevity of the company has allowed the development of an equally broad range of effective treatments.

3. The most significant network risks for Marlborough Lines are the failure of assets higher in the supply chain (generation and transmission assets). While these events are considered very unlikely, they could leave Marlborough with no or restricted supply for a considerable period of time.

4. Marlborough Lines' 33kV lines and zone substations do carry some operational risk, but these are minimised by the diversity of the loads and the security offered by the existing configuration. All of the larger zone substations have 'n-1' security, using the 11kV network to support any failures in the zone substation or the 33 kV network. The smaller rural zone substations generally have 'n' level security and repairs need to be carried out before supply can be restored. In these situations, trained and competent staff are available for response at all times, supported by additional technical staff and emergency spares.

5. Double 33kV circuits on common poles are another source of risk particularly on lengths of the circuits supplying the Spring Creek and Picton zone substations. A single motor vehicle accident in these areas could result in multiple Zone substations losing supply. Consumers in the immediate vicinity of any such vehicle accident could have

supply interrupted for the duration of the time required to repair the damage. However, alternative supply routes available within the Company's 33kV and 11kV Networks would allow supply to be restored to all other consumers by manual switching to alternative feeds.

6. Marlborough Lines' Network is well constructed and maintained, with ongoing asset inspection regimes in place. Monitoring of these systems and routine network operation has not presented any significant untreated risks.

Emergency Preparedness Plan

Marlborough Lines' Emergency Preparedness Plan documents procedures for use in the event of major damage to the Network. Contingency planning is regularly reviewed with consideration given to various "what-if" scenarios. This helps to ensure that the Network is prepared and staff are well trained for any eventuality.

Marlborough Lines operates a full time fault service with sufficient staff levels to ensure appropriate responses to any foreseeable event on the network. Minimum staff levels of three staff immediately, four additional staff within four hours and a further four staff within eight hours are maintained 24hr a day, 365 days a year. However these staff levels are invariably supplemented by other staff as required.

1.6 Undergrounding

Discussions are currently being undertaken with the Marlborough District Council with a view to reinstating an overhead to underground conversion programme now that the company can include the actual cost of the work in its Regulatory Asset Base. The extent of this work is currently being determined in conjunction with the Council.

1.7 Performance evaluation

During the past twelve months Network performance and reliability has been reasonable and consistent with customer expectations and comparable with the performance of other similar network companies in New Zealand.

For the 2009 year, there were 164.5 minutes per consumer lost due to faults and 109.5 minutes lost due to planned outages. This equates to an overall reliability of 99.948%. There were 357 faults with 355 faults on the 11kV system and 2 faults on the 33kV system.

One feature of these results is the increase in planned outages resulting from increased economic activity. The increase in faults is mainly due to adverse weather, in particular in May 2009 which equated to 51.8 minutes lost.

We have identified opportunities to make improvements in the network with the objective of improving supply reliability. In summary these are:

- Increase the number of tielines where it is reasonably practical to do so.

- Further install remotely operated circuit breakers at critical points on long radial lines.
- Continue with the installation of long length possum guards in possum prone areas.
- Continue the relocation of poles away from intersections.

2 Plan Background & Objectives

Marlborough Lines AMP is the foundation document that translates Marlborough Lines data, analysis, procedures, policies and strategic aims into physical actions bounded by performance criteria and timeframes. It is also the principal vehicle utilised to communicate its electricity supply network intentions to its internal and external stakeholders.

2.1 Background

Marlborough Lines is the electricity lines business that conveys electricity throughout Marlborough to approximately 23,900 consumer connections (ICPs) on behalf of a number of energy retailers. The figure below indicates Marlborough Lines position in the electricity industry supply chain.

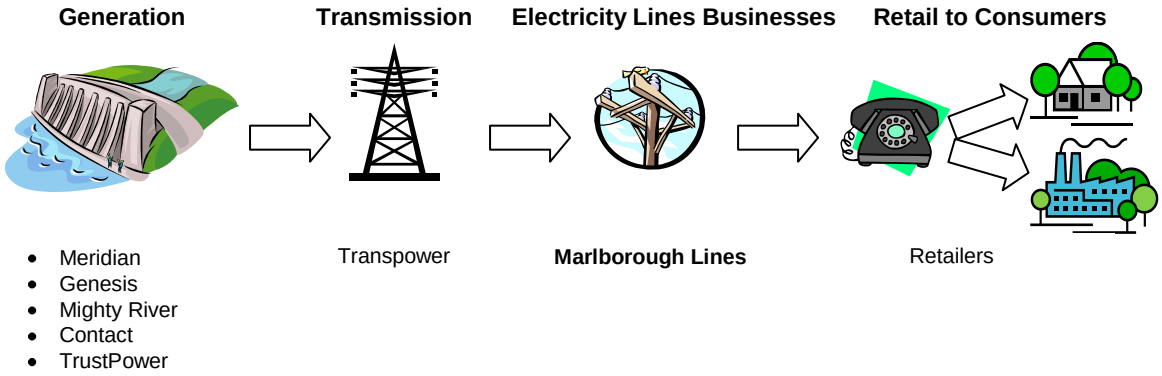

Figure 1 - Electricity Industry Structure

The wider Marlborough Lines Ltd group also includes the following entities:

- A 50% stake in Nelson Electricity. The entity for disclosure is Nelson Electricity Ltd, and its AMP is prepared and disclosed by its staff.
- A 51% stake in OtagoNet. The entity for disclosure is OtagoNet JV, and its AMP is prepared and disclosed by PowerNet in Invercargill who manage the OtagoNet assets along with those of Electricity Invercargill and The Power Company.
- A 51% stake in Otago Power Services Ltd, an electrical contracting company based in Balclutha.

The interrelationship of these entities with the various holding companies and shareholders, along with the accounting treatment of results, is described in Marlborough Lines' annual reports.

The Marlborough Lines' Statement of Corporate Intent also provides information relevant to the AMP. This AMP deals solely with the Marlborough area's electricity assets and, along with Marlborough Lines' other plans and policies, demonstrates that Marlborough Lines is responsibly managing its electricity network assets to best-practice levels.

2.2 Purpose of this AMP

This purpose of this is to provide a governance and management framework that ensures that Marlborough Lines:

- sets service levels for its electricity network that will meet customer, community and regulatory requirements.
- understands the levels of network capacity, reliability and security of supply required both now and in the future, and what issues drive these requirements.
- has robust and transparent processes in place for managing all phases of the network life cycle from initial concept to disposal.
- has adequately considered the classes of risk its network business faces, and that it has processes in place to mitigate identified risks.
- has made adequate provision for funding and resourcing all phases of the network lifecycle.
- makes decisions within systematic and structured frameworks at each level within the business, and that it especially doesn't make ad-hoc decisions.
- has an ever-increasing knowledge of its asset locations, ages, conditions and the networks likely future behaviour as it ages and may be required to perform at different levels.

Disclosure of the AMP in this format will also assist Marlborough in complying with the requirements of Section 24 and Schedule 2 of the Electricity Information Disclosure Requirements 2004.

This AMP is not intended to be a detailed description of Marlborough's assets (these lie in other parts of the business), but rather a description of the thinking, the policies, the strategies, the plans and the resources that Marlborough uses and will use to manage the assets.

This report covers the period 1 April 2010 to 31 March 2020 and was approved by the Board of Marlborough Lines on 31 March 2010.

The next report is expected to be prepared and issued in January 2011.

2.3 Planning & operating contexts

All of Marlborough's assets exist within a strategic context that is shaped by a wide range of issues including Marlborough's SCI, its' Vision and Mission, its' asset strategy, the prevailing regulatory environment, government policy objectives, commercial and competitive pressures and technology trends. Marlborough's assets are also influenced by technical regulations, asset deterioration and various risk exposures independently of the strategic context.

Issues include:

- The prevailing regulatory environment, which constrains prices, requires no material decline in SAIDI and requires compilation and disclose of performance and planning information.

- Government policy objectives, such as the promotion of distributed generation, improving public safety, and pressure to offer increasingly variable tariffs.

- Marlborough's commercial goals, which are primarily to deliver a sustainable earnings stream to the shareholders.

- The need for water to irrigate pasture land, and the associated District and Regional Council policies.

- Advancing technologies, such as gas-fired fuel cells that could strand conventional lines businesses.

- Possible changes to the Marlborough climate which may include heavier and more frequent snow storms and hotter, drier summers with scorching east winds.

- Local, national and global economic cycles, in particular the relative value of dairy products compared to other pastoral commodities that drives the rate of dairy conversions and the continued development pastoral land into vineyards and Horticulture.

- Interest rates and the general business confidence in the Marlborough community which can influence the rate at which new customers connect to lines networks, particularly dairy conversions and vineyard/irrigation development.

- Ensuring sufficient funds and skilled people are available in the long term to resource our service requirements.

It is also recognised that while Marlborough's assets and asset configuration will be shaped by the strategic issues identified in section 1.2.1 (otherwise Marlborough will cease to be relevant to its' stakeholders), the assets will also be influenced (and sometime constrained) by technical issues that are independent of the strategic context. For example the rate at which wooden poles rot is independent of the availability or otherwise of skilled contactors. This issue may constrain the rate at which Marlborough replaces rotten poles, but it does not influence the rate of rot.

A sample of issues that are independent of Marlborough's strategic context include:

- Technical regulations including such matters as limiting interference and limiting harmonics to specified levels.
- Asset configuration, condition and deterioration. These parameters will significantly limit the rate at which Marlborough can re-align circuits and transformers to fit ever-changing strategic goals.
- Physical risk exposures. Exposure to events such as salt spray, wind, snow, earthquakes and vehicle impacts are generally independent of the strategic context. Issues in which Marlborough's risk exposure might depend on the

strategic context could be in regard to natural issues such as climate change (increasing severity and frequency of storms) or regulatory issues (eg. if NZTA required all poles to be moved back from the carriage way).
- Safety requirements such as earthing of exposed metal and line clearances.
- Changes to legalisation.

2.4 Key Planning Documents

Marlborough Lines' key planning documents are:

- Vision Statement
- Mission Statement
- Statement of Corporate Intent
- Asset Management Plan

2.5 Vision

"Our Vision is to be a leader in all that we do in the distribution of electricity and related businesses for the benefit of our customers, shareholder and community".

2.6 Mission

To exceed our customers' expectations in all aspects of our operations and furnish our shareholder with a commercial return.

Our primary objectives are to:

- Operate as a successful business in the distribution of electricity and other related activities.
- Pursue the most efficient use of energy.

In achieving our objectives, we will:

- Develop and maintain customer responsive transmission, reticulation and distribution systems.
- Ensure that all resources – financial, physical and human – are utilised efficiently and economically.
- Meet our commercial and productivity targets.
- Fulfil market requirements in terms of quality and price on a competitive, commercial basis.
- Ensure the safety of all systems, plant and equipment under our control and promote electrical safety within Marlborough.
- Care for the environment and ensure that any impact of our activities is minimised or, where possible, eliminated.
- Use all legislative powers fairly and in accord with the principles of natural justice.

- Be a good employer by observing and applying best practice in all areas relating to employment.

2.7 Statement of Corporate Intent

Marlborough's SCI is a requirement under Section 39 of the Energy Companies Act 1992, and forms the principal accountability mechanism between Marlborough's board and the shareholder (the Marlborough Electric Power Trust). The SCI includes inter alia revenue and performance targets, which form the heart of the asset management activity. The SCI will be updated in April 2010. The following extracts are from the SCI 2009/2010.

Projected Parent Company Income and Expenditure 2009/10	
Income	$(000)
Network Revenue	31,647
Discounts	(6,037)
Contracting Trading	18,100
Interest Income	30
Investment Income	6,606
Other Income	7,365
TOTAL	**57,711**
Expenditure	
Transmission Charges	4,386
Trading Cost of Sales	14,003
Maintenance and Operation	13,648
Administration Expense	4,883
Interest expense	876
Depreciation	7,548
Other Expenditure	47
TOTAL	**45,391**
Net Surplus Before Tax	12,320
Taxation	2,845
Tax Paid Surplus	9,475

Projected Capital Expenditure 2009/10	$(000)
33kV Sub Transmission Assets	2,500
11 & 22kV Overhead Distribution	5,235
Low Voltage Overhead Distribution	65
Underground Reticulation	65
Zone Substations	5,835
Test Equipment	50
Radio Equipment	68
Plant and Tools	171
Vehicles	745
Land and Buildings	190
Office and Computer Equipment	266
TOTAL	**15,190**

2.7.1 SCI Performance Targets

(a) The company's performance against these targets is published each year in the Annual Report as an indication of progress against the targets.

(b) It is important to note that the percentage returns outlined in this statement of corporate intent are based on the total Marlborough Lines business. The calculations also include valuation of the company's infrastructural (Network) assets at depreciated replacement cost (DRC). The returns are stated as percentages of average shareholders funds on a pre discount tax-adjusted basis. This is a different basis to the similar calculations undertaken as part of the Commerce Commission regulatory process. In general terms the calculation of the regulatory ROI results in a lower denominator value, and a higher resultant rate of return.

(c) The company's intended financial and operational productivity targets are set out in its Five Year Model and for the coming financial year are:

(i) To achieve, in the Marlborough Lines Network business unit, a rate of return on equity of at least 4.80% (calculated according to generally accepted accounting principles). The Company will retain the medium term aim to increase the rate of return on equity to reach the target level of 10%. The actual commercial performance will be affected by any constraints imposed by Government regulation of electricity lines businesses. The Company remains committed to achieving a realistic and reasonable commercial rate of return in the medium term.

(ii) In the other business units of the Company, to achieve a rate of return on equity of at least 10% on the Company's interest in Nelson Electricity Limited, of at least 10% on its investment in the OtagoNet Joint Venture, and of at least 10% in its remaining business units. As noted above the Company is committed to achieving its target average rate of return on equity of 10% in the medium term in all of its operations.

(iii) To achieve a percentage of shareholders funds to total assets which is prudent but which is able to accommodate business expansion.

(iv) Consumer hours lost by scheduled shutdowns of the company's network to not exceed an average of 1.5 hours compared to an average of 1.68 hours for the years 2006/2007/2008.

(v) Consumer hours lost on the company's system through internal faults to not exceed an average of 2.0 hours compared with an average of 2.69 hours for the years 2006/2007/2008.

(vi) Where practicable the response times to consumer loss of supply will not exceed:

Blenheim Urban	0.5 hours
Urban Other	1.5 hours

Rural	1.5 hours
Remote Rural	8.0 hours

(vii) The company's anticipated dividend to be paid to the Marlborough Electric Power Trust in the 2009/2010 financial year will be $400,000.

(viii) The company will survey its consumer base to ascertain satisfaction levels with the company's performance on two occasions through the year.

(ix) The company will undertake to provide newsletters to all electricity consumers summarising its financial result, and including energy efficiency information and other topical matters on at least four occasions in the year.

2.8 Interaction between Planning Documents

The interaction between Marlborough Lines' major planning documents and processes is depicted in Figure 2 below. These plans are compiled annually and are subject to regular review during the financial year.

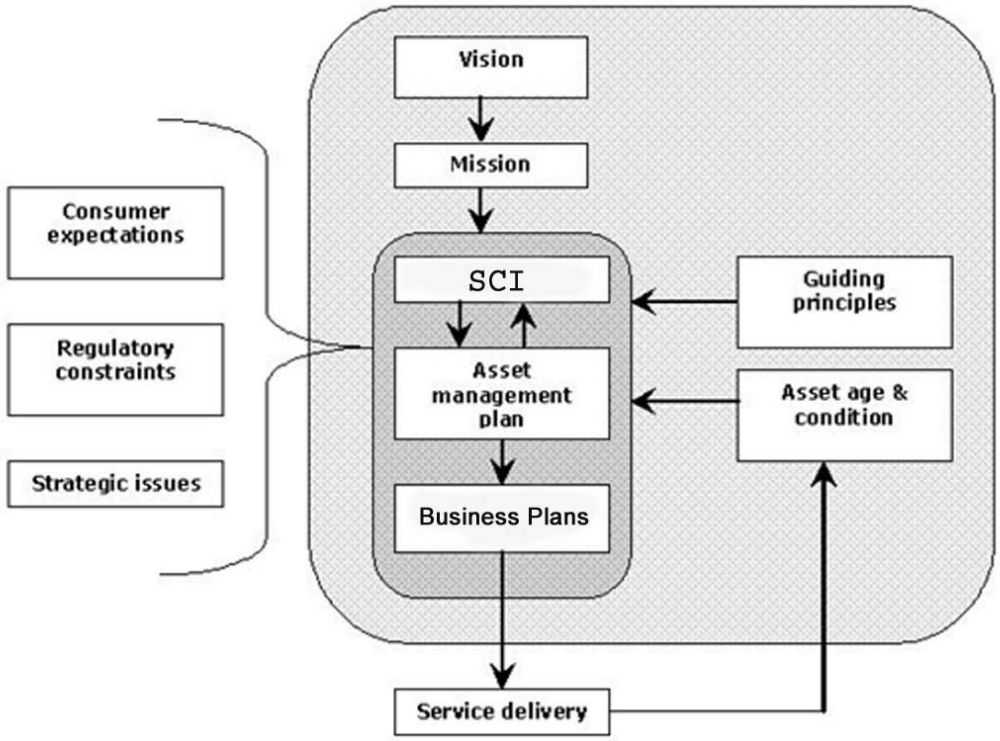

Figure 2 – Interaction between Major Planning Documents

Table 1 outlines the principal guides to decision making within Marlborough Lines.

Category	Description of guide	Decisions to be guided
Policies	Vision	All organisation decisions.
	Mission	All organisation decisions.
	Non-asset solutions	Purchasing decisions in terms of whether alternative options can be considered.
	Distributed generation	Whether distributed generation should be installed and on what terms & conditions.
	Redeployment & upgrade of existing assets	Whether and how assets should be either redeployed or upgraded.
	Purchase of new assets	Whether new assets should be purchased.
	Adoption of new technology	Whether new technologies should be adopted.
	Disposal of assets	How assets should be disposed of.
	Network Standards	How Assets are to be constructed
Plans	Strategic plan	High level corporate decisions including growth & investment and responses to competitive and regulatory issues.
	Asset management plan	Asset maintenance, operational and investment decisions.
	Risk management plan	Whether the level of risk implicit in various options falls within Marlborough Lines' approved limits.
	Contingency plan	Responses to defined contingent events.
	Annual business plan	Allocation of resources to activities.
Standards	ISO 9001:2000	Critical business processes.
	AS/NZS 4360	Risk assessment & mitigation.
	Technical eg. IEC, BS	Technical design & engineering.
	Financial eg. GAAP, FRS	Financial reporting & disclosure.
Legislation	Commerce Act 1986	Disclosure of information, restraining anti-competitive behaviour, setting appropriate tariff levels, ensuring supply reliability does not materially decline.
	Companies Act 1993	Requirement to file various returns.
	Health & Safety in Employment Act 1992	Requirement to provide a safe & healthy workplace.
	Resource Management Act 1991	Requirement to comply with all restrictions on use of natural resources defined in the district and regional plans.
Regulations	Electricity Information Disclosure Requirements 2004	What needs to be disclosed to the Commerce Commission and by when.

Table 1 - Guides to decision making

2.9 Stakeholders

Marlborough defines its stakeholders as any person or class of persons that:

- Has a financial interest in Marlborough (be it equity or debt).
- Pays money to Marlborough (either directly or through an intermediary) for delivering service levels.
- are physically connected to the network.
- Use the network for conveying electricity.
- Supplies Marlborough Lines with goods or services (including full-time labour).
- Is affected by the existence, nature or condition of the network (especially if it is in an unsafe condition).

- Has a statutory obligation to perform an activity in relation to the network's existence or operation (such as request disclosure data, regulate prices, investigate accidents, include in a District Plan etc).

Figure 3 below highlights Marlborough Lines' key internal and external stakeholder groups as well as the nature of their relationship with Marlborough Lines.

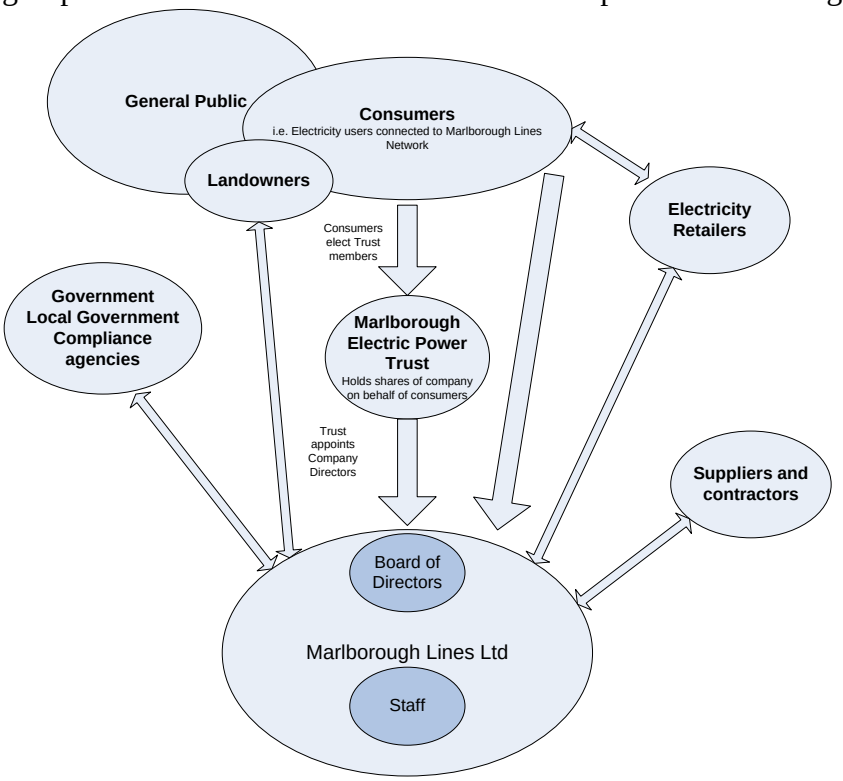

Figure 3 - Stakeholders

The suppliers and contractors group includes a wide range of business and service providers including: equipment suppliers, legal and professional advisors, bankers, insurers, Transpower, subcontractors, etc. Table 2 gives a general indication of the interest of various stakeholders.

Stakeholder	Interests					
	Viability	Price	Supply quality	Safety	Compliance	Energy Efficiency
Marlborough Electric Power Trust	✓		✓	✓	✓	✓
Bankers	✓	✓				
Connected customers	✓	✓	✓	✓		✓
Energy retailers	✓	✓	✓			✓
Mass-market representative groups	✓	✓	✓			✓
Industry representative groups	✓	✓	✓			
Staff & contractors	✓	✓		✓	✓	
Suppliers of goods & services	✓	✓				
Public (as distinct from customers)				✓		
Land owners				✓	✓	
Councils (as regulators)				✓	✓	✓
NZTA				✓	✓	
Ministry of Economic Development		✓		✓	✓	✓
Energy Safety Service				✓	✓	
EECA					✓	✓
Commerce Commission	✓	✓	✓		✓	
Electricity Commission					✓	✓
Electricity Complaints Commission			✓		✓	
Ministry of Consumer Affairs			✓		✓	

Table 2 - Stakeholders Interests

Table 3 indicates how stakeholders expectations are identified.

Stakeholder	How expectations are identified
Marlborough Electric Power Trust	• By their approval or required amendment of the SCI • Regular meetings between the directors and the trustees
Bankers	• Regular meetings between the bankers and Marlborough Lines staff • By adhering to Marlborough Lines' treasury procedure • By adhering to banking covenants
Connected customers	• Regular discussions with large industrial consumers as part of their on-going development needs • Regular customer surveys
Energy retailers	• Annual consultation with retailers, regular contact and discussion.
Mass-market representative groups	• Informal contact with group representatives
Industry representative groups	• Informal contact with group representatives
Staff & contractors	• Regular staff briefings • Regular contractor meetings
Suppliers of goods & services	• Regular supply meetings • Newsletters
Public (as distinct from customers)	• Informal talk and contact • Feedback from public meetings
Land owners	• Individual discussions as required
Councils (as regulators)	• Formally as necessary to discuss issues such as assets on Council land
NZTA	• Formally as required
Ministry of Economic Development	• Regular bulletins on various matters • Release of discussion papers • Analysis of submissions on discussion papers
Energy Safety Service	• Promulgated regulations and codes of practice • Audits of Marlborough's activities • Audit reports from other lines businesses
Commerce Commission	• Regular bulletins on various matters • Release of discussion papers • Analysis of submissions on discussion papers • Conferences following submission process
Electricity Commission	• Weekly update • Release of discussion papers • Briefing sessions • Analysis of submissions on discussion papers • Conferences following submission process • Information on Electricity Commission's website
Electricity Complaints Commission	• Reviewing their decisions in regard to other lines companies

Table 3 - Identification of Expectations

Table 4 provides a broad indication of how stakeholder interests are accommodated.

Interest	Description	How interests are accommodated
Viability	Viability is necessary to ensure that shareholders and other providers of finance such as bankers have sufficient reason to keep investing in Marlborough (and to retain ownership).	• MLL will accommodate stakeholders' needs for long-term viability by delivering earnings that are sustainable and reflect an appropriate risk-adjusted return on employed capital. In general terms this will need to be at least as good as the Trust could obtain from a term deposit at the bank plus a margin to reflect the risks to capital in an ever-increasingly regulated lines sector.
Price	Price is a key means of both gathering revenue and signalling underlying costs. Getting prices wrong has economic implications for MLL's consumers.	• MLL total revenue is constrained by the price path threshold regime. • Failure to gather sufficient revenue to fund reliable assets will interfere with consumer's business activities. MLL's pricing methodology is expected to be cost-reflective, but issues such as the Low Fixed Charges requirements can distort this.
Supply quality	Emphasis on continuity, restoration and reducing flicker is essential to minimising interruptions to customers businesses.	• MLL will accommodate stakeholders' needs for supply quality by focusing resources on continuity and restoration.
Safety	Staff, contractors and the public at large must be able to move around and work on our network in total safety.	• MLL will ensure that the public at large are kept safe by ensuring that all above-ground assets are structurally sound, live conductors are well out of reach, all enclosures are kept locked, and all exposed metal is securely earthed. • MLL will ensure the safety of its' staff and contractors by providing all necessary equipment, improving safe working practices, and ensuring that workers are stood down in unsafe conditions. • Motorists will be kept safe by ensuring that above-ground structures are kept as far as possible from the carriage way within the constraints in regards to private land and road reserve.
Compliance	MLL Lines needs to comply with many statutory requirements ranging from safety to disclosing information.	• MLL will ensure that all safety issues are adequately documented and available for inspection by authorised agencies. • MLL will disclose performance information in a timely and compliant fashion.
Energy Efficiency	As a good corporate citizen, MLL will encourage energy efficiency both within its business and for customers.	• MLL will consider losses within its system and ensure that these are minimised where practical. • MLL will assist customers by providing advice and assistance on energy efficiency.

Table 4 - Accommodation of Stakeholder Interests

2.10 Managing conflicting interests

The priorities for managing conflicting stakeholder expectations and interests are:

- Safety - MLL will give top priority to safety. Even if budgets are exceeded or non-compliance arises, MLL will not compromise the safety of its staff, contractors or the public.

- Viability - MLL will give second priority to viability (as defined above), because without it MLL will cease to exist which makes supply quality and compliance pointless.

- Pricing – MLL will give third priority to pricing as a follow on from viability (noting that pricing is only one aspect of viability). MLL recognises the need to

adequately fund its business to ensure that consumer's businesses can operate successfully.

- Supply quality – MLL will give fourth priority to supply quality as this is what makes consumers and therefore MLL successful.

- Compliance - MLL will give fifth priority to compliance except where it is safety related where it will be given highest priority.

- Energy Efficiency - MLL will give lower priority Energy Efficiency than to Compliance.

- All other considerations will be given lower priority than those listed above.

2.11 Planning periods adopted

In line with previous AMPs, a rolling 10 year horizon has been adopted covering the period 1 April 2010 to 31 March 2020. The activities for the first three years of the AMP are reasonably certain, and the activities for the first year form the basis of Marlborough Lines' 2010/2011 business plan which is currently being implemented.

The activities described in this AMP are considered appropriate to construct, maintain and operate assets that will meet projected levels of service. Should those levels of service change because of changing strategic drivers, greater or lesser levels of activity may be required subject to Marlborough Lines ability to fund those activities.

2.12 Accountabilities for asset management

Marlborough's accountabilities and accountability mechanisms are shown in Figure 4 on the following page and discussed in detail in the following sections.

The ultimate accountability is to the connected consumers, and it is therefore pleasing to note that the Commerce Amendment Bill has recognised this accountability and has removed the price path threshold for beneficially owned lines businesses.

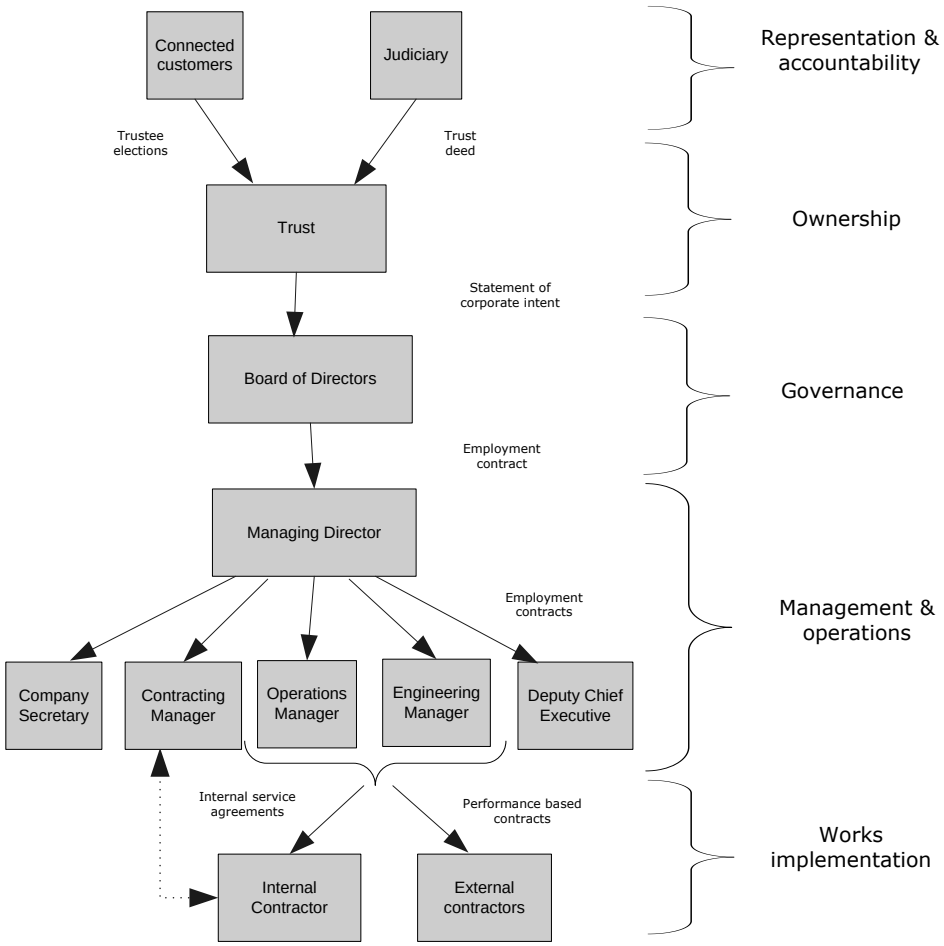

Figure 4 - Accountabilities for Asset Management

2.12.1 Accountability at ownership level

Marlborough has a single shareholder – the Marlborough Electric Power Trust. The Trust currently has six trustees, each of whom stands possessed of 4,666,650 shares in Marlborough on behalf of the Trust. The Trust members are currently:

- Mr Leo McKendry
- Mr Graeme Taylor
- Mr Paul Ham
- Mr Ross Inder
- Mr John Cuddon
- Mr Clive Ballett

The Trust is subject to the following two accountability mechanisms:

- By an election process in which two trustees are elected every year.

- By the Trust Deed which holds all Trustees collectively accountable to the New Zealand judiciary for compliance with the Deed.

2.12.2 Accountability at governance level

Marlborough currently has six directors who are collectively accountable to the Trust through the SCI. The current directors are:

- Mr Des Ashton
- Mr Ross Butler
- Mr David Dew (Chairman)
- Mr Ken Forrest (Managing Director)
- Mr Terry Shagin
- Ms Jo Buckner
- Mr Anthony Beverley

The SCI includes projected revenue and reliability measures. Equally the Board is well aware of price-quality tradeoffs in terms of the network and this information is communicated to stakeholders.

2.12.3 Accountability at Chief Executive level

The Managing Director, Mr Ken Forrest, is accountable to the directors primarily through his employment contract which sets out *inter alia* revenue and supply quality targets.

2.12.4 Accountability at management level

Accountability for asset management at the second tier is split two ways:

- Accountability for the moment by moment continuity and restoration of supply lies with the Operations Manager, Mr Brian Tapp, principally through control & dispatch, switching and fault restoration. The success of this role obviously depends on the nature and configuration of assets decided upon by the Engineering Manager.

- Accountability for managing the existing assets and planning new assets lies with the Engineering Manager, Mr Wayne Stronach. This role addresses long-term planning issues such as capacity, security and asset configuration.

Hence in the medium to long term, the Engineering Manager plays the most significant role in influencing key outcomes such as reliability, security and capacity.

Accountability for the key area of line pricing lies with the Deputy Chief Executive, Ms Katherine Hume-Pike.

Accountability for all administrative and financial activities lies with the Company Secretary, Mr Geoff Hoare. Mr Hoare does have some involvement in the asset funding and budgeting phases of the AMP.

The key accountabilities of the four second tier managers are to the Managing Director through their respective employment contracts which sets out performance targets.

2.12.5 Accountability at works implementation level

Marlborough Lines has an in-house contracting department. This operates as an separate division of Marlborough Lines Ltd. With the implementation of the Electrical Industry Reform act 1999, many lines business sold their contracting operations. Marlborough Lines recognised that it was very unlikely that real competition would be present in the Marlborough market and therefore choose to retain its contracting staff, rather than being subject to limited competition and consequent price gouging.

Marlborough Lines Contracting undertakes the majority of the work on Marlborough Lines Network for Marlborough Lines. Broadly this is:

- Construction of new assets.
- Maintenance of existing assets.
- Operation of existing assets

It also undertakes work for external customers, such as construction of line extensions.

Marlborough Lines retains relativity with prevailing market rates and undertakes testing from time to time to compare the commercial performance of the company's Contracting diversion.

The Contracting Manager, Mr Stephen McLauchlan, is accountable both to the Operations Manager for the quality of work done, and to the Managing Director for the overall profitability of the contracting business unit.

2.13 Systems & processes

Marlborough Lines makes use of a wide range of systems, processes and technology assets to capture, manipulate, store and present information derived from and about its assets. This information is continually updated as the status of the network changes (e.g. load variations, switching, faults, connection of new consumers, new investments etc). Processed information can range from single items of raw data used by operations staff in making real-time decisions to highly processed and aggregated data used by executives in making long-term decisions.

Figure 5 outlines the key information flows occurring at Marlborough Lines, while Table 5 outlines the repositories of network information. Marlborough Lines has migrated most of its paper records to computer-based systems that are available on its internal intranet.

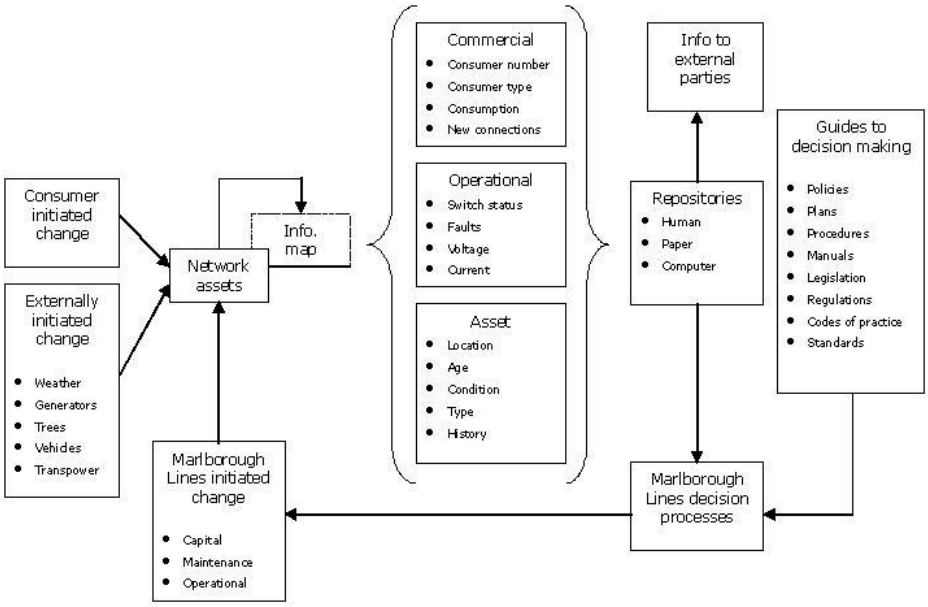

Figure 5 - Key Information Flows

Repository	Information	Key users
EMS-WASP	• Zone substation assets • Location • Technical specifications • History • Test records • Network outages	Most staff.
MapInfo	• Line asset type • Line connectivity	Most staff.
Legacy databases	• Location • Condition • History • Specifications • Test records	Most staff, although individual databases may only have 2 or 3 users.
Design records & project files	• Calculations etc	Network Contracts Engineer.
Easement records	• Land-owner details • Agreements	Operations & contracting staff.
ODV database	• All network component ages & conditions.	Most staff.
Various maps	• Asset location	Rarely used.
SCADA	• Network status eg. loads, switch positions etc. • Faults & outages • Inspection data	Operations & development staff.
Fault record sheets	• Description & duration • Likely cause	Operations manager
Switching instructions	• Operating instructions	Operations staff & contracting staff
GenTrack	• Connection data • Billing data • ICP management • Load control relays not owned by Marlborough Lines	Operations staff Deputy chief executive

Table 5 - Information repositories

Most asset information is contained in the EMS-WASP and the GIS (MapInfo) databases. These databases are synchronised, i.e. they contain data in common and new data is

entered into each system simultaneously through a database interface. As network condition monitoring has taken place, the asset positions and descriptions have been confirmed over time. The result has been databases which contain increasingly accurate information in relation to asset types and locations.

2.14 ISO system

Marlborough Lines has ISO 9001:2000 accreditation. To achieve this, formal procedures covering all aspects of the company's business have been developed. This quality management system ensures that the company's procedures and work practices meet with recognised industry best practice. Compliance with the systems procedures is integral to Marlborough Line's operations and as such, regular audits are completed.

During 2001/02 Marlborough Lines' environmental management system was accredited with ISO 14001:1996. Marlborough Lines was the first Marlborough based company to achieve this accreditation.

One of the company's key objectives is:

"Marlborough Lines will take a leadership role in environmental compliance activities and will demonstrate our commitment to caring for the environment."

This will be achieved through the avoidance or mitigation of any adverse effects of Marlborough Lines' activities upon the natural and built environment as well as the local community. All areas of Marlborough Lines operation have documented environmental policies and all staff are required to undertake their work in accord with these policies.

Where appropriate, consultation will be undertaken to assist in obtaining the best possible outcome for all affected parties.

The company also has attained the international safety accreditation of Occupational Health and Safety OHSAS 18001:1999, which is held by only a few New Zealand companies.

2.15 Network Standards

These document the design and construction of Network assets. The Network Standards are used for all assets where ownership and/or maintenance responsibility will ultimately rest with Marlborough Lines.

2.16 Information technology

The principal asset management system at Marlborough Lines is WASP, an assets & works management program, this system went live in late 2004. WASP consists of a series of modules built around a central asset register of the approximately 100,000 items that make up Marlborough Lines' network assets. The functionality covered by these modules includes;

- Asset creation, modification and deletion
- Asset attribution and attribution history
- Project and works management (including work design and estimation)
- Inventory integration
- Outage and fault management and data recording
- Maintenance management
- Reliability and regulatory reporting
- GIS (map viewer) integration

There is a strong focus on improving data quality or filling in data gaps. This has been and continues to be addressed by the following three strategies:

1. Close alignment of WASP and MapInfo (GIS) so that when data is entered the appropriate fields in both systems are updated.
2. Data mining and data base updates, where better information is found to exist in paper records or spreadsheets these are transferred to the WASP system and users are trained in the ongoing update of this data.
3. Mini data capture projects as required.

These strategies have been successfully utilised and most major asset classes are now complete with accurate and current data. The principal asset categories where better data attribution is required are:

- Zone substation ancillary equipment (i.e. battery chargers, etc)
- Vegetation management
- Low voltage overhead lines
- Low voltage underground cables
- Linking field book drawings to the GIS
- Ongoing data attribution improvement (e.g. dates)

2.16.1 Asset inspection and maintenance

A key feature of the WASP asset management system is its maintenance management module. This module connects regimes created by Marlborough Lines to asset classes within the database and can be triggered by either calendar schedules (user defined) or event triggers. For example an asset maintenance task could be calendar driven or based on a condition trigger such as number of operations or both. Please refer to section 7.2 to review the maintenance / inspection regimes utilised by Marlborough Lines.

2.16.2 Network development data support

The WASP works management system is linked through to the Finance1 financial system for inventory requisition, payroll and project / job number management. This system is completely synchronised, and period based so that costs can be aggregated and disaggregated as required to support network planning and development. For example expenditure by type, asset class and/or area can easily be achieved.

The current limiting factor on this type of analysis is the fact that the system has only been live since 2004 and the implementation of WASP and Finance1 lead to the re-classification of Marlborough Lines' account structure. The result is that any historic comparison must be manually completed to a large extent.

2.16.3 Performance measurement

All of Marlborough Lines core systems utilise Microsoft SQL databases so reporting across multiple systems is simplified. Marlborough Lines utilises Microsoft Reporting Services to track the performance of a range of asset related activities such as:

- Project and work / job number analysis
- Circuit breaker technical settings (i.e. protection)
- Inspection and testing results
- Defect reporting
- Logging database changes to signal changes required in network models (i.e. loadflow)
- Network configuration changes

All of these reports are available directly from Marlborough Lines' intranet, some are scheduled in the database and are emailed directly to subscribers where the preset conditions are met.

In addition to this capability WASP has a reliability and regulatory reporting module which has been configured to suit the information disclosure requirements of the Ministry of Economic Development and the Commerce Commission. This module is fed operational information from other WASP modules and integrated systems. For example it calculates network reliability figures (i.e. SAIDI, SAIFI, etc) based on outage data from the outage module which ties a fault to an asset and utilises the connectivity model (maintained in the GIS) and customer connection data (provided by Gentrack3).

3 Transpower Point of Supply/Transmission Lines

While the management of Transpower's assets is outside the scope of this report, nevertheless they are an essential part of the supply chain and hence a general description of the important issues are detailed here.

Marlborough Lines has a single Transpower grid exit point at Blenheim substation where supply from the national grid enters the Company's Network. Blenheim substation is currently supplied by three separate Transpower owned 110kV circuits, one from Kikiwa and two from Stoke. The Kikiwa line is an "H" structure hardwood pole line, although a number of structures have been replaced with PSC poles. This line has a summer rating of 55MVA, and winter rating of 68MVA.

The Stoke 110kV circuits are constructed on steel towers, with the two circuits currently now installed. These circuits are rated at 67MVA each.

During 2002 all South Island line businesses were required by the Grid Security Committee (GSC) to install and maintain automatic under-frequency load shedding (AUFLS) equipment on their Networks. This equipment allows automatic disconnection of two blocks of at least 16% of network load at all times in the event of under frequency events within the Transpower system. This means that 16% of the Company's total load may be disconnected if the frequency in the transmission system drops to 47.5Hz, and a further 16% disconnected should the frequency drop to 45.5Hz. Based on information provided by Transpower, such events could be expected to occur once every five years. Marlborough Lines has arranged for Transpower to provide AUFLS control relays on the 33kV circuit breakers at Transpower's Blenheim substation to comply with this grid security requirement.

The 110/33kV transformer capacity at Blenheim substation consists of two banks of three single phase 50MVA units, with one spare single phase unit on site. In the event of failure of any one of these single phase units, the Company would be restricted to a demand of 64/68MVA (summer/winter) for the estimated eight hours required to bring the spare transformer unit into service.

Transpower are in the progress of increasing the capacity and reliability of Blenheim GXP by installing a new 110/33kV transformer and additional 33kV circuit breakers.

Changes to the Transpower charging scheme mean that Marlborough Lines Peak charges are based on its contribution to the twelve highest Upper South Island Coincident Peaks. Marlborough Lines will work constructively with other Lines companies to manage the Upper South Peak. Changes have been made to MLL's load control system to allow control based on Upper South Load. It is expected that this will reduce the overall quantity of shedding.

The graph below shows the load duration curve on Transpower's Blenheim substation for the 12 months to 31 March 2008 compared to previous years.

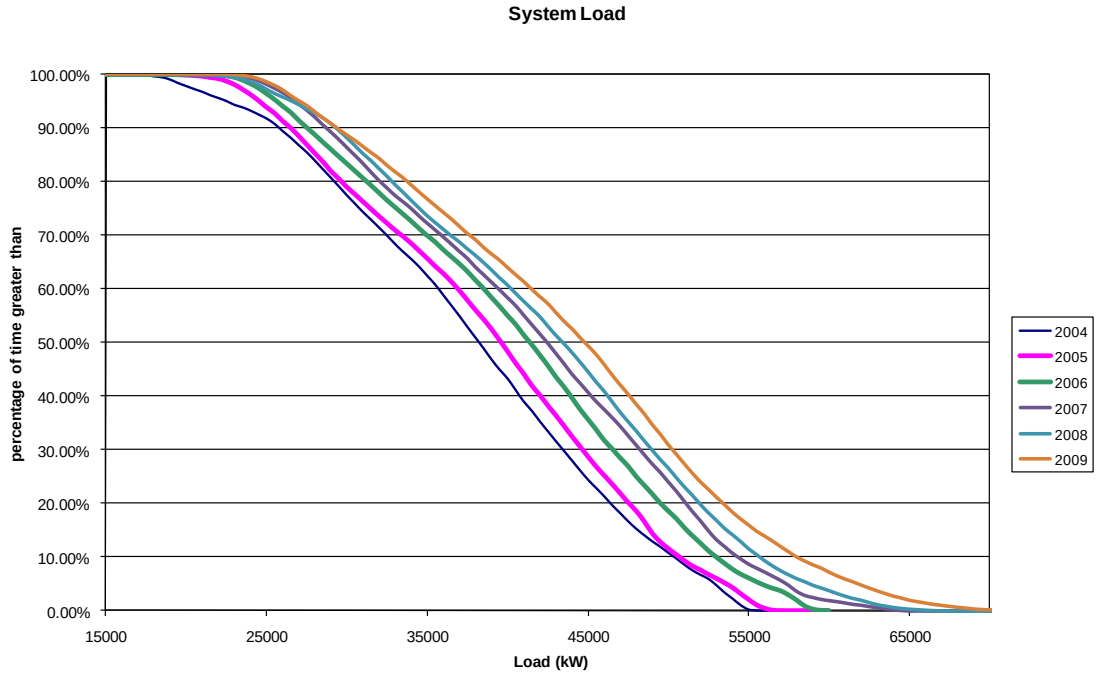

Figure 6 – Blenheim Load Duration

This graph clearly shows the increase in load as metered at the Transpower substation.

3.1 Local Generation

Trustpower operate a 2.4MW embedded 'run-of-river' generator at Waihopai. This is embedded into MLL's 33kV Network. Output of this generator is dependant on rainfall in the catchment area.

Energy 3 have installed three 250kW turbines at Weld Cone near Marlborough Lines Ward substation. These units commenced generation in February 2010 and are embedded at 11kV into Marlborough Lines Network.

Trustpower , who operate the Branch Power Scheme have been granted resource consent to extend this scheme, however this has appealed to the Environment Court. Six new power stations are proposed with one connecting to the existing Branch scheme infrastructure , four connecting to a new substation on the 110 kV line Kikiwa to Blenheim and one connecting to Marlborough Lines existing 33kV in the Wairau Valley.

4 Marlborough Lines' System Assets

Marlborough Lines' network originally began as three historically distinct networks:

- The Marlborough Electric Power Board, which commenced supply in 1927 from the 1MW Waihopai River scheme.
- The Havelock Town Board electricity department, which commenced in 1917 with a 9kW Pelton Wheel, and was merged into the Board in 1926.
- The Picton Borough Council electricity department, which commenced in 1917 with a 10kW Pelton Wheel, and was merged into the Board in 1947.

These networks are now electrically connected and operated as a single integrated system.

Marlborough Lines' assets are spread over the Marlborough area on the broad flat plain surrounding Blenheim, into the valleys of the surrounding hills and into the rugged and isolated Marlborough Sounds. Key implications of the geographical location are difficult access to some areas with many Sounds's areas only accessible by boat or helicopter.

Marlborough Lines conveys energy to 23,900 consumer connections with an after-diversity maximum demand of 70 MW. Marlborough Lines' consumers are predominantly domestic and small-to-medium commercial consumers, with the largest consumer representing approximately 3% of total energy volume.

4.1 Asset configuration

Marlborough Lines currently operates four voltage levels of assets:

- A 33kV sub-transmission network based on a radial topology with duplicated feeders that provides (n-1) security of supply to the 33kV bus at all zone substations, except Rai Valley, Linkwater and Ward.
- An 11kV distribution network based on a radial topology with some meshing in urban areas that provides additional security of supply.
- A 400V reticulation network based on a radial topology with significant meshing in urban areas. Due to the loading of many 11/0.4kV transformers this does not always provide n-1 security of supply at 400V.

Note all new 33kV construction in rural areas is currently being insulated at 66kV, and similarly new 11kV lines in rural areas are being insulated at 22kV to allow for future increases in supply voltage.

The Network area is depicted in the following Figure 7, with the 33kV zone substations shown as blue triangles and the 11kV lines shown in red.

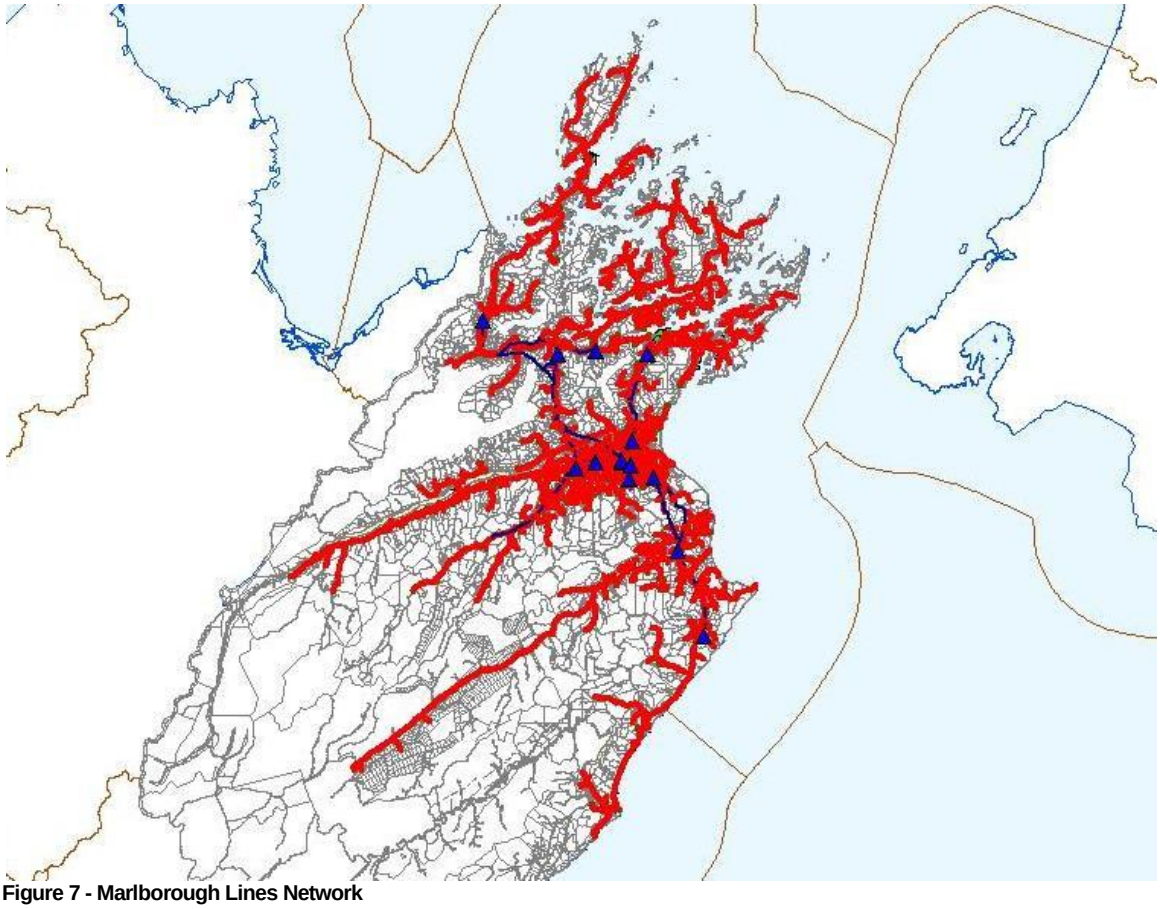

Figure 7 - Marlborough Lines Network

Each of the fourteen zone substations has between two and six 11kV feeders radiating outwards, with some meshing possible in urban areas. These feeders collectively supply 3,727 distribution transformers that range from pole-mounted 5kVA units to ground-mounted 1,000kVA units. In turn, each distribution transformer has a number of 400V feeders radiating outwards, again with some meshing possible in urban areas.

The 110/33kV transformer configuration at Blenheim GXP of two 50MVA banks limits Marlborough Lines demand to a nominal 50MVA (which can be exceeded for about 1,500 hours per year) in the event of a transformer failure. Transpower estimates it would require eight hours to bring the spare transformer into service. Transpower are currently undertaking in the progress of installing an additional transformer and additional circuit breakers at the Blenheim GXP.

4.2 Load

During 2008/2009 the Network delivered 372GWh of electricity to 23,900 customers. The peak load was 70.1 MW. The five largest loads collectively used 25GWh (6.6% of total) of electricity, while the single largest used 10GWh (2.7% of total). These loads are spread across a diverse range of activities from food processing to supermarkets.

Generally the load on the Marlborough Lines' Network consists of a large number of smaller customers and consequently while the loss of any large load would affectoperation of the Network, the effect would be relatively minor compared to the effect of changes to the economy or one of the significant industries. For example a downturn in the wine industry would have a much greater effect on the operation and development of Marlborough Lines, than the loss/gain of two or three of the largest customers.

The Marlborough Lines' Network currently has a single embedded generator of greater than 1MW at Waihopai. During 2008/2009, this generated 10.4 GWh with a peak output of 2.5MW. The generation is run-of-the-river, i.e. it has no storage and generates 24hr/7days according to the water in the river.

Trustpower, who operate the Branch Power Scheme have been granted resource consent to extend this scheme. Six new power stations are proposed with one (12.1MW) connecting to the existing Branch scheme infrastructure, four (total 38.4 MW) connecting to a new substation on the 110 kV line Kikiwa to Blenheim and one (22.3MW) connecting to Marlborough Lines existing 33kV in the Wairau Valley. The resource consent has been appealed.

Trustpower propose to connect the four to the new GXP by installing new 33kV line above the existing MLL 11kV line. Connection of the final power station, PS5 into MLL's sub-transmission Network will require MLL to construct additional sub-transmission line. MLL and Trustpower have only had very preliminary discussions regarding these proposals and no agreement for this work has been reached.

There has been considerable interest in the embedment of wind generation into Marlborough Lines' Network, and at the time of writing Weld Cone is the only site operational. This site has three 250kW machines.

4.3 Identification of assets by class

The table below identifies the major classes of assets that make up Marlborough Lines' Network:

Table 6 - Major Classes of Assets

Type	Number	Average Age	Useful Life	Replacement Cost	Depreciated RC
11kV Distribution Lines Overhead	2,152	34	64	123,893,658	58,658,074
11kV Distribution Lines Underground	127	10	48	18,410,748	14,891,193
33kV Switchgear	217	14	39	3,723,857	2,423,538
33kV Transmission Lines Overhead	290	45	69	20,863,927	8,171,475
33kV Transmission Lines Underground	14	4	45	2,919,276	2,645,623
Consumer Service Connection	28,755	27	45	12,860,783	6,196,116
Distribution Substations	11,417	21	53	45,399,767	27,102,525
Distribution Switchgear	3,060	12	37	15,241,764	10,264,866
Isolating Substations	33	27	55	515,843	265,779
Land and spares	4	n/a	n/a	7,775,438	7,775,438
LV Distribution Lines Overhead	449	43	67	15,567,386	5,767,930
LV Distribution Lines Underground	255	13	46	23,686,193	16,979,475
LV Switchgear	2,778	12	45	5,576,415	4,078,042
Scada Equipment	115	6	15	653,939	408,716
System Control Equipment	7	22	38	1,093,155	589,963
Voltage Regulators	17	20	55	1,072,341	695,866
Zone Substation	272	16	54	23,721,439	16,493,127
Subtotals				***322,975,929***	***183,407,746***

The values are based on the currently unaudited accounting valuation of Network assets as of 1/4/2009.

More detailed information on assets, including age profiles, is contained in Appendix A. It should be noted that while a significant percentage of assets are greater than the maximum life allowed in the ODV handbook, all assets are in good condition and are providing good service. Marlborough Lines' policy is to obtain minimum lifecycle cost.

4.4 Justification for asset classes

Delivery of electricity to consumers requires Marlborough Lines to own and operate the classes of assets described in sections 4.1 and 4.3.

A key measure of justifying assets is the degree of optimisation applied by the ODV valuation methodology, and accordingly Marlborough recognises that the ratio of ODRC to DRC provides a good measure of asset justification. This ratio is typically in excess of 98.8% meaning that very little optimisation is necessary.

Marlborough notes with concern that the ODV methodology includes optimisation and modern equivalent assets, which are quite clearly at odds with the way a network is incrementally planned and built over time. Marlborough believes that each incremental investment decision that contributed to the existing network was probably optimal at the time, and the application of an academic construct that excludes such investment because it is sub-optimal in aggregate is unhelpful. In practise upgrades on assets with long lives cannot be done on an incremental manner, but is a step increase in capacity or function.

Justification for each class of asset is outlined in the table below:

Asset class	Justification
33kV circuit-breakers within GXP	Provide fault interruption and switching functionality at GXP end of 33kV lines.
33kV sub-transmission network	Power transfer requirements beyond that of 11kV lines or cables.
33kV circuit-breakers within zone substations	Provide fault interruption and switching functionality at zone substation end of 33kV lines.
33/11kV transformers	Interface power transfer capability of 33kV network with flexibility and safety of 11kV network.
11kV distribution network	Power transfer requirements beyond that of 400V lines or cables.
11kV SWER line	Low consumer density does not justify more expensive configurations such as 2 or 3 phase. The single conductor configuration also eliminates conductor clashing enabling longer spans.
11kV distribution switches	Provide additional fault interruption and switching functionality on 11kV network.
11/0.4kV transformers	Interface power transfer capability of 11kV network with flexibility and safety of 400V network.
400V reticulation network	Most cost effective way of delivering supply to low capacity consumers.

Table 7 - Justification for asset classes

There are no levels of service that cannot be justified by current power engineering practice.

4.5 Mobile substations/generators

Marlborough Lines has a 900kVA mobile generator which is utilised to reduce outages when work is required on radial lines and when the total load of the customers in close proximity to the work site is within the capacity of the generator. Marlborough Lines currently has no mobile substations.

In the last year the generator was used for a total of 145 hours and saved 2.9 million customer minutes. Consideration is currently being given to the purchase of a second smaller unit (200kW).

4.6 Regional Issues

4.6.1 Marlborough Sounds

Reticulation in the Marlborough Sounds poses many unique construction and operational challenges. Most of the lines are constructed over rugged terrain, with access to many areas for construction and maintenance by way of track vehicles or helicopter. Some areas do not have road access, and can only be accessed by boat. Much of the area has a climate that encourages rapid vegetation growth, leading to the need for tree trimming and vegetation control on a 3-5 year return basis.

Lines located near the sea coast are subject to salt spray. These lines require higher levels of maintenance, with special provision required to minimise corrosion damage to conductors, salt build up on insulators, and concrete poles being subject to concrete spalling.

The Company has some 600km of 11kV distribution lines in the Sounds area, supplying approximately 1,850 consumers by way of 15,000kVA of distribution transformer capacity. Total annual energy volume for these consumers is approximately 8GWh, an average of 4,350kWh per consumer. This total includes a small number of tourism-based commercial consumers with consumption in excess of 100,000kWh per annum. Nearly 50% of the consumers use less than 2,000kWh per annum.

These statistics demonstrate the very low load factor on these lines, the low distribution transformer capacity utilisation and the low population density. The maximum demands on the various lines supplying Marlborough Sounds' areas generally occur over long weekends or public holiday periods – Easter, Christmas, Queens Birthday or Labour Weekend. The very nature of these consumers' holiday occupation lead to much lower diversity of demand than would traditionally be expected from more usual areas.

All these various factors increase both the cost of construction and operation/maintenance of the distribution system substantially. A significant issue facing the Company regarding reticulation in this area is associated with load growth or supply enhancement. Many of the existing lines are built on private or government-owned land and constructed in the 1960s and 1970s, with access protected by the "existing works" provisions of the Electricity Act. The Company has minimal easements over line routes. Therefore, any upgrade to the capacity of the lines which necessitates further supports being erected will require easements to be created. This is a difficult and time-consuming process. Any future major developments in the Marlborough Sounds area will require very careful analysis and design of both asset and non-asset (eg. demand control) alternatives to ensure the optimal solution is found.

A further issue with respect to lines in the Marlborough Sounds is that of supply reliability. The various lines supplying sections of the Marlborough Sounds are all radial/spur lines, with no interconnection to other parts of the Network. Faults on the Network will therefore result in supply being interrupted to consumers supplied from that section of the Network until that fault is repaired.

The Company has installed automatic switching devices (sectionalisers, reclosers etc.) at various points along each of the radial spurs, to minimise the areas affected by faults to the system. There is however a practical limit to the number of such switching devices that can be installed. With the extension of the deducted SCADA radio system, several of these switching devices are planned to have remote operation fitted to reduce travel time for trial restoration.

In recent years, Marlborough Lines has expended significant capital in fitting larger possum guards to poles throughout the Sounds, in an attempt to minimise the number of momentary interruptions caused by possums coming in contact with the lines. This work has resulted in a significant reduction in the number of such interruptions.

Many areas in the Sounds are subject to severe wind storms. Marlborough Lines has an ongoing programme of vegetation control in an attempt to minimise interruptions caused by tree branches etc. being blown across the lines. There is however a practical limit to the amount of vegetation control which can be undertaken, particularly given the sensitive environment in which these lines are constructed and the distances that branches can be blown.

It is not realistic to expect that reliability to consumers in the Marlborough Sounds area can be further significantly improved. The Company believes it has reached the point where the costs of additional work to improve reliability would far outweigh the benefits. Any major improvement in reliability in this area would require capital investment of tens of millions of dollars, with corresponding large increases in line charges.

In order to improve supply, it is proposed to use mobile generators to supplement supply over high load holiday periods. This will defer expenditure, but is not considered a long term solution. Distributed generation operated by others could offer benefits, depending on numbers, locations and availability.

4.6.2 East Coast

The East Coast consists of a narrow strip of land along the region's southern seacoast with some sparsely populated river valleys running into the centre of the South Island. Much of the Network in this area was constructed in the late 1950s using concrete poles and copper conductors. The long radial nature of the area means that there are no alternative supplies available during faults or planned outages. The low population density makes it difficult to justify the high levels of expenditure required to provide alternative supplies.

4.6.3 Asset Lives

The ODV handbook assigns maximum lives of 45 years for wooden poles and 60 years for concrete poles. The experience in Marlborough is that poles (in particular treated pine and concrete) last much longer than this. Hardwood poles, including larch, are starting to give problems, and for these 45 years seems a reasonable estimate of useful life.

Concrete and treated pine poles are showing little if any signs of aging. In the last ten years, there have been less than ten treated pine or concrete pole failures and/or

replacement due to signs of aging out of a total population of approximately 25,000. Most of the failures have been due to adverse environment, e.g. salt spray on concrete poles.

For concrete poles 70 years is a conservative estimate which may be extended as poles age and more data on actual failures is obtained. Similarly for treated pine poles 55 years is a conservative estimate which may be extended as poles age and more data on actual failures is obtained.

Lines built in 1927 on steel towers are still in service, however some sections of the original lines have now been upgraded to steel poles. In dryer locations (generally across farmland as opposed to alongside tar-seal roads) the towers continue to give good service.

These lives are consistent with the environment in Marlborough being relatively benign, compared to other areas of NZ, without the extremes of rainfall/wind/temperature that many other regions experience.

5 Proposed Service Levels

Marlborough Lines' assets provide connected consumers with a bundle of service levels for a monthly line charge (paid to Marlborough Lines indirectly via the energy retailer). The principal service levels include:

- Capacity, as required by consumers (a 63A fused connection for a typical domestic consumer).

- Reliability and security. This is more difficult to quantify as the linkage between charges and the level of service is not immediately obvious or apparent. Consumer research indicates that generally Marlborough Lines' consumers are happy with Marlborough Lines and the direction the Company is taking with some wanting improvements in reliability, and very few wanting the option of paying less for lower reliability. In any event it is not practical to provide a quantifiable lower level of supply and the reduced cost of such a supply for a single consumer supplied as part of a group.

- Voltage stability. Consumers are becoming increasingly sensitive to sags, surges, spikes and flicker which interfere with electronic equipment. Moreover industrial processes that have sufficient mechanical or thermal inertia to ride out sags and surges are now often controlled by sensitive controllers that initiate a shut down sequence during voltage excursions. It is acknowledged that some voltage excursions can result from Transpower or Marlborough Lines' assets but by far the most problems are caused by either consumers' own or neighbouring consumers' equipment such as arc furnaces, welders and big motors imposing flicker or dragging down the line voltage. Addressing this is largely a matter of advising electricity consumers on the best way to overcome their problems.

Additional service features that consumers may want are:

- Accuracy of billing.

- Prompt fault restoration.

- Friendly & helpful service.

- Prompt resolution of complaints.

It is to be noted, however, that the current industry structure in which the energy retailer is usually the first point of consumer contact makes it difficult for Marlborough Lines to influence these factors. Many end-users do not understand or differentiate between their provider of Network services and their energy retailer.

The principal customer oriented measures of service are SAIDI, SAIFI and CAIDI.

5.1 Consumer service levels

5.1.1 Network Service levels

The principal consumer oriented targets set by Marlborough Lines are:

- SAIDI, SAIFI and CAIDI.
- Number of faults per 100km broken down by voltage.
- Supply Restoration in accordance with Network Supply Restoration Objectives.

Class of Supply	Range of Demand (MVA)	Typical Example	MD to be met after:	
			First Fault	Second Fault
D1	0 to 1	Urban LV eg Blenheim CBD	within 0.5 hour 50% of load within 1 hour 100% of load	repair time
D2	0 to 5	Radial feeder	repair time	repair time
D3	5-20	Zone Substations	within 2 hours – 50% of load repair time 100%	repair time
D4	0 to 5	Urban Feeder	within 0.5 hour 50% of load within 1 hour 100% of load	repair time

Table 8 - Network Supply Restoration Objectives

Marlborough Lines regularly undertakes surveys of consumers' views. These continue to indicate that consumers are very satisfied with Marlborough Lines' performance and the direction the Company is taking. Consumers generally want to see improvements in reliability, although most do not wish to pay more for an increase in reliability

Key reliability targets are summarised below in Table 9 and Table 10 respectively.

Measure	Target 2010/11 and beyond
Class B SAIDI	90
Class C SAIDI	120
Total SAIDI	210
Class B SAIFI	0.35
Class C SAIFI	1.44
Total SAIFI	1.79
Class B CAIDI	251
Class C CAIDI	81
Total CAIDI	115

Table 9 - Target SAIDI, SAIFI and CAIDI

Measure	Target 2010/11 and beyond
Overhead 33kV	<5
Underground 33kV	-
Total 33kV	<5
Overhead 11kV	<260
Underground 11kV	-
Total 11kV	<260

Table 10 – Target Maximum number of faults

5.1.2 Non-network service levels

Marlborough Lines also monitors a range of non-network service levels such as:

- Promptness of new connections.
- Handling of complaints
- Overall consumer satisfaction.
- Speed of fault restoration.

5.2 Non-consumer service levels

It is noted that other parties or organisations can impose some service levels and/or costs that are not the consumer's wish or direct requirements, and that these service levels may impose costs that consumers would not otherwise wish to fund. For example NZTA may wish to underground overhead power lines to reduce the hazard to traffic, however the consumer may prefer to have overhead lines to reduce the cost of supply.

5.2.1 Disclosure requirements

Schedule 1 to the Electricity Information Disclosure Requirements 2004 also requires several other measures to be disclosed which relate more to the efficiency of the lines businesses:

- Load factor (ratio of average demand to maximum demand). This is influenced by the manner in which load control (primarily hot water cylinders) is used. Currently Transpower charges are based on the maximum demand on the Blenheim GXP at the time of maximum demand on the upper south island. This means that at other times, there is no financial incentive to cut hot water supply to houses. The effect on this is to reduce load factor since on high load days in Marlborough, but low load in the upper south island there is little load control. Once further experience is gained with this method of controlling our target for load factor may need to be revised.

- System losses (ratio of energy lost to total energy entering the system). The volume of electricity sold, from which the volume lost is derived, is based on data provided by the electricity retailers trading on Marlborough Lines' system. Because Marlborough Lines has no control over the reliability of this data, Marlborough Lines cannot offer any warranty that the calculated volume of energy lost in any year is accurate. In general terms the losses derived for the Marlborough Lines network are consistent with those expected for a network of this kind i.e. a predominantly radial network supplied from a single point of supply and with a lesser number of customers per transformer than in a purely urban area. Work is being undertaken to improve the reliability and accuracy of this data.

- Capacity utilisation (ratio of maximum demand to installed transformer capacity). Marlborough Lines capacity utilisation has declined and is expected to decline further as the classes of load that don't contribute to the (winter) maximum demand increase. For example baches in the Sounds, wineries and irrigation all require transformer capacity, but make little or no contribution to winter maximum demand, thereby reducing the capacity utilisation.

Marlborough Lines' targets for these measures are summarised in Table 11 below:

Measure	Target
Load factor	65%
System losses	7%
Capacity utilisation	21%

Table 11 - Summary of efficiency measures

During 2006/07 changes to the company's network construction standards were aimed at reducing the number of transformers being installed. But many of the sites under development are for irrigation where single use, larger transformers are required to reduce the impact on other customers, hence leading to relatively poor capacity of utilisation and also affecting load factor.

5.2.2 Electrical codes of practice

The various Regulations and Codes Of Practice made pursuant to the Electricity Act 1992 impose explicit levels of service on Marlborough Lines. These include such matters as:

- Maintaining safe clearances from live conductors (NZECP34:2001).
- Power system earthing (NZECP35:1993).
- Harmonic levels (NZECP36:1993).
- SWER load limitation to 8A (NZECP41:1993).

5.2.3 Other legislation

Implied levels of service are derived from the following legislation:

- The Resource Management Act 1991 which implies levels of environmental performance that benefit the wider community.
- The Health & Safety In Employment Act 1992 which implies levels of personal safety that benefit Marlborough Lines employees and contractors.

5.2.4 Local government

The District Plan requirement to underground new works in some areas creates a level of reliability beyond which consumers may desire, and at a significant extra cost.

5.2.5 New Zealand Transport Agency (NZTA)

NZTA's increasing requirement to underground works along road corridors and pressure to underground existing works will impose significant extra costs which consumers and society may not wish to meet, and which may be difficult to justify in economic terms.

5.3 Justification for targets

Justifying target levels of reliability is complex. In a perfect world, the target for SAIDI would be zero rather than the 210 minutes Marlborough Lines targets for 2010/2011.

The reasons Marlborough Lines targets 210 SAIDI minutes instead of some other lesser (or greater) figures are broadly as follows:

- The network has an inherent reliability that has been shaped by policies and standards dating back many years that have long-term implications. To make significant changes to reliability, similar changes in expenditure would be required. Rather than targeting step changes, the Company is constantly looking at ways to make incremental improvements in reliability.

- Each additional dollar of expenditure on reliability delivers a diminishing improvement in reliability. Accordingly it is necessary to balance the expenditure on reliability with customer expectations of service and cost. Customer surveys continue to indicate a very high level of satisfaction with Marlborough Lines performance and accordingly, it is considered that the current balance is acceptable.

- Customer surveys indicate that customers generally want to retain or improve the current levels of reliability. There is no desire on the part of customers to see reliability reduced.

- Expenditure on the Network assists in achieving long term reliability, however in the short term it affects the reliability as shutdowns are required to undertake the work and assets tend to fail when they are new or old, i.e. there are a certain number of faults and outages associated with undertaking expenditure.

- Over the last ten years, Marlborough Lines has only bettered the target of 210 minutes once. This suggests that possibly the target should be increased, and it is conservative.

Hence Marlborough Lines justifies its target SAIDI on customer's expectations of service and what is reasonable with the current funding and asset characteristics.

This plan is based on incremental improvements on current performance. However, changes in reliability will be gradual and reflect realistic improvements. A line built with 30 year old insulators where one cracks each year will not immediately show up as an endemic failure but as records of failure grow, proper plans can be put in place to carry out an orderly replacement of either the area immediately affected or the complete line.

6 Development & Lifecycle Plans

Marlborough Lines undertakes capital and maintenance expenditure in a timely manner to ensure that appropriate levels of Network service and reliability are provided. The Asset Management Plan assumes that Marlborough Lines ability to invest and maintain the Network, now and in the future, is not constrained. Should future expenditure be limited or constrained, then reductions in Network service levels and reliability are likely.

Long-term investment in the Network is dependent on the company being able to achieve an appropriate level of commercial return.

Marlborough Lines' fixed assets exist to provide a range of service levels in return for a monthly line charge. The key service levels are capacity, reliability and security of supply. Capacity tends to be the primary driver as reliability and security of supply tend to follow capacity rather than vary independently.

6.1 Planning criteria

Marlborough Lines has adopted a range of planning processes and technical and engineering standards to ensure that the fixed assets required to deliver service levels generally meet the following requirements:

- Minimise over-investment.
- Minimise risk of long-term stranding.
- Maximise operational flexibility.
- Maximise the fit with organisational capabilities such as engineering and operational expertise and vendor support.
- Comply with environmental and public safety requirements.
- Are appropriate, e.g. in the Sounds fit within the context of low consumer density.

The basic planning unit is the 11/0.4kV transformer which typically supplies 50 to 100 urban domestic consumer interfaces, or a lesser number of either rural domestic consumer interfaces or commercial/ industrial consumer interfaces.

The key criteria considered for the 11/0.4kV distribution substation is its maximum demand. The maximum demand indicator(MDI) or electronic load logger of distribution substations of greater than 200kVA are recorded (usually during winter) and any distribution substation which has an MDI greater than 90% of its kVA rating is earmarked for replacement with a higher capacity transformer. Transformers smaller than 200kVA generally have lower numbers of connections and the maximum loading is assessed when additional connections are made.

The increases in load are then reflected up-stream through the various classes of Marlborough Lines assets back to the Transpower GXP. The load on all 11kV feeders, zone substations and the 33kV feeders is continuously monitored and the data used for system modelling and project planning purposes.

6.2 Trigger points for planning purposes

Marlborough Lines has a broad range of criteria that represent trigger points for triggering remedial action across its varying classes of fixed assets, these are summarised in Table 12.

Asset class	Capacity criteria	Reliability criteria	Security of supply criteria	Voltage criteria
400V reticulation network	Unusual for 400V conductor to be limiting factor.	Blenheim CBD – 50% of load restored with 0.5 hours of fault, 100% within 1 hour Elsewhere – restored within repair time	(n) security of supply for standard residential or commercial connection	Voltage falls below 0.94pu at consumers point of supply
11/0.4kV distribution substation	90% of transformer kVA rating	Blenheim CBD – 50% of load restored with 0.5 hours of fault, 100% within 1 hour Elsewhere – restored within repair time	(n-1) security for most urban distribution subs N security for most rural subs	
11kV distribution network	Current exceeds 90% of thermal rating for more than 15 hours per year	Meshed Feeder - 50% of load restored with 0.5 hours of fault, 100% within 1 hour Radial Feeder – repair Time	(n-1) security for most of the urban 11kV network (n) security for rural 11kV network	Voltage falls below 0.95 pu for more than 100 hours per annum
11kV distribution hardware	90% of regulator rating. Load current exceeding RMU rating			
33/11kV zone substation	90% of firm capacity ability to comply with Supply Restoration Guidelines	50% of load restored within 2 hours of fault	(n-1) > 5MVA (n) < 5MVA	
33kV sub-transmission network	Current exceeds 66% of thermal rating for more than 1500 hours per year		(n-1) > 5MVA (n) < 5MVA	

Table 12 - Summary of planning "trigger points"

There are a range of options available when trigger points are exceeded:

- 'Do nothing', and simply accept that one or more criteria has exceeded a trigger point. In reality, 'do nothing' options would only be adopted if the benefit-cost ratio of all reasonable options were unacceptably low and if it was considered that the 'do nothing' option did not represent an unacceptable increase in either safety, commercial or regulatory risk to Marlborough Lines. The low consumer density and low kWh consumption in many parts of the Sounds typify such occurrences of low benefit-cost ratios – the cost benefit ratio involved in correcting minor mismatches (e.g. low voltage for a few hours per annum) are simply too low.

- Construct new distribution assets that will move (generally increase) an assets trigger point to a level at which it is not exceeded. An example would be to replace a 300kVA distribution transformer with a 500kVA transformer so that the 90% MDI criteria is not exceeded.

- Modify distribution assets so that the assets trigger point will move to a level that is not exceeded. This is essentially a sub-set of the above approach, but will generally involve less expenditure. An example would be installing forced cooling on a 33/11kV transformer to allow a greater maximum demand at a lower cost than installing a bigger transformer that might be under-utilised a lot of the time.

- Retrofitting high-technology devices that can exploit the features of existing assets (including the generous design margins of a bygone era) which moves the asset's trigger point. Examples might be SCADA monitoring of transformer core temperatures to enable higher cyclic loadings instead of installing a higher rated transformer, or using remotely switched air-breaks to improve reliability.

- Operational activities that alter the asset's activity level relative to the trigger point, in particular switching on the 11kV to shift load from heavily-loaded to lightly-loaded zone substations to avoid new investment. The downside to this approach is that it may increase line losses, reduce security of supply, or compromise protection settings.

- Construct distributed generation so that neighbouring distribution assets performance is restored to a level below their trigger points. Distributed generation would be particularly useful where additional distribution assets could eventually be stranded or where primary energy is going to waste eg. steam from a process. The most likely application for distributed generation in Marlborough Line's context would be diesel generators in the Sounds.

- Influence consumers to alter their consumption patterns so that assets perform at levels below the trigger points. Examples might be to shift demand to different time zones, negotiate interruptible tariffs with certain consumers so that overloaded assets can be relieved, or assist a consumer to adopt a substitute energy source to avoid new capacity. It is noted that the required separation of lines and energy functions does make demand management very difficult if not impossible.

Table 13 summarises these approaches.

Approach	Effect on asset's activity level	Effect on assets trigger point
Do-nothing	Activity level exceeds trigger point	Nil
Construct new assets	Nil	Move, typically upwards
Modify assets	Nil	Move, typically upwards
Retrofit hi-tech devices	Nil	Move, typically upwards
Operational activities	Reduce activity level to below trigger point	Nil
Install distributed generation	Reduce activity level to below trigger point	Nil
Influence consumer behaviour	Reduce activity level to below trigger point	Nil

Table 13 - Summary of approaches to trigger points

In identifying solutions for meeting future demands for capacity, reliability and security of supply, Marlborough Lines considers options that cover the above range of categories. The costs and benefits of available options are considered (taking into account the benefits of environmental compliance and workplace/public safety) and the option yielding the greatest benefits to Marlborough Lines will generally be adopted, if it meets consumer's reasonable expectations.

6.3 Quantifying new capacity

The theoretical starting point for quantifying new capacity is to build just enough just in time, and then add a bit more over time. However Marlborough Lines recognises the following practical issues:

- The current regulatory constraints on investment and ability of the company to obtain a commercial return on investment.
- The standard size of many components (which makes investment lumpy).
- The one-off costs of construction, consenting, traffic management, access to land and reinstatement of sealed surfaces (which make it preferable to install large lumps of capacity and not go back to the site).
- The addition of extra capacity can in some cases require complete re-construction (for example where larger conductor requires stronger poles or closer pole spacings), leading to considerable increases in total cost of ownership if an incremental approach is used at the outset.

Marlborough's guiding principle is therefore to minimise the level of investment ahead of demand whilst minimising the costs associated with doing the work.

6.4 Demographics

At the time of the 2006 Census, Marlborough's network area had a normally resident population of about 42,500 people, which was a 7.6% increase from the 2001 Census. Of this population, about 23,000 live within the urban Blenheim area. Key demographic features of the network areas resident population are:

- An older population than the national average, with a median age 6 years greater than the national median, and about 35% more people aged over 65.
- A less-well educated population than the national average.
- An average dwelling occupancy of about 2.5 people per household.
- Low deprivation, with phone, mobile phone and internet penetration rates comparable with the national averages.
- Significantly lower unemployment than the national average however the most common occupational class of labouring is almost twice the national average.
- Wages slightly lower than the national median across all age groups.
- Household spending levels slightly lower than the national median.
- A higher level of home ownership than the national average.

The key demographic implications for Marlborough are therefore steady population growth, lower levels of discretionary spending in the community at large, and an increasing proportion of connected consumers shifting to retirement-level incomes.

6.4.1 Key economic activities

Marlborough's key economic activities include:

- Grape growing and associated wine making.
- Fishing, farming of shell fish and associated processing.
- Pastoral farming.
- Forestry.
- Woodbourne air force base.

The area's fortunes will therefore be strongly influenced by:

- Markets for consumer delicacies such as wine, mussels and salmon.
- Any changes to the climate that alter grape growth.
- Markets for dairy products.
- Markets for processed timber.
- Government policies on forestry and nitrogen-based pastoral farming.
- Government policies on siting of major defence installations.
- Access to water for crop and stock irrigation.

The impact of these issues is broadly as follows:

Issue	Impact
Shifts in market tastes for wines, mussels and salmon.	• May lead to a expansion/contraction of demand by these industries. The conversion of pastoral land into vineyards is continuing, with land previously thought not suitable for grape production now being converted. This leads to increase in demand in areas where electrical load had been static for many years.
Government policy on nitrogen-based farming	• May lead to contraction of dairy shed demand. • May lead to contraction of dairy processing demand.
High milk prices	• May lead to further conversion of pastoral land to dairying and subsequent increases in demand
Access to water.	• May lead to increased irrigation demand.
Government policy on siting defence installations.	• Could lead to a significant contraction of demand at a single site, followed by a knock-on decline in disposable income in the community.
Lack of Generation and/or electricity supply nationally.	• May lead to reductions in demand as alternative energy sources are more widely utilised.

Table 14 - Impact of Key Economic Activities

6.4.2 Other drivers of electricity use

Other drivers of electricity use include:

- Low inland temperatures during winter (-5^{o}C frosts are common in many areas beyond the Blenheim flats).
- The use of these heat pumps as air conditioners in the summer time

6.4.3 Energy & demand characteristics

Key energy & demand figures for Marlborough's network the year ending 31 March 2009 are as follows:

Energy	Max demand	Load factor	Long-term trend
372 GWh	68.7 MW	62%	Load is increasing at approx 3% p.a.

Table 15 - MLL 2008 Key Network Values

The following base assumptions are used for demand forecasts:

- The resident population will continue to grow at about the current rate.
- Existing major loads will remain for the entire planning horizon.
- The Riverlands' industrial estate will continue to grow at approximately the current rate for the entire planning horizon.
- Vineyard conversions of land in the lower Wairau Valley will continue to grow at approximately the current rate for the entire planning horizon.
- Vineyards will continue to extend into more remote areas for the entire planning horizon until the risk of localised frost becomes too great.

- The mussel and salmon industries will continue to grow at the current rate for the entire planning horizon.

- The current cycles of forest harvest will continue.

- Load Control measures will continue to be used at the same level.

- Generation will be available to supply loads and Transpower will provide and maintain the assets required to deliver supply to Marlborough Lines.

- Embedded Wind Generation is likely to proceed, however it will not be sufficiently diverse or reliable to allow reductions in investment in the Network or reduce the demand forecast. It is likely that this may be a driver for more investment as Generation companies require additional capacity to allow export of energy.

- Demand-side management is assumed to have no real effect on load growth and Network capacity requirements. Until prices increase substantially, it is considered that this will have little effect on load growth, which is mainly driven by economic factors.

- The current recession will have a damping effect on growth and tend to slow growth in the next few years.

Consideration is also given to the general and regional economic outlook. Resource consent applications to Marlborough District Council are evaluated and recorded. These indicate the level of development in various areas for either subdivisions or specific land use such as irrigation. To date there has been good correlation between consents and short to medium term load growth.

Nevertheless, forecasting of future demands always has a high degree of uncertainty. Actual demands are the result of the complex interaction of a series of factors, some of which are impossible to predict. For example, good weather and good forecasts prior to Easter, coupled with a cold snap on Good Friday will result in massive loadings on the Sounds supply, while consistently cold weather will probably result in more normal loadings.

The Table below shows the historical growth rates and the rate used for planning purposes.

Description	Growth over last year	Annual Growth Over Last 5 Years	Annual Growth Over Last 10 Years	Rate used for planning purposes
Maximum Demand	4.9%	4.6%	3.2%	3.2%
Energy	5.0%	2.7%	3.0%	2.7%
Transformer capacity	3.0%	3.7%	4.2%	3.0%

Table 16 - Overall Growth Rates

In looking at overall growth, a value of 3.2% for maximum demand growth and 2.7% for energy have been used. In the event that the actual rate is less or greater than this, the effect will be to delay or bring forward work, i.e. it will generally only affect the timing of projects. Marlborough Lines' historical demand and projected demand are shown in Figure 8, while Table 17 disaggregates the projected growth over the 14 zone substations.

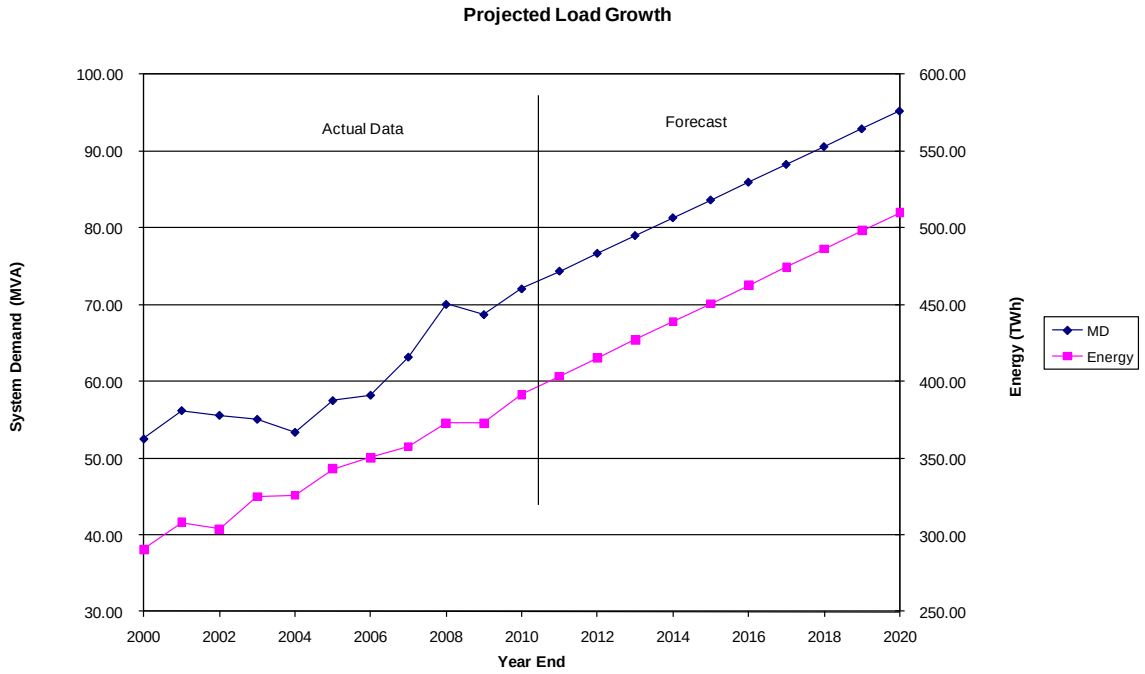

Figure 8 - Projected Load Growth

6.4.4 Zone Substation Demands

Substation	MD 2009	Increase % Last Year	Estimated Increase % pa Long Term	T1 Capacity kVA	T2 Capacity kVA	Esimated MD 2015	Reserve 2015 (n-1)	Estimated MD 2020	Reserve 2020 (n-1)
Leefield	910	0%	9%	5000		1300	3700	2000	3000
Linkwater	3960	18%	3%	5000	5000	4500	500	5200	-200
Havelock	2770	14%	3%	5000		3200	1800	3800	1200
Nelson St	12830	3%	1%	16500	16500	13300	3200	13900	2600
Picton	7700	6%	1%	16500	16500	7900	8600	8100	8400
Rai Valley	2200	4%	0%	3000		2200	800	2200	800
Redwoodtown	16540	0%	2%	16500	16500	18600	-2100	20900	-4400
Renwick	8190	2%	0%	10000	10000	8200	1800	8300	1700
Riverlands	10920	14%	8%	10000	10000	15800	-5800	23100	-13100
Seddon	5350	5%	4%	10000	5000	6600	-1600	8200	-3200
Spring Creek	3780	6%	3%	5000	5000	4400	600	5100	-100
Springlands	13860	10%	5%	16500	16500	17600	-1100	22400	-5900
Ward	1030	-2%	3%	2000	2000	1200	800	1400	600
Woodbourne	7940	4%	1%	10000	10000	8400	1600	8900	1100

Table 17 - Zone Substation Loadings and Growth

The short term changes in maximum demand in the above table highlight the volatility of using maximum demands for planning. Many of the changes are due to short term measures such as changes in the open points in the Network and /or temporary loading due to work being undertaken. In addition the weather has a significant effect on any particular year's maximum demand, particularly in areas of significant domestic installations.

For planning purposes a long term growth figure is used which takes into account the factors identified in section 6.4.3 and uses the actual changes in installed transformer capacity and the changes in energy as a basis for assessing the likely future load growth.

A key implication of increasing demand is that the percentage of time for which a stated level of security is available will decline (assessed from load duration curves). When this percentage declines to a level that is considered unacceptable, security reinforcement will occur. What is "unacceptable" will depend on the precise circumstances, in particular the proximity of other assets from which additional security can be obtained.

From the table above, in the absence of any further development, Redwoodtown, Riverlands, Seddon and Springlands will be loaded beyond their n-1 level by 2015.

Waters Zone substation is currently under construction and has two 16.5 MVA transformers. It is located in the south east of Blenheim and will reduce the loading on Redwoodtown, and may assist in reducing it slightly on Springlands.

Riverlands substation is also currently operating beyond its n-1 capacity. Increased industrial development, along with Marlborough District Council plans to upgrade the

waste water treatment at Hardings Rd, mean that increased capacity in this area is required in the short term, accordingly Cloudy Bay substation will be built in 2011/2012

To improve the security of supply in the Seddon region, one of the existing 5MVA transformers will be replaced with a 10 MVA unit in 2012/2013. The 5MVA unit will be installed at Rai Valley in 2014/2015.

To improve the capacity of Spring Creek and reduce loading on Springlands, this substation will be upgraded to two 10MVA units in 2018/2019. The precise timing of this will depend on actual load growth in this area.

6.5 Configuration analysis

Marlborough Lines has identified the following issues in regard to its current use of 33kV, 11kV and 11kV SWER configurations:

- The continuing growth of vineyards into remote areas is rapidly exceeding the distance over which 11kV lines can adequately supply. To address this and the overall problems associated with load growth in rural areas and the difficulties of constructing new lines, all distribution renewals or extensions outside of urban areas will be at 22kV.

- Load growth in many areas supplied by SWER may merit conversion to 2 or 3 phase 11kV or conversion to 22kV. In some cases conversion is also driven by the requirements of ECP41.

6.6 Reliability assessments

Marlborough Lines places great emphasis on reliability of supply, and systematically investigates all recurring interruptions to identify the source of interruption. There are no areas that cause on-going reliability concerns.

Table 10 in the previous section outlines Marlborough Lines' target number of faults for each class of line.

6.7 Constraints

Marlborough Lines considers an asset to be capacity constrained when either of the following occurs:

- One hundred percent of the asset's thermal rating is exceeded for more than 10 consecutive half-hour periods. This allows for abnormal loading of assets during fault recovery.

- For a meshed feeder, when sixty-six percent of the asset's thermal rating is exceeded for about 1,500 hours per year. Loading up to 66% allows load on a faulted feeder to be fully switched to two adjacent feeders.

Marlborough Lines considers an asset to be voltage constrained when the delivered voltage at a consumers' point of connection drops below 0.94 per unit.

Our rural power lines are generally voltage constrained. This means that the voltage drop dictates the conductor size, not the current rating of the conductor.

When new load, e.g. an irrigation pump, is to be connected to a rural feeder where voltage is constrained, an upgrade is required. One option for an upgrade is to increase the conductor size, while another option is to install voltage boosters at a particular location. A problem with conductor upgrades is that it may require replacement of all the poles, because the bigger conductor requires poles of a greater strength than the existing poles. The voltage booster option can be an economical option but contributes more to distribution line losses.

For new load on a rural feeder, another critical issue pertains to voltage flicker, which is caused when electric motors start. The situation can therefore arise where an upgrade is required just so that the new motor can start. This means that the increased capacity is only used for motor starting.

We use computer models of our 11,000V feeders to establish which rural areas are voltage constrained. We are also establishing permanent voltage measuring points on our rural feeder to confirm the results from the computer model.

Feeders that are currently voltage constrained or are nearing the limit of the present system:

- East Coast feeder
- Dashwood feeder
- Richmond-Brook feeder
- Waihopai Valley feeder
- Wairau Valley feeder
- Sounds feeder (Kenepuru)
- French Pass feeder

On single wire earth return (SWER) lines the limiting factor is generally current, not voltage.

The following SWER lines are or are close to being current constrained:

- Port Underwood west
- Port Ligar
- Waikakaho Valley

New load devices have been installed on SWER transformers to monitor demand.

6.8 Options available to meet target levels

The guiding principle is "what means will meet the target service levels at the lowest life-cycle cost". Accordingly Marlborough Lines considers the following broad classes of approaches to meeting service levels:

- Do nothing.
- Construct a new asset.
- Modify one or more features of an existing asset.
- Retrofit advanced technology that will allow greater operating ranges.
- Operational activities that reconfigure assets.
- Install distributed generation.
- Influence consumer demand for levels of service.

A range of decision tools such as NPV analysis, payback period and risk assessment are used to determine which option will give the lowest life-cycle cost. The degree to which these decision tools are applied obviously depends on the level of expenditure and significance involved. For example, recurring decisions made at the operational level of the business will typically use a pre-defined decision tool that considers a few simple parameters and identifies one of a few possible options as being optimal. In contrast, non-recurring decisions made at the executive level of the business may consider wide ranging and complex data and may use several decision tools to identify an optimal option from among a vast number of possible options.

7 Maintenance and Operation

Deterioration of assets can be caused by a number of factors, some of which include:

- Number of operations (e.g. switchgear, tap changers)
- Loading and duty cycle (transformers)
- Exposure to corrosive chemicals (such as salt laden air)
- Age (typically embodying number of operations, exposure to corrosive chemicals and weathering)

Critical assets must be maintained to reverse the effects of this deterioration, and extract maximum benefit from their continued operation. This involves assessing asset condition and performing corrective action based on these assessments.

7.1 Maintenance Strategy

Marlborough Lines undertakes a condition-based maintenance program centered around regular inspection and testing of network equipment. The programme has the following major aims.

- To achieve a highly reliable, secure system.
- To ensure the safety of staff and the general public
- To comply with all aspects of our environmental policy
- To identify required corrective maintenance

Marlborough Lines endeavours to achieve these aims, whilst ensuring that unnecessary maintenance is avoided. It is a process of continuous improvement, and one that will become more effective over time, as more history is collected about equipment and failure modes.

Marlborough Lines also endeavours to buy new equipment with minimal maintenance requirements, to aid with future reliability.

7.2 Maintenance Planning

Preventive maintenance is planned annually and scheduled on a monthly basis. The table below outlines the regimes, and the frequencies at which inspections and testing are done.

Zone Substation and Booster Site Inspections	Monthly
Major Distribution Substation Inspections	Varying 1-5 years
Oil Switch Inspections	Varying 1-5 years
Pole Mounted Circuit Breaker Inspections	Annually
Earth Testing	5 yearly
Asset Condition Survey (Poles & Lines)	Approx 5 yearly
MDI Readings	Varying 1-12 months
Safety Inspections (Aerial Crossings etc.)	Annually
Thermovision	Annually
DGA Testing	As required
Tree Maintenance	As required

Table 18 - Key Preventive Maintenance Regimes

Most of the preventive maintenance is planned using the WASP Maintenance Module. This involves the setup of regimes, and the adding of assets to these regimes. Each month, work packs are generated for maintenance that is due. Wasp stores asset "triggers", effectively storing a date which shows when the next maintenance is due for a particular asset. When the work packs are created, this "trigger" is reset to the next date, based on a frequency stored within the regime.

Corrective maintenance is planned using a risk-based approach. Corrective tasks are identified and are added to the "Task Pool" in the WASP Maintenance Module. Tasks are automatically prioritised using a combination of ACR (asset criticality) and TCR (task criticality).

The ACR for a particular asset encompasses the weighted average of five factors (No. of Customers, Safety, Environment, Degradation and Cost of Replacement). This is automatically calculated from parameters stored within the system. TCR is an assessment of "days to fix" for a particular task, based on what the field inspector perceives at the time when the maintenance is identified. The combination of ACR and TCR creates a RPN (Risk Priority Number) which is used to generate a report, showing a prioritised list of corrective maintenance tasks.

The risk based approach gives priority to serious defects, assets serving large numbers of consumers, specific high-value consumers, or places where public safety is a concern. It also results in low-priority assets effectively being operated on a "run-to-failure" regime. This system ensures that at all times, corrective maintenance is being performed efficiently and the most critical tasks are the ones being focused on.

Marlborough Lines have also implemented a more efficient outage planning system. For each corrective maintenance task in the "Task Pool", a maintenance icon appears on the GIS system, directly on top of the defected asset. This enables corrective maintenance to be visually identified and scheduled alongside known planned outages, improving efficiencies.

7.3 Testing and Inspection Regimes

7.3.1 Zone Substation and Booster Site Inspections

This regime provides the condition assessment for some of the Network's most critical assets. Inspectors gather up to 100 different pieces of data per substation, and also remark on the perceived condition of all equipment. The inspections are intended to function as an early warning for potential problems that may occur, as well as a means of capturing data that is currently unavailable via the SCADA system.

No systemic problems have been uncovered in recent history. Various minor defects are often identified, including saturated silica gels, oil leaks and faulty indication. These tasks are given to the electrical workshop to investigate and repair.

7.3.2 Major Distribution and Substation Inspections

With a large percentage of revenue coming from major customers, it is important that their electrical assets are in kept in good condition. Transformers used for large industrial loads are generally exposed to harsher operating conditions than residential transformers, making it even more critical that they are regularly visited and tested. The routine inspections involve visual checks and data capture, as well as oil testing for transformers greater than 500kVA. This combined information gives a strong indicator as to the internal health of the transformer, enabling planning to be done for future transformer changes.

Generally the inspections have revealed the population of large transformers to be in relatively good condition. There have been a few transformers that have failed crackle tests, and some that have had severe oil leaks. These transformers have either been replaced, or are in the corrective maintenance Task Pool and will be replaced in the near future when they reach the top of the priority list.

7.3.3 Oil Switch Inspections

Being an operable asset, it is important that oil switches are regularly visited to ensure the safety of staff that operates them. Small tolerances within oil switches mean that oil level becomes a critical component to the safety of the operator. Marlborough Lines recognise this, and as a consequence have set up a regime to regularly inspect oil switches. In locations where an oil switch neighbours a transformer, the two are inspected together.

7.3.4 Pole Mounted Circuit Breaker Inspections

Pole mounted circuit breakers are a difficult asset to inspect, and therefore little more than visual checks can be done. If the circuit breaker can be bypassed, inspection staff bypass it and perform a trial operation to ensure that the mechanisms are operating correctly. Marlborough Lines keeps a service history of circuit breakers and this is used alongside visual inspection results and operational information to assess whether circuit breakers need to be replaced.

Marlborough Lines is currently undertaking a programme to remove all remaining Reyrolle OYT circuit breakers from the Network. These circuit breakers are approaching the end of their life, and are in some instances becoming quite unreliable. They are being replaced with newer model circuit breakers, some with remote operation and monitoring.

7.3.5 Earth Testing

Currently all network earth testing is performed on a five yearly basis. Testing is done by area, and environmental conditions are recorded at the time of testing. Results are used to detect unsatisfactory readings and poor earthing areas so that future corrective action may be taken.

Currently work is being undertaken in response to the new draft EEA guide to power system earthing. This work will result in a new Marlborough Lines Network Standard for earthing, as well as determining the corrective action required on earth banks based on their historical test results. Currently resources are being applied to collecting testing data, but as the network standards are finalised, resources will be shifted to correcting the earth banks that do not meet the new requirements.

7.3.6 Asset Condition Survey

All poles in the Network are visited on a regular basis and a visual assessment is done to assess the condition of the pole and the other equipment on it. This data is essential for detecting areas of the network that are showing the effects of age, and also for detecting problems before they become serious. This data has recently begun to be captured in WASP, and the history that will build up will provide an essential planning tool for the future.

Poles and equipment are given a condition assessment score of 1-5. This history is being built up over time in WASP, and this historical data will enable thematic maps to be created, highlighting the condition of equipment in various areas of the network.

Marlborough Lines have just purchased some new GPS equipment. This equipment also enables data capture and in-field photo attachment. This equipment has eliminated the need for paper inspection forms in the field, and will cut out the data entry that is currently required.

7.3.7 MDI Readings

MDI readings are performed on all large distribution transformers to assess capacity usage. The frequency of the readings increases as the transformer capacity margin decreases. Recently Marlborough Lines has bought some advanced electronic loggers which will provide load profile data rather than peaks only. MDIs are gradually being replaced by these new loggers.

7.3.8 Safety Inspections

Regular safety inspections are done of all aerial crossings and boat ramps to ensure that signage is visible and that clearances are at safe levels. This is done annually prior to the summer boating season.

7.3.9 Public Places inspections

Recently Marlborough Lines have begun an inspecting regime to visit public places and ensure that all electrical equipment in the vicinity of these areas is safe and in good working order. This is pre-empting the 2007 amendments to the Electricity Act which are going to require increased monitoring and management of electrical assets in public places. The inspections are mainly to check that every step has been taken to ensure that any electrical risks to members of the public are eliminated or mitigated.

7.3.10 Road and Rail Crossings

During the last year, all road and rail crossings in the network were measured. Crossings that did not meet ECP requirements were identified and designs are being done to correct these.

7.3.11 Thermovision Surveys

Annual thermovision surveys are performed on all major lines and zone substations. A full report is created after this survey, identifying all hot spots located in the network. The identified tasks are prioritised and corrected.

7.3.12 DGA Testing

Dissolved Gas Analysis (DGA) testing is used to monitor condition of Zone Substation Transformers and Tap changers. It is the tool used to assess the internal health of the equipment and provides a basis for scheduling maintenance. Transformers with poor DGA readings are scheduled for refurbishment or oil filtering, and tap changers with poor DGAs are scheduled for overhaul.

Generally the condition of power transformers appears to be very good. Recent DGA testing did however pickup three transformers that required attention. Two were filtered for moisture and gases, while the other was sludging badly and was treated with Fullers Earth, bringing it back to acceptable condition for service.

7.3.13 Trees

The current tree legislation came into effect on 1 July 2005 and requires all trees to be kept to a certain distance from overhead power lines. The legislation requires lines companies to advertise suitable safety information to tree owners as well as contacting tree owners when their trees are close to power lines.

Each tree owner has the option of taking ongoing responsibility for keeping the tree outside the minimum distance, or granting the line owner approval to keep the tree outside the minimum distance by appropriate pruning or removal. The cost of first pruning is to be met by the lines company as is the cost of the record keeping, liaising and advertising.

7.4 Feedback of Results

All inspections involve the completion of an inspection form. These forms are returned and are entered into Marlborough Lines' test results database. This database is an Access front end which integrates data into WASP via an API. It adds attributes and test results against the particular asset, and also closes the relevant work task, indicating that the particular inspection is complete.

Once the data is entered it is available via WASP and also via reporting services reports. Some of the reports are automated and email asset management staff showing the lastest inspection results. Asset Managers are able to look through these results and add any corrective maintenance required to the task pool.

Work is currently being undertaken to put systems in place to enable mobile inspections to be performed. This will involve inspections being done on a laptop rather than a paper sheet. This will eliminate the data entry step and will mean greater data accuracy and speed of information flow.

7.5 Maintenance Expenditure

Maintenance expenditure is difficult to predict as external factors, such as sustained bad weather conditions, can have a large influence. The estimated maintenance expenditure for the next ten years is shown in the table below, and is based on current estimates. The estimates factor in previous history, growth expectations and known condition of assets.

Item	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20
Routine and Preventative Maintenance	3,870	3,900	3,930	3,960	3,990	4,020	4,060	4,100	4,140	4,180
Refurbishment and Renewal Maintenance	1,190	1,200	1,210	1,220	1,230	1,240	1,250	1,260	1,270	1,280
Fault and Emergency Maintenance	890	890	890	890	890	890	890	890	890	890
Total ($000)	5,950	5,990	6,030	6,070	6,110	6,150	6,200	6,250	6,300	6,350

Table 19 Operational Expenditure 2010 to 2020

The values above are in today's dollars, i.e. no allowance for inflation has been included. It is noted that the difference between routine maintenance and renewal maintenance is open to interpretation and accordingly the spilt between these may vary in the future.

8 System Development

Future system development and enhancement will be dictated by a number of factors, many of which are outside the Company's control. These include, but are not limited to, rural irrigation load increases associated with changing land use, expansion to the wine and marine farming industries, processing of the significant forestry resource in Marlborough and general economic growth. It is therefore difficult to predict with any degree of accuracy where and when future system development and capacity enhancements will be required. Accordingly, this plan is revised at least annually.

The ten-year capital investment forecasts on the basis of, in the shorter term known system expansion requirements, and in the longer term historic growth in demands.

Projects will be considered, and options, including non-assets solutions such as distributed generation, will be assessed prior to budget approval.

Discussions are currently being undertaken with the Marlborough District Council with a view to reinstating an overhead to underground conversion programme now that the company can include the actual cost of the work in its Regulatory Asset Base. The extent of this work is currently being determined in conjunction with the Council.

The predications are predicated on the assumption that the regulatory regime will be such that the company will be able to earn an appropriate commercial return on all capital expended. If the future regime is such that achieving a commercial return is not possible, all projections will be revised.

Marlborough Lines expects to undertake the following developments as detailed the following sections.

The overall budget is shown in the Table 20 and Table 21 below:

Year begin	33kV Subtransmission ($000)	11kV Overhead ($000)	11kV Underground ($000)	LV Overhead and Underground ($000)	Zone Substation and Network Automation ($000)	Total ($000)
2010	6,215	2,950	2,830	55	1,675	13,725
2011	4,380	4,070	915	40	3,825	13,230
2012	3,240	4,890	1,055	465	1,275	10,925
2013	1,560	5,570	915	525	825	9,395
2014	3,245	5,220	640	365	625	10,095
2015	3,620	5,470	515	375	425	10,405
2016	4,920	4,220	565	385	425	10,515
2017	5,475	3,970	615	675	1,925	12,660
2018	2,000	4,770	715	735	775	8,995
2019	4,200	4,220	665	665	425	10,175

Table 20 - Capital Expenditure Budget – Assets

Year begin	Customer Connection ($000)	System Growth ($000)	Renewal ($000)	Safety, Reliability, Environment ($000)	Relocations ($000)	Total ($000)
2010	277	5,045	4,075	4,033	294	13,725
2011	303	5,624	3,633	3,387	284	13,230
2012	288	3,060	4,369	2,790	418	10,925
2013	286	1,990	4,004	2,555	560	9,395
2014	283	2,330	3,319	3,221	942	10,095
2015	258	2,691	3,775	2,940	742	10,405
2016	278	4,158	2,816	3,049	215	10,515
2017	288	5,125	3,307	3,651	290	12,660
2018	288	2,298	3,461	2,885	65	8,995
2019	288	3,030	3,496	3,062	300	10,175

Table 21 - Capital Expenditure Budget - Categories

Table 21 displays the expenditure data in the format required by the Electricity Information Disclosure Requirements 2004. In practise most jobs involve multiple categories (for example replacing an line at the end of its life where load has grown has elements of growth, renewal, and safety), and therefore the data is somewhat subjective.

8.1 Zone Substations

As indentified in section 6.4.4, in the absence of further investment, four zone substations will be operating beyond their n-1 capacity within the next ten years. These are Redwoodtown, Seddon, Spring Creek and Springlands. Figure 9 shows the locations of proposed substations sites, while Figure 7 shows the current Network and zone substation sites.

8.1.1 2010 to 2015

Work is currently underway on the construction of Waters substation which will relieve the loading concerns on Redwoodtown. This substation will be completed within the current financial year. The budget for this substation is $3.2 million.

The Riverlands substation is experiencing strong growth, mainly from light commercial/ industrial expansion in the Riverlands industrial estate and Cloudy Bay Park. In addition the Marlborough District Council has plans to significantly increase the capacity of their waste water plant at Hardings Rd. Because of the strong growth, it is planned to construct a new zone substation at Cloudy Bay in 2011/2012. The budget for this substation is $3.4 million.

To improve the security of supply in the Seddon region, one of the existing 5MVA transformers will be replaced with a 10 MVA unit in 2012/2013. The 5MVA unit will be installed at Rai Valley in 2013/2014. The estimated cost of this is $1,1 million.

8.1.2 2015 to 2020

To improve the capacity of Spring Creek and reduce loading on Springlands, this substation will be upgraded to two 10MVA units in 2017/2018. The estimated cost of

this is $1.5 million. The precise timing of this will depend on actual load growth in this area.

Two further sites for future substations have been identified and land purchased, they are Bradley Park and Hammerichs Road. Using current load growth and projections, these substations will not be necessary within the next ten years, however they could be developed quickly if required.

8.2 Subtransmission 33kV

The existing 33kV subtransmission system was largely designed and built over forty years ago. Since then the load has grown considerably and this has placed constraints on parts of the 33kV system, in particular where older smaller conductors are installed above 11kV lines. In addition a significant portion of the 33kV system was constructed in 1927 on steel towers and concrete poles and sections of the 33kV supply to Havelock, Parts of the supply to Linkwater and Rai Valley are on hardwood poles constructed in 1944. These lines are at the end of their useful life.

Consideration has been given to possible changes to the subtransmission voltage, however this is not an easy or low cost option and hence it is not envisaged within the period of this plan. All new subtransmission overhead construction is at a minimum of 66kV insulation, with 110kV insulation being used in the supply to the East Coast to allow for future large scale windfarms. While the use of higher levels of insulation adds marginally to the cost, it also improves reliability and gives better options for the future.

It is also noted that the development of a large scale wind farm on the East Coast may affect a number of the proposed projects.

8.2.1 2010 to 2015

8.2.1.1 Lansdowne Rd to Riverlands

This section of line was originally constructed in 1927 and has small conductor (mink). It is being rebuild with neon conductor. The section of ground it crosses comprises very low strength soils and concrete foundations are being used. The circuit is being insulated to 110kV. This project is estimated to cost $2.8 million and will be constructed in 2010/2011.

8.2.1.2 Transpower Substation Redevelopment

During the current financial year, Transpower will be installing a third 110kV/33kV transformer and altering the 33kV circuit breakers at Blenheim substation. As part of this Marlborough Lines will be altering the 33kV cables leaving the substation to take maximum advantage of the changes. The estimated cost of this work is $0.5 million.

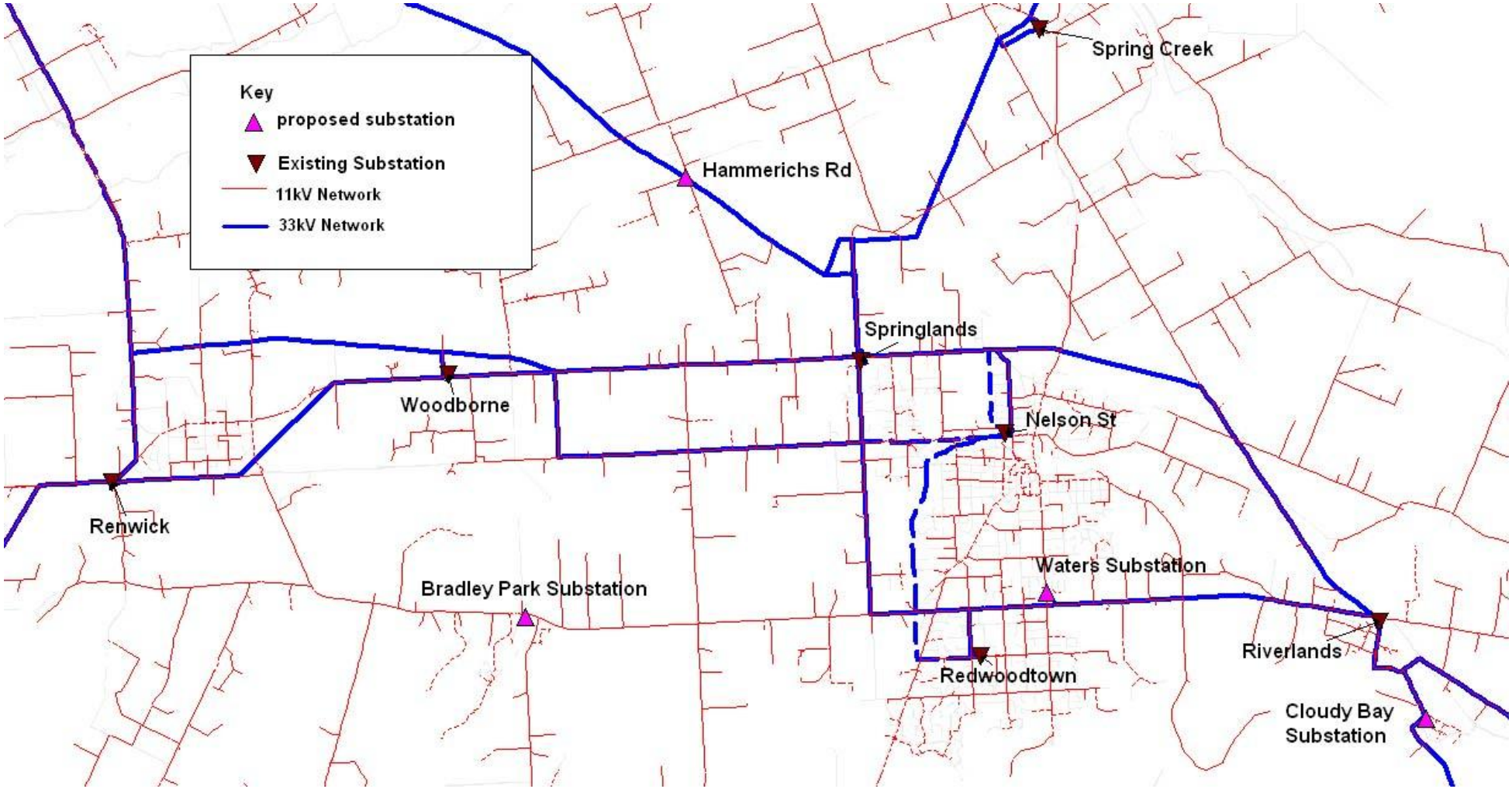

Figure 9 - Central Wairau Plains zone substations - existing and planned

8.2.1.3 Cobb Line

This line was built in 1944 and the hardwood poles are at the end of their useful life. During the current financial year, the final section of line between the Wairau River and Long Valley will be renewed at a cost of $1.3 million.

From 2012 to 2014 the final section of this line, i.e. Kaituna Valley to Hughes Creek will be renewed at an estimated cost of $3.9 million

8.2.1.4 Old Renwick Road East

The section of lines from Blenheim GXP to Lansdowne Park along Old Renwick Road carry two 33kV circuits, an 11kV circuit and some 400V overhead. It is proposed to reconstruct this to 110kV insulation levels using steel poles. The 400V would be undergrounded at the same time. This would substantially reduce the poles alongside the road and would complete the construction from Blenheim GXP to Riverlands. This work is scheduled to be undertaken in 2011/2012 and is estimated to cost $2 million.

8.2.1.5 Alabama Road

This section of line is 1965 waxwing. It is proposed to install neon 33kV along with iodine 11kV to strengthen the supplies to Waters substation and Riverlands Substation.

The estimated cost of this is $0.9 million and it is scheduled to be undertaken in 2011/2012.

8.2.1.6 Waihopai Line

The section of 33kV from Renwick substation to Waihopai Dam was built in 1927. Approximately 25 years ago, the conductor started to fail near the insulators and amour rods were fitted to strengthen the conductor. Recent monitoring revealed that the towers, in particular those near the road were at the end of their life. As a consequence, the section of line from Blenheim GXP to Renwick was renewed.

In total there is 27 km of line which needs replacement. It generally has 33kV on top with underbuilt 11kV. Because of the total size of this project it has been spread out over several years and is scheduled to be undertaken 2011 to 2017. The estimated total cost of this work is $8.4 million. Some of this work will be subject to agreement with Trustpower, the owners of the Waihopai Generation.

8.2.1.7 Thomson Fords Overhead

This section of overhead has four 33kV circuits and one 11kV circuit plus some 400V on double pole structures. It was built in 1968. Replacement of this section of line would improve security of supply. This is scheduled for 2012/2013 and is estimated to cost $0.5 million.

8.2.1.8 Thomson Fords to Hammerichs

The section of line uses 1944 conductor (7/0.1093 copper) on 1960's concrete poles. The estimated cost of this is 0.7 million and it is scheduled for 2013/2014.

8.2.1.9 Redwood Pass Line

This line was part of the original reticulation of Marlborough in 1927. It is at the end of its life and is scheduled for renewal 2014 to 2018. The total estimated cost of the work is $3.7 million. The precise timing and scope of may vary depending on large scale wind farm development on the East Coast.

8.3 2015 to 2020

A number of the 33kV renewal projects will carry onto this period, specifically Redwood Pass Line and the Waihopai line.

8.3.1.1 Taylor Pass 33kV

This project involves building a new 33kV line to Seddon, thereby freeing up one the existing lines for upgrading to 110kV and use with large or medium scale wind generation. The estimated cost of the line is $6.2 million and it is scheduled for 2015 to 2020.

8.3.1.2 Murphys Road

This section of line carries two 33kV circuits, an 11kV circuit and a 400V circuit down Murphys Road. It is a key section of line which is difficult to maintain and impacts greatly of the security of supply for a large number of customers. The line is built on 1967 concrete poles. It is proposed to reconstruct this and install most of the circuits underground. The estimated cost of this work is $1.8 million and it is planned for 2015/2016.

8.3.1.3 New Renwick Road

This line has 1966 waxwing conductor on 1930's reinforced concrete poles. It is proposed to rebuild the section of line from Battys Road to Grahams Rd. This will ultimately provide a second 33kV supply to the proposed Bradley Park substation site. The estimated cost of this is $1.5 million and it is scheduled for 2016 to 2017.

8.3.1.4 Jacksons to Renwick

If required for the Wairau River Hydro scheme, this section of line can be upgraded to 66kV. The estimated cost of this is $2.25 million and it is provisionally scheduled for 2017 to 2018.

8.3.1.5 Waikawa Feeder

This feeder has approximately 2000 customers with no alternative power supply. There is growth in subdivision in this area and accordingly consideration is being given to the establishment of a 33/11kV substation in this area. As a first step in this process, a 33kV feeder to the area is proposed. This is scheduled for 2018 to 2020 and is estimated to cost $2.2 million.

8.4 11kV Reticulation

Work on the zone substations and subtransmission system consists of a small number of high value projects which have a major effect on the Network and accordingly are planned in detail. Work on the 11kV Reticulation in contrast generally consists of a large number of small value projects. Because of this detailed planning for 11kV work is relatively short term and estimates of ongoing cost for the medium to long term are based on the age of the assets and the amount of renewal required to maintain asset function and value. The figure also takes into account load growth and customer demands.

8.4.1 2010/2011

Specific projects planned for this financial year are:

Wairau Valley to Wantwood: This is estimated to cost $250,000 and is required to maintain voltage in the upper Wairau Valley. A section of line will be upgraded.

SH63 to Narrows: This project is also aimed at improving the voltage and supply to the Wairau Valley. The budget for this work is $250,000.

Havelock to Double crossing: This section of line was built in 1946 and has a large number of iron rails used as poles. This line is an important connection between Rai Valley and Havelock and is to be upgraded. The estimated cost of this work is $700,000.

McLaren Bay: This section of lines has been built on Larch poles which are at the end of their life. The forests in this area are near harvest and it is planned to relocate and rebuilt the line in conjunction with the harvesting work. The estimated cost of this is $300,000.

Canterbury St to Elevation: These lines are at the entrance to Picton and are at the end of their useful life. In conjunction with the Marlborough District Council and Marlborough Roads, these lines will be upgraded and installed underground. The estimated cost of this work is $700,000.

Meadowbank Tieline: This will involve an underground cable and will improve the security of supply to the south west end of Blenheim and to Ben Morven Road area. The budget for this work is $625,000.

8.4.2 2011 to 2020

Specific 11kV projects planned for this period include:

French Pass Feeder – Conversion to 22kV: This feeder has limited spare capacity and cannot meet future needs for expansion. To allow additional capacity for subdivision, it is proposed to convert the French pass feeder from Rai Valley to Elaine Bay to 22kV. The estimated cost of this is $800,000 and it is planned for 2011/2012.

Pelours to Rai Valley Line upgrade: This section of line has 7/14 Cu on iron rails and was built in 1946. It is planned to upgrade this in 2011/2012 at a cost of $400,000.
Tetley Brook to Ward: This section of line is part of the original reticulation and was constructed circa 1928 on reinforced concrete poles using 7/14 Cu. It is planned to renew this. The estimated cost is $1,250,000 and it is planned for 2011 to 2013.

Pembers Rd Tieline: This will improve the security of supply to the Rarangi area. It will require some underground cables as well as new 11kV overhead. The estimated cost is $910,000 and it is planned for 2012/2013.

Sounds Feeder – Conversion to 22kV: This is feeder is constrained for new loads. It is proposed to upgrade it to 22kV. The budget cost for this is $1,800,000 and it is planned for 2015 to 2018. The maximum demand tends to occur at Holiday periods and further study will be uptaken to ascertain whether it would be more economic to install generators to provide supply or convert to 22kV.

Additional mobile generators: The 900kW unit MLL currently owns has been very successful in reducing planned outages and maintaining supply. Consideration is being given to purchasing additional units.

8.5 2010/2011 Budget

Budget 2010/2011	Estimate	Main Reason	Notes
33kV TRANSMISSION			
Landsdowne - Riverlands 1	400	Growth	Old Renwick Rd to just over Flood Bank
Landsdowne - Riverlands 2	805	Growth	Flood Bank to Vickerman St
Landsdowne - Riverlands 3	1,205	Growth	Vickerman St to Opawa River
Landsdowne - Riverlands 4	400	Growth	Opawa River to SH
Cobb Line Stage 5	1,295	Safety	remaining 20 hardwoods Wairau River to Long Valley
Battys Road	480	Refurbishment	33 and 11kV rebuild - old small conductors
Waters Substation Undergrounding	960	Environmental	Part of substation redevelopment
new 33kV feeders at Transpower	480	Growth	For new substation/GXP redevelopment
33kV Switching Structures	190	Refurbishment	Air break switches need replacement
OVERHEAD RETICULATION			
Additional Lightning Arrestors/Air Break Switches/Spur Line Fuses	145	Reliability	
MLL 11kV Dist.Lines General Area extensions	95	Growth	
Distribution Transformers and Substations	375	Customer	
Line Relocations/Minor upgrades	190	Relocations	
Wairau Valley/Wantwood 1	240	Growth	At limit of voltage regulators - dairying/grapes
Ben Morven Road - Stage 2	245	Refurbishment	
SH63 Waihopai River to Narrows	305	Growth	At limit of voltage regulators - dairying/grapes
NZTA Rapaura Road (Stump Creek)	240	Safety	Continuation of Rapaura Rd, in conjunction with NZTA Rd Widening
Havelock-Double Crossing - Stage 2	575	Refurbishment	Old Small conductor - link Havelock to Rai Valley
Kaituna Track - Stage 3	45	Refurbishment	
Maclaren Bay	285	Safety	Line relocation through Forestry
Hardings Road Stage 2	140	Growth	MDC Treatment
NZTA Lions Back Realignment	70	Safety	Realignment
415 VOLT DISTRIBUTION			
Distribution Subs LV Switches, LV line extensions, Load logging	55		
UNDERGROUND RETICULATION			
General Underground Cabling, subdivisions, fuses	55	Customer	
SH63 Waihopai River crossing	335	Growth	
Tarrants Road	70	Growth	
Vavasour Tieline	190	Reliability	
Havelock-Double Crossing - Stage 1	95	Refurbishment	
NZTA Rapaura Road - Murrays/Cravens	380	Refurbishment	
Ben Morven 3 Tieline	240	Reliability	
Maxwell Road - new RMU	45	Reliability	
Canterbury St/Elevation	670	Environmental	Approach to Picton
Meadowbank Tieline	600	Reliability	
Auckland St Upgrade	150	Refurbishment	
MAIN SUBSTATIONS			
Zone Sub. General Expenses	20		
Springlands - 33 kV switchgear Installation	190	Reliability	
Waters substation completion	470	Growth	new substation
Havelock Substation	265	Refurbishment	new building, switchgear, 2nd Transformer
Rai Valley Substation	115	Refurbishment	indoor switchgear
SCADA/Automation	140	Reliability	
Additional Reclosers	190	Reliability	
Automation of Zone substations CB/TCs	95	Reliability	
Upgrade Town Substations	190	Reliability	
Total Network Capex	**13,725**		

Table 22 - 2010/2011 Budget

9 Risk Management

Marlborough Lines' business is the conveyance of electricity, and due to the safety aspects inherent in the delivery of this essential service, it has a very low tolerance to risk. To ensure this exposure remains within acceptable levels, Marlborough Lines has adopted the systemic approach to risk identification and control outlined in the Australian/New Zealand Standard on Risk Management (ASNZS 4360:2004). With the recent introduction of ISO 31000:2009 *Risk Management* and NZS 7901:2008 *Electricity and gas industries – Safety management systems for public safety*, Marlborough Lines will review the work undertaken and will adopt an integrated approach to Risk Management.

Most of the material in this section details the approach taken to date which will be updated this year.

Figure 10 below presents the risk management process suggested by this standard:

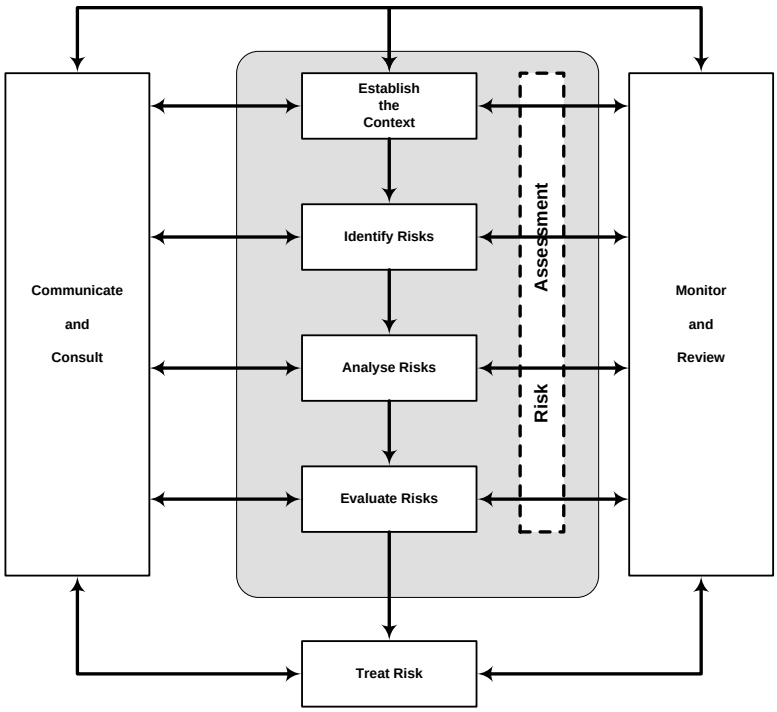

Figure 10 – Risk Management Process Overview

This process has five key steps:

1. Establish the risk context,
2. Risk identification,
3. Risk analysis,
4. Risk evaluation,
5. Risk treatment,

These are supported by a framework for ongoing:

- Risk monitoring and review, and
- Communication and consultation with stakeholders.

Even with the aid of this standard and its associated definitions, the risk management process is still largely a qualitative and labour intensive task. To streamline and automate this burden as far as possible, Marlborough Lines has utilised a computerised risk register, the output of which is discussed in the sections that follow.

9.1 Risk context

Management of network related risks is ultimately the responsibility of the Engineering Manager, who directs the risk management process. This process considers all credible electricity conveyance risks associated with the Marlborough Lines' Network including network operational and safety risks as well as network-related risks to the business, the environment and the general public. These are broadly grouped into the following risk category types:

- Electricity network risks
- Environmental risks
- Electricity business risks
- Regulatory compliance risks

Table 23 below provides further definition.

Risk Category Type	Definition
Electricity network risks	Risks associated with all aspects of electricity network construction, operation and maintenance. Including electricity supply, network access, operational control and vegetation management.
Environmental risks	Risks associated with the natural environment's impact on Marlborough Lines' distribution network and the Network's impact on the environment.
Electricity business risks	Network related risks that impact on Marlborough Lines future viability and profitability for example; the Commerce Commissions' threshold regulatory regime, disruptive technologies, data and knowledge management.
Regulatory compliance risks	Risks associated with all statutory requirements compliance, including complaints, health and safety issues, land access issues and Resource Management Act issues.

Table 23 – Risk Category Types

The range of credible risks that place Marlborough Lines electricity network at risk is very broad. Everything from vermin damage to minor vandalism to vehicle accidents to major natural disasters (such as earthquake or flood). Similarly the impact of these possible events can and does range significantly for the same event. For example, a car versus pole incident on a lightly populated rural feeder has far less impact (and therefore loss/risk) than the same incident would at the grid exit point or a zone substation.

The distributed nature of Marlborough Lines' asset base does mean that individual assets are less susceptible to any one event (unless that event is region wide), however as the assets are dispersed over a greater number of sites, some classes of risk are harder to control.

To cope with this complexity Marlborough Lines examines risks firstly at a generic level and then drills down to examine specific risks where this is necessary.

9.2 Risk management tools

During the 2006-07 planning year a major revision of how Marlborough Lines analyses and manages risk was completed. This included the configuration and population of a central, computerised risk register and the establishment of review processes to ensure the relevance of this register going forwards. This is reviewed informally annually and formally every 5 years. The next formal review will be in 2011.

9.2.1 Central risk register

This centralised risk register has proved to be a very effective tool for the documentation, analysis, evaluation, treatment and communication of risk. It has provided a standardised framework (compliant with ASNZS 4360) and meant that Marlborough Lines' multiple risk memos and hazard registers have been superseded.

ASNZS 4360 suggests five levels of likelihood and consequence for risk analysis, however Marlborough Lines has chosen to go to nine levels as this provides a far greater level of granularity. The five level analysis has a tendency to allocate risks to higher levels as the graduation scale is so coarse.

9.2.2 ISO system integration

While the risk study is now complete, at the date of this report the risk register has not been integrated into the Marlborough Lines ISO accredited quality management system. This work will be completed before the next planning period revision of the Asset Management Plan. A key part of this integration will be the use of the ISO systems CAR (corrective action request) forms as a source of new data for the risk register i.e. when an issue is identified through the submission of a CAR form it will be assessed as to whether or not the issue is significant enough to go onto the risk register for treatment and ongoing monitoring.

9.2.3 Risk categories

A total of 17 risk categories were identified as a result of the risk study, these are grouped into the four risk category types described earlier. They are presented in Table 24 below.

Risk Category	Risk Category Type	Description
Commerce Commission Threshold Regime Breach	Business	A Commerce Commission threshold regime breach, leading to investigation and possible targeted control of ML (price setting)
Data Management and Record Access	Business	Issues relating to the availability and accuracy of ML network data (assets and asset performance / condition).
Disruptive Technologies	Business	The impact disruptive technologies on the ML asset base and business value (i.e. technical obselesance and network bypass).
Fire Damage to Buildings and Equipment	Business	Damage to ML buildings and equipment caused by fire (network and support infrastructure).
Knowledge Management	Business	Knowledge management issues (e.g. skill gaps) relating to the ML asset base.
Vandalism and Public Nuisance	Business	Disruption to the operation of ML electricity distribtuion network through acts of vandalism and public nuisance.
ML Distribution Network Access and Control Breakdown	Electricity	The inability of the ML distribution network to safely convey electricity within the supply regulations, due to the breakdown of the ML network access and control systems i.e. unlawful or unsafe network connection
ML Distribution Network Failure	Electricity	The inability of the ML distribution network assets to safely convey electricity within the supply regulations.
Retailer Major Generation Failure	Electricity	Major generation failure causing the unavailability of electricity within the supply regulations to the Marlborough region.
Transpower Transmission Network Failure	Electricity	The inability of the Transpower transmission network assets to safely convey electricity within the supply regulations.
Vegetation Control	Electricity	Constant effort is required to keep trees clear from the ML overhead distribution assets and tracks clear so that assets can be accessed in the Marlb Sounds.
ML Distribution Assets Impact on Natural Environment	Environment	Major natural environment impact caused by ML distribution assets i.e. fallen lines cause a fire or an oil spill pollutes a waterway.
Natural Environment Impact on ML Distribution Assets	Environment	Major natural environment impact on ML distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.
Electricity Complaints	Regulatory	Complaints resulting in reputational damage to ML
Health & Safety Issues (staff and general public)	Regulatory	Situations or events in relation to the ML electricity distribution network which lead to health and safety issues for ML staff and the general public
Land Access Difficulties	Regulatory	ML is unable to access land to site its equipment or get access across to service / upgrade existing assets
Resource Management Act Issues	Regulatory	ML is unable to progress network expansion / maintenance or upgrade project due to RMA issues.

Table 24 - Risk Categories

9.2.4 Risk register

At the date of this report a total of 87 network related risks are documented in the Marlborough Lines risk register. All of these risks were found to have treatments in place, and most treatments had multiple effects (i.e. staff training, emergency spares, ISO system procedures, etc) with the effectiveness of these varying with the nature of the risk they were applied to.
The division of these 87 risks across the four risk category types is presented in Table 25 below. Predictably the majority of the identified risks relate to the distribution of electricity across the Marlborough Lines' Network.

Risk Category Type	Number of Risks
Electricity network risks	59
Environmental risks	9
Electricity business risks	12
Regulatory compliance risks	7

Table 25 - Risk Division Across Types

A list showing the risk register is included in Appendix E.

9.2.5 Risk treatments

Table 26 below details the risk treatments currently documented in the risk register and in use at Marlborough Lines. This listing also demonstrates the broad range of treatments in use everything from mobile generation to insurance cover.

Control Name	Control Description
1.5MVA 33-11kV Portable Power Transformer	This power transformer has been refurbished and can be installed as a portable package to allow rapid recovery in the event of a transformer failure, particularly for the smaller single Tx zone subs i.e. Ward and Rai Valley.
900kVA Flatbed Mounted Generator Unit	This flatbed mounted genset can be installed as a portable package to allow rapid recovery in the event of distribution asset failure.
Accept Risk	Overall risk rating means the appropriate action for ML is to accept the risk
Approved Contractors	The exclusive use of approved contractors on the ML network as well as ISO system defined procedures for netwok access and operation.
Close Approach Permit Issue & High Load Escorting	ML has a process (free to individuals) for handling the issue of close approach permits and assessment of the need for high load escorting. This ensures tha access to expert electrical advice for the general public.
Construction Site Security	The securing of expensive or hard to source construction items so that they are either unavailable or not easily accessed.
Electricity Awareness Campaigns & Free Advisory Service	ML runs numerous electricity awareness campaigns and has a free electricity advisory service to heighten awareness of the efficient use but also potential dangers of electricity.
Electricity Network Access Control (physical)	Access to ML electricity network assets is restricted to authorised (trained) personnel through the use of design, preventive barriers, keys, tooled fittings and monitored security systems. The intention is to prevent accidental access.
Emergency Spares Holding	Emergency network spares held to ensure that adequate stocks are on-hand for corrective maintenance
Incident Reporting & Investigation	ML has an ISO procedure for incident reporting and investigation, which allows the timely investigation of ML network incidents and accidents so that the key issues are understood, allowing remedial action to be undertaken.
ISO System With Defined Procedures	Well designed, auditable systems representing best practice, leading to customer satisfaction, loss minimisation and productive efficiency.
Land Access Policies	ML has ISO system procedures for securing the right to occupy space on private property.
Load Control	The use of ML load control plant to reduce (control) load, for demand target management in normal operation as well as during periods of supply shortage.
ML Emergency Preparedness Plan	This plan provides documentation, key contacts and background information that would be useful in a range of emergency situations. Its aim is to limit damages and speed the recovery of the ML electricity network from an emergency situation.
ML Network Asset Inspection Program	ML has processes and business systems in place to manage the identification of defective electricity network assets i.e. zone sub monthly inspections, MDI readings, earth testing, OH & UG asset inspection, etc.
ML Network Asset Maintenance Program	ML has processes and business systems in place to manage the identification of defective electricity network assets i.e. zone sub monthly inspections, MDI readings, earth testing, OH & UG asset inspection, etc.
Network Design & Construction Standards	The development and use of the ML design and construction manuals to ensure that the ML electricity network is engineered to the highest appropriate standard. This also extends to the siting of equipment i.e. not in flloodway or on known fault line, etc.
Network Re-Design	This involves the re-design of any aspect of the ML electricity supply network, it includes network layout /configuration as well as equipment and construction standard re-design.
Oil Spill kits and Site Bunding	To minimise the potential for an environmental issue oil spill kits and bunding arrangements are instak\lled as appropriate. Procedures and training for their use are in place.
Process Auditing	Internal and external auditing of MLs business systems, policies and procedures
Control Name	Control Description
Regulatory Environment Monitoring	Scanning of the regulatory environment in which ML is operating to look for issues / changes which will impact on the operations of ML
Resource Management Act Mitigations	Resource Management Act issues are mitigated against in three ways; 1. a good working relationship with the Marlb. District Council, 2. defined procedures, 3. trained staff (aware of the district plan and RMA issues generally).
Site Access Control	ML has procedures to ensure that visitors to sites are aware of the hazards that exist and have the appropriate PPE. Physical barriers and signage are used to keep the general public clear of such sites.
Supplier and Materials Review	ML has ISO system procedures for supplier and materials review to ensure that the electricity network is constructed and maintained to the highest appropriate level.
System or Procedure Re-Design	This involves the re-design of any system or procedure affecting the ML electricity supply network, it includes everything from ISO system polices to business processes to work site instructions.
Technology Monitoring	This involves the monitoring of innovative technology development as well as its analysis to assess its potential impact on the ML electricity distribution network
Trained and Competent Staff	ML staff are required to become qualified in their own right (as appropriate for their role) and under go regular / ongoing competency assessment.
Training (ML Staff & Contractors)	The delivery of training to ML staff and contractors to reduce the likelihood and or consequences of a risk
Use of Best Practice Industry Guidelines & Manuals	Training materials to reduce the likelihood and or consequences of a risk.
Vegetation Management	The ML vegetation management team, co-ordinate the activities of ML staff, ML contractors and private individuals in accord with the Electricity (Hazards frrom Trees) regulations 2003.
Network Connection Control	The development and use of the ML network connection control systems to ensure that the ML electricity network is engineered to the highest appropriate engineering and safety standards.
Insurance	Insurance to cover risks such as fire damage or professional idemnity, etc.

Table 26 - Risk Treatments

9.2.6 Untreated risk matrix

Once the identified risks were entered into the register they were grouped into a risk matrix to allow an overall assessment of Marlborough Lines untreated risk exposure.

From this analysis, no critical or very high rated risks were identified and that the majority of Marlborough Lines untreated risks are mid range (some risk to considerable risk).

Where possible, it is attempted to design out identified network risks and mitigate or eliminate them through network capital investment or changes to asset maintenance or work practices. Non asset based solutions are also considered in these evaluations such as staff training and business system development. However, it is not always possible or even feasible to eliminate risk altogether. Aside from natural disaster preparation (considered placement of equipment and contingency plans), Marlborough Lines also faces supply risk due to the nature of electricity and its position in the supply chain. For example the risk of non-supply through the complete or partial unavailability of generation or transmission assets has an immediate effect on Marlborough Lines' operations but is a risk beyond its direct control.

9.2.7 Treated risk matrix

A key step in the risk management process is the treatment of identified risks. This step has been completed for all 87 register entries and the risk matrix re-compiled to examine the overall effect.

After the treatment application the highest risk rating is now moderate risk, with the large majority falling into the bottom of the range between some risk and insignificant risk.

9.2.8 Highest network related risks

The ten highest network related risks (post treatment) are presented in Table 27 below.

Risk Name	Description	Rank	Rating	Pre-treatment Rating
Full Supply Outage - Transpower Transmission Network Failure	The inability of the Transpower transmission network assets to safely convey electricity within the supply regulations, through the loss of key equipment at the Blenheim GXP or multiple transmission line failures.	1	Moderate	Considerable
Full Supply Outage - Retailer Major Generation Failure	Major generation failure causing the unavailability of electricity within the supply regulations to the Marlborough region.	2	Moderate	High
Partial Supply Only - Transpower Transmission Network Failure	The inability of the Transpower transmission network assets to safely convey electricity within the supply regulations, due to the loss of transmission assets i.e. a supply constraint (above the Blenheim GXP).	3	Moderate	Moderate
Partial Supply Only - Retailer Major Generation Failure	Major generation failure causing diminished supply availability of electricity (within the supply regulations) to the Marlborough region.	4	Moderate	Considerable
Major Earthquake Damage to ML Distribution Assets	Major natural environment impact on ML distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.	5	Moderate	Considerable
Price Path Threshold Regime Breach	Price Path threshold regime breach, leading to investigation and possible targeted control of ML (price setting)	6	Some	Considerable
Double 33kV Circuits on Common Poles	The inability of the ML distribution network assets to safely convey electricity within the supply regulations. 33kV feeders supplying Spring Creek, and Picton.	7	Some	Considerable
Quality Threshold Regime Breach	Quality threshold regime breach, leading to investigation and possible targeted control of ML (price setting)	8	Some	Considerable
Non-major Earthquake Damage to ML Distribution Assets	Non-major natural environment impact on ML distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.	9	Some	Moderate
33kV Overhead Line Failure	The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - high wind speed activity or snow loading.	10	Some	Moderate

Table 27 - Highest Network Related Risks

9.2.9 Highest electricity distribution risks

The ten highest electricity distribution risks (post treatment) are presented in Table 28 below.

Risk Name	Description	Rank	Rating	Pre-treatment Rating
Full Supply Outage - Transpower Transmission Network Failure	The inability of the Transpower transmission network assets to safely convey electricity, through the loss of key equipment at the Blenheim GXP or multiple transmission line failures.	1	Moderate	Considerable
Full Supply Outage - Retailer Major Generation Failure	Major generation failure causing the unavailability of electricity within the supply regulations to the Marlborough region.	2	Moderate	High
Partial Supply Only - Transpower Transmission Network Failure	The inability of the Transpower transmission network assets to safely convey electricity, due to the loss of transmission assets i.e. a supply constraint (above the Blenheim GXP).	3	Moderate	Moderate
Partial Supply Only - Retailer Major Generation Failure	Major generation failure causing diminished supply availability of electricity to the Marlborough region.	4	Moderate	Considerable
Double 33kV Circuits on Common Poles	The inability of the ML distribution network assets to safely convey electricity within the supply regulations. 33kV feeders supplying Spring Creek, and Picton.	5	Some	Considerable
33kV Overhead Line Failure	The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - high wind speed activity or snow loading.	6	Some	Moderate
Single 33kV Supply to Redwoodtown Zone Sub	The single 33kV supply to Redwoodtown zone sub means that a failure in this line or the equipment that connects it to the wider network, will result in a zone substation outage.	7	Moderate	Some
33kV UG Cable Failure Due to 3rd Party (excavation) Damage	33kV UG cable failure causes the loss of a subtrans circuit or a zone substation.	8	Low	Low
Power TX Failure	The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.	9	Considerable	Low
11kV Cable Failure	11kV cable failure causing the inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.	10	Some	Low

Table 28 - Highest Electricity Distribution Risks

9.2.10 General risk commentary

From the risk study analysis presented above the following conclusions are drawn:

1. The overall post treatment network- related risk profile of Marlborough Lines is presently constrained to acceptable levels.

2. The bi-annual review of the risk register and its associated treatments will allow ongoing monitoring of this profile.

3. Marlborough Lines faces a broad range of network- related risks, but the technical expertise and longevity of the company has allowed the development of an equally broad range of effective treatments.

4. The most significant network risks for Marlborough Lines are the failure of assets higher in the supply chain (generation and transmission assets). While these events are considered very unlikely, they could leave Marlborough with no or restricted supply for a considerable period of time.

5. Marlborough Lines' 33kV lines and zone substations do carry some operational risk, but these are minimised by the diversity of the loads and the security offered by the existing configuration. All of the larger zone substations have 'n-1' security, using the 11kV network to support any failures in the zone substation or the 33 kV network. The smaller rural zone substations generally have 'n' level security and repairs need to be carried out before supply can be restored. In these situations, trained and competent staff are available for response at all times, supported by additional technical staff and emergency spares.

6. Double 33kV circuits on common poles are another source of risk particularly on lengths of the circuits supplying the Spring Creek and Picton zone substations. A single motor vehicle accident in these areas could result in multiple Zone substations losing supply. Consumers in the immediate vicinity of any such vehicle accident could have supply interrupted for the duration of the time required to repair the damage. However, alternative supply routes available within the Company's 33kV and 11kV Networks would allow supply to be restored to all other consumers by manual switching to alternative feeds.

7. Generally the Marlborough Lines' Network is well constructed and maintained, with ongoing asset inspection regimes in place. Monitoring of these systems and routine network operation has not presented any significant untreated risks.

9.3 Emergency preparedness and civil defence

Marlborough Lines' Emergency Preparedness Plan documents procedures for use in the event of major damage to the Network. It contains information on Transpower, the 33kV system, the zone substations, the 11kV lines, suppliers contact details, staff, consumers and other information which may be useful at times of emergency. Contingency planning is regularly reviewed with consideration given to various "what-if" scenarios. This helps to ensure that the Network is prepared and staff are well trained for any eventuality.

Marlborough Lines operates a full time fault service with sufficient staff levels to ensure appropriate responses to any foreseeable event on the network. Minimum staff levels of three staff immediately, four additional staff within four hours and a further four staff within eight hours are maintained 24hr a day, 365 days a year. However these staff levels are invariably supplemented by other staff as required.

Marlborough Lines is involved in civil defence and emergency management activities in conjunction with the Marlborough District Council. Liaison is, in the first instance, through the emergency services groups of each organisation.

Civil Defence involvement is not restricted to natural disasters, but includes any event – planned or unplanned – which disrupts the Marlborough area and may limit Marlborough Lines' capability to respond. For instance a large festival may place a high peak load on local infrastructure for a short duration.

Marlborough Lines is part of a group of South Island lines companies who have agreed to a Mutual Aid cooperative in the event of major disruption to individual or multiple networks. Marlborough Lines recently sent several staff to Timaru during an extended snow storm as a result of this agreement.

10 Performance Evaluation

10.1 Customer consultation

Marlborough Lines regularly undertakes surveys of consumer's views, both as part of its everyday business practices and its requirement under the Commerce Act (Electricity Distribution Thresholds) Notice 2004 and the Amendment Notice 2006. This legislation requires electricity lines businesses to establish a consumer engagement program to understand their preferences regarding the price-quality trade offs inherent in electricity lines business service delivery.

As a result the bi-annual consultation methodology outlined below was developed and implemented. It was last completed during March 2008 and will be re-administered before 31 March 2010. Analysis and discussion of the 2008 result set is presented below.

10.1.1 Introduction

Marlborough Lines has adopted the approach that quality includes:

- The reliability of supply, both in terms of momentary fluctuations and longer term interruptions.
- Compliance with the electricity regulations in terms of standards of voltage and frequency.

10.1.2 Methodology

In developing this methodology, the efforts of other lines companies and the Commerce Commission's April 2005 document; 'Electricity Distribution Business Asset Management Plans and Consumer Engagement: Best Practice Recommendations' were reviewed.

The following key stakeholder groups were identified:

- Major Consumers (top 10)
- Interest Groups (such as Federated Farmers, Chamber of Commerce, Sounds Residents Groups)
- Mass Market Consumers (approx. 21,000)

Marlborough Lines adopted the following methodologies to consult with these groups:

Stakeholder Group	Consultation Method
Major Consumers	Direct Interview & Notes
Mass Market Consumers	Mail Out (free post) Questionnaire included in regular consumer newsletter. Response also possible through form on Marlborough Lines' website. Phone Survey undertaken on approximately 200 random customers.

Table 29 - Stakeholder Consultation

10.1.3 Consultation

A telephone survey of 200 Marlborough electricity consumers was conducted in late April 2009 to measure satisfaction with a range of performance measures, current attitudes towards Marlborough Lines, and consumer preferences regarding company ownership and electricity industry regulation.

The sample comprised 170 domestic consumers (aged 20+) and 30 commercial business managers.

As well as direct consumer communication methods, Marlborough Lines has several other mechanisms for indirect consumer communication through its operations and commercial transactions. These include consumer feedback from retailers, negotiated Use of System Agreements, negotiated Tariff schedules and Trust ownership.

10.1.4 Results

Over 92% of the sample was satisfied with reliability and quality while 86% was satisfied with the fault service. Overall 94.5% of the sample was satisfied with Marlborough Lines performance. This high level of satisfaction indicates general acceptance of the asset management practises of Marlborough Lines.

10.1.5 Discussion

Consumer feedback is utilised at many levels in Marlborough Lines' Asset Management Planning processes, for example at a high level consumers desire for improved reliability helps to set Marlborough Lines' overall service level targets for system and consumer supply interruption frequency and duration (SAIDI, SAIFI, and CAIDI). At a lower level this consumer input is used to shape asset maintenance and replacement philosophies as well as to develop and analyse system reliability improvement initiatives.

In summary Marlborough Lines considers that the consumer feedback received reinforces its intention to pursue incremental improvement of its network performance as opposed to 'step change' solutions (which would involve significant additional cost).

10.2 Review of progress against plan

During the past twelve months, Network performance has been good, and generally Network performance and consumer expectations are well aligned (as noted above). One area previously identified by consumer surveys, is a concern over the number of short interruptions, ie. Feeder auto-reclosers. Many of these were caused by possums and work is almost completed in installing additional, longer possum guards in key areas. Over 11,100 longer length guards have been installed on poles in forestry and native bush areas where brief outages have been a problem. Installation of these guards has reduced momentary interruptions from an average of three per week in some areas to none in six months.

The Company provides a newsletter to all consumers on a quarterly basis which typically addresses issues of reliability. The Company has provided fridge magnets showing 24 hour faults telephone numbers to all consumers.

10.3 Review of expenditure

The actual capital expenditure against budgets for the 2008-2009 financial year is given below:

Capital Expenditure 2007/08	Estimate ($000)	Actual ($000)
33kv Transmission	4,825	3,837
Overhead reticulation	3,880	3,031
415 volt distribution	390	91
Underground reticulation	755	1,607
Main substations	2,780	2,451
Electrical test equipment	60	29
Radio equipment	25	1
Plant & tools	137	222
Transport	940	704
Land & buildings	205	392
Office equipment	523	478
Total	**14,520**	**12,843**

Table 30 – Budget and Actual Capital Expenditure 2008/09

The variances in actual versus budget arose from a range of factors including late material deliveries causing the need to rearrange work programs and alter the timing of projects. In addition, landowners are becoming more assertive in the times that they prefer access to their properties and this lead to the deferral of some projects until the following year. While the Electricity Act gives Marlborough Lines the ability to override this, it is preferable to work with landowners.

The actual versus budgeted operating maintenance and administration expenditure for 2008/09 is given below:

Item	Budget	Actual
Zone Substation Corrective Maintenance	15,000	2,088
SCADA Corrective Maintenance	10,000	160
33 kV System - Corrective Maintenance	2,000	30,928
11 kV System - Corrective Maintenance	70,000	229,561
Distribution Substation Corrective Maintenance	5,000	9,355
LV System - Corrective Maintenance	660,000	382,505
Zone Substation Preventative Maintenance	255,000	192,653
SCADA Preventative Maintenance	125,000	70,404
33 kV System - Preventative Maintenance	225,000	153,643
11 kV System - Preventative Maintenance	750,000	1,054,333
Distribution Substation Preventative Maintenance	280,000	358,477
Distribution Transformer in depot maintenance	135,000	95,224
LV System - Preventative Maintenance	235,000	348,054
Asset Condition Assessment	210,000	238,007
Earth Testing	80,000	45,934
Monitoring & Inspections	28,000	47,705
Possum Guards	50,000	50,833
Tree Cutting and Vegetation Control	1,500,000	1,152,621
Communication Equipment Maintenance	19,000	18,547
Material and Equipment Maintenance	85,000	90,328
Totals	***4,739,000***	***4,571,360***

Table 31 - 2008/2009 Maintenance Expenditure - Budget vs Actual

The actual expenditure on maintenance and operation was close to budget.

10.4 System performance

Marlborough Lines is committed to reducing causes of outages on its Network. In recent years a number of fault prevention ideas have been initiated by Marlborough Lines' staff and installed within appropriate areas of the Network. These initiatives include:

- Bark catcher attachments on the conductor to prevent bark contacting poles and thereby causing outages and the risk of fire.

- Bird spikes being fitted to steel crossarms to prevent magpies and other large birds contacting both the conductor and the crossarm.

- Extra wide possum guards have been installed on over 11,100 poles to prevent possums climbing poles and contacting the conductor. The guards are environmentally coloured to blend in with the landscape. Forestry blocks and reserve areas have been the initial areas covered but all 33kV lines and new high voltage lines will have these fitted.

- Additional lightning arrestors are being fitted to selected transformer poles following receipt of the detailed location of historical lightning strike information from the Met Service. This information was matched with our history of faults to identify the location and nature of vulnerable network equipment. These areas have been targeted first with a new device designed by Marlborough Lines' staff.

- Power alarms which phone us when power is lost are located in most of the remote areas of the Network. The software which allows these incidents to be quickly notified to fault staff was designed by Marlborough Lines' staff.

The key indicators for system performance are shown in the following table. The Marlborough Sounds is one of the unique features of the Marlborough Lines' Network. This region has a very large proportion of holiday homes and baches. The feeders supplying this area are all radial, with no alternative supplies available. This area has difficult access (requiring boat and/or helicopters) and long travel times. As a result the Sounds area has a disproportionate influence on performance figures for both planned shutdowns and faults. This is particularly so, when it is considered that many of the installations are holiday homes and therefore unlikely to be occupied for considerable periods, compared to a similar fault in an urban area where the majority of the installations are likely to be occupied. Despite this, Marlborough Lines' overall system reliability figures compare very well with other similar line companies.

Looking forward, the continued reliability of the Network at current or greater levels is primarily dependent upon the Company not being restricted relative to its revenue requirements by inappropriate regulatory requirements.

10.5 Targets and actual performance

The performance targets and actual outcomes for the 2009 calendar year were:

Description	Target	Actual
Urban Blenheim < 0.5 hours	75%	29%
Urban Other < 1.5 hours	75%	45%
Rural < 4 hours	75%	87%
Remote Rural < 8 hours	75%	81%
Faults not restored after 3 hours	<20%	26%
Faults not restored after 24 hours	0%	3%
Number of Planned Interruptions	<260	284
Number of unplanned interruptions	<300	357
Total Number of faults/100km - 33kV	<2.5	0.65
Total Number of faults/100km - 11kV	<10	14.2
SAIDI - Class B minutes/consumer (planned outages)	<90	109
SAIDI - Class C minutes/consumer (faults)	<120	165
SAIFI - Class B outages/consumer (planned outages)	<0.35	0.36
SAIFI - Class C outages/consumer (faults)	<1.44	1.64
CAIDI - Class B minutes/consumer (planned outages)	<251	276
CAIDI - Class C minutes/consumer (faults)	<81	74

Table 32 – Key Performance Indicators

These results are for the twelve months ending 31 December 2009. The table above shows that the number of faults and planned outages were greater than the maximum targets and hence the SAIDI results were also greater than the targets. This is mainly a result of adverse weather, and increased economic activity. The increase in economic activity required more outages to allow work on development, and also resulted in a greater than normal number of faults from activities such as tree felling and equipment such as diggers.

One further factor is that the increased use of SCADA and power alarms means that faults are known much earlier. Historically Marlborough Lines wasn't aware of faults until customers phoned in to advise them. For example if the power went off at 12:30am, then until customers got up at 6:00am to 7:00am, Marlborough Lines wasn't aware of the fault and the time to repair commenced with the first telephone call. Today, the combination of power alarms and SCADA mean that Marlborough Lines is aware of the fault within a few minutes of it occurring. For overhead faults, most fault location and repair requires light and accordingly the true repair can't commence until 6:00-7:00am. Since the fault repair time now commences at 12:30am, it appears that fault repairs are taking longer than they were historically when in fact the converse is true.

In order to benchmark performance the actual figures were compared with those from other similar companies. Unfortunately, these figures for the same year will not be disclosed in time to allow inclusion in this Asset Management Plan. Comparison for the purposes of this plan will be made on the basis of the 2008/09 financial years disclosed figures.

Of the twenty-eight Electricity Lines businesses, there are nine of similar size to the Marlborough Lines' Network, i.e. maximum demand within 10MW or length of lines within 500km or within 3000 consumers. Those companies with predominant overhead networks are shown in the following table:

Company	System Length	Consumers	Maximum Demand MW
Alpine Energy	4060	30267	130
Counties Power	3009	35970	94
Eastland Network	3664	25300	56
Horizon Energy	2341	24250	85
Marlborough Lines	3320	23870	70
Network Tasman	3330	35829	148
OtagoNet	4368	14761	60
The Lines Company	4417	24185	61
Top Energy	3837	30453	63
Waipa Networks	2058	22897	61

Table 33 – Comparison Group for Year Ending 31 March 2009

Item	Marlborough Lines	Group Average
Costs (Direct)/km	1900	1479
Faults/100km prescribed voltage	12.9	11.4
SAIDI	249	295
SAIFI	2.6	3.5
CAIDI	105	91

Table 34 – Comparison of Key Performance Indicators for Year Ending 31 March 2009

These figures show that our performance in terms of SAIDI/SAIFI is better than the group average while CAIDI is below the group average. Faults/100km is less favourable reflecting the remote and rugged nature of the Network and an above average year of storms and high winds. Many faults occurred when high winds carried small sections of broken branches to lines or toppled trees that were further away than the distances in the new tree legislation. The more remote Sounds areas are particularly prone to these events. Overall the comparison is positive and indicates good performance from Marlborough Lines' Network given its coverage area.

Of the ten comparison companies six have over 80% of their Network as either urban or rural while Marlborough Lines has only 47% urban and rural. Only the Lines Company has a higher percentage of remote/rugged lines than Marlborough Lines.

10.5.1 System reliability

For the 2009 year, there were 164.5 minutes per consumer lost due to faults and 109.5 minutes lost due to planned outages. This equates to an overall reliability of 99.948%. The 357 faults can be broken down into 355 faults on the 11kV system and 2 faults on the 33kV system. The graph below shows the customer minutes lost for each month.

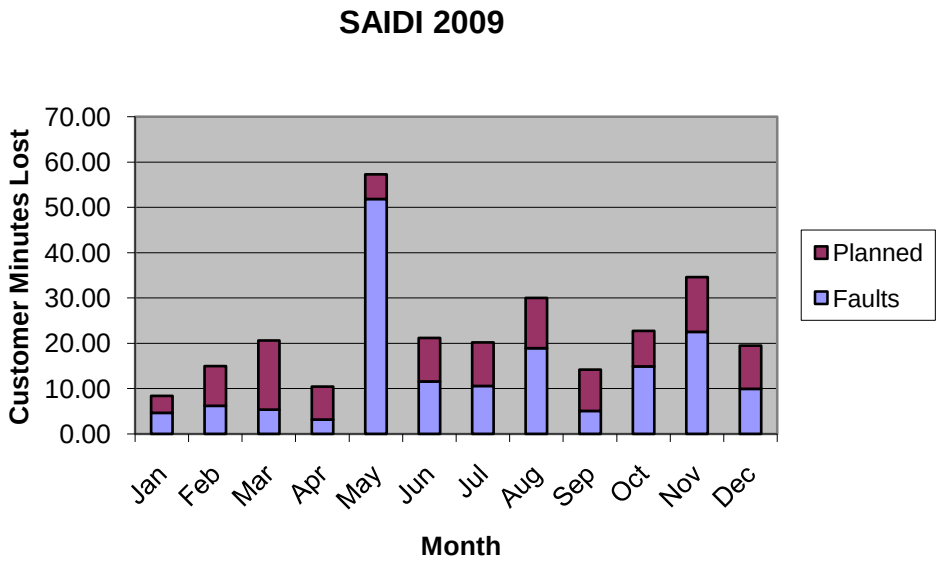

Figure 11 - Monthly Breakdown of System Outages

Figure 11 shows that the month of May had a large number of customer minutes lost due to faults. On the 15, 17,18, 23,24, and 31 May, a number of weather related faults with causes such as clashing lines, branches over 11kV, broken crossarms and a broken 33kV pole. The largest fault affected 700 customers for up to 15 hours. Without this month, the figures for 2009 would have been close to target.

10.5.2 System faults

The total of 357 faults on the Network in 2009 compares to 379 in the 2007/2008 financial year. Historical data on the causes of faults within the Network and a breakdown of this year fault data is shown below:

Year	Unknown	Transpower	Trees	Weather /lightning	Component failure adverse environment	Human element	Vehicle /foreign	Total Excluding Transpower
1994-1995	4	7	1	250	64	0	90	409
1995-1996	6	2	16	52	39	1	56	160
1996-1997	9	3	21	63	36	2	27	158
1997-1998	29	2	21	23	69	1	33	176
1998-1999	26	1	24	21	8	27	55	161
1999-2000	47	0	8	30	4	7	31	127
2000-2001	62	0	26	157	1	8	41	295
2001-2002	16	1	17	131	50	4	65	283
2002-2003	51	3	8	78	3	29	41	210
2003-2004	75	11	19	64	17	14	30	219
2004-2005	56	6	18	66	22	36	35	233
2005-2006	34	0	7	98	20	74	61	294
2006-2007	106	5	13	99	94	13	34	359
2007-2008	40	0	17	126	113	17	66	379
2008-2009	133	0	28	19	106	16	31	333
2009	140	0	26	101	20	20	42	357

Table 35 - Causes of Faults

The graph below shows the total number of faults for the years 1995 to the present day. The higher levels of reported faults were due to adverse weather together with faults caused by vehicles and people working near the Network (for example diggers damaging cables and logging operations damaging overhead lines). The accuracy of the data recording has improved significantly in recent years and this has resulted in higher numbers of recorded faults since 2000.

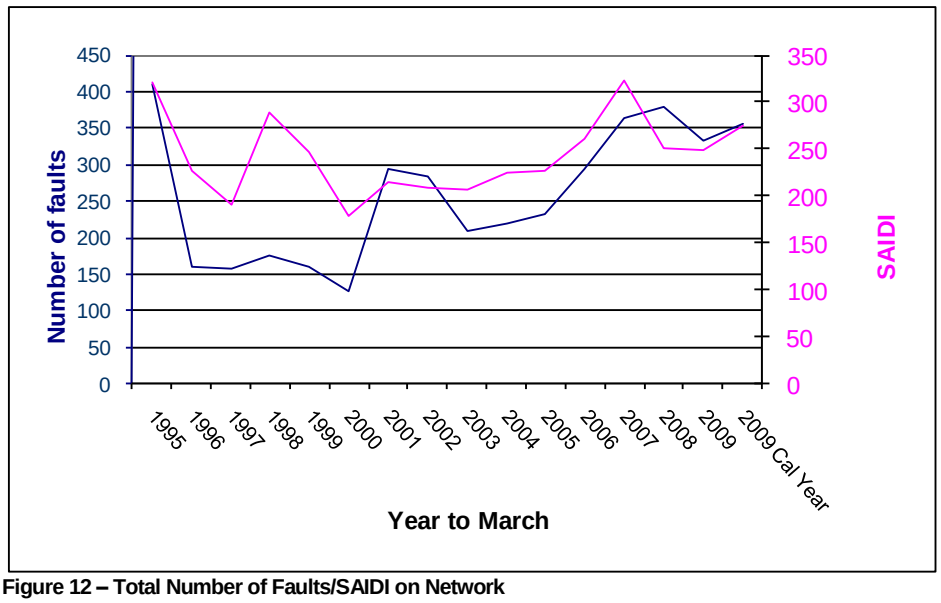

Figure 12 – Total Number of Faults/SAIDI on Network

During 2009 there were five major faults (defined as faults where greater than 2,000 consumer hours are lost). This compares with seven major faults over 2,000 consumer hours in the previous year.

Location	Reason	Consumer Hours Lost
Kenepuru Sounds	Suspect Weather	4071
Linkwater Area	Broken Insulator on 33kV Pole	3593
Linkwater Area	Unknown, suspect clashing lines	2489
Wairau Valley	Broken Insulator	2458
Wairau Valley	Tree over line	2058

Table 36 - Major Faults

	SAIDI							SAIFI						
	08/09	07/08	06/07	05/06	04/05	03/04	02/03	08/09	07/08	06/07	05/06	04/05	03/04	02/03
Planned	96	100	109	94	93	53	74	0.36	0.52	0.4	0.35	0.37	0.34	0.32
Faults	154	164	155	166	120	141	126	1.64	2.36	2.5	2.55	1.52	1.39	1.51
Total	250	264	264	260	213	194	200	2.0	2.88	2.9	2.90	1.89	1.73	1.83

Table 37 - Historical Performance

The above table shows the SAIDI and SAIFI for the 2002 to 2009 financial years. Live line work techniques have enabled the number of planned supply interruptions to be significantly reduced. It is however not possible to do all planned maintenance work on the Network using live line techniques. As a general rule, the Company uses live line techniques wherever possible where a conventional shutdown would result in more than 100 consumer hours being lost.

10.5.3 Planned outages

During 2009 there were five major outages required to undertake maintenance work on the Network, as listed in the table below. Line maintenance is essential to maintain the safety and performance of the Network. Live line techniques have reduced the need for many planned shutdowns.

Location	Reason	Consumer Hours Lost
Old Renwick Road	Reconstruct 33/11 kV lines	2088
Kenepuru Head	Rebuild CB structures	1895
Dillon St, Blenheim	Replace underground HV cable pole	1438
Kenepuru Rd	Replace faulty pole	1358
French Pass Rd	General Maintenance	1065

Table 38 – Major Planned Shutdowns

Two of these shutdowns were in the Sounds area where many installations are unoccupied for much of the year. All were essential for the safe operation of the Network.

With a large capital programme, and in particular line renewals, it is often necessary to shutdown large section of the Network in order to undertake the work. The single end feeders in many regions can result in numerous and long outages for those at the end of the feeders. To minimise this, Marlborough Lines has a 900kW mobile generator. In the

2009/2010 year this was used on 19 occasions saving 2,924,677 customer minutes. This is shown in the table below:

Date	Location	Mode	Customers	Customer Minutes
16/04/2009	Provincial Coolstores	Island	1	451
21/05/2009	Okuri Bay	Island	188	88172
22/05/2009	Okuri Bay	Island	188	91556
25/05/2009	Okuri Bay	Island	188	88924
26/05/2009	Okuri Bay	Island	188	91744
24/07/2009	Grove Road	Island/Fault	33	12870
11/08/2009	Safe Air	Island/Fault	1	480
12/08/2009	Safe Air	Island/Fault	1	1136
7/09/2009	Burleigh Road	Island/Fault	20	3280
15/09/2009	Marama Road	Island	230	95910
17/09/2009	Provincial Coolstore	Island	1	434
7/10/2009	Marama Road	Island	230	73600
16/11/2009	Rai Valley	Support	679	344253
18/11/2009	Rai Valley	Support	679	230181
24/11/2009	Rai Valley	Support	679	302155
27/11/2009	Rai Valley	Support	679	249872
10/12/2009	Rai Valley	Support	679	325920
14/12/2009	Rai Valley	Support	679	279069
17/12/2009	Linkwater	Support	1482	644670
	Total			***2924677***

Table 39 - Generator Use

10.6 Targets for 2010 on

The performance targets for the 2010 year and on are:

Description	Target
Urban Blenheim faults less than 0.5 hours	>75%
Urban Other faults less than 1.5 hours	>75%
Rural faults less than 4 hours	>75%
Remote Rural faults less than 8 hours	>75%
Faults not restored after 3 hours	<20%
Faults not restored after 24 hours	0%
Number of Planned Interruptions	<260
Number of unplanned interruptions	<300
Total Number of faults/100km - 33kV	<2.5
Total Number of faults/100km - 11kV	<10
SAIDI - Class B minutes/consumer (planned outages)	<90
SAIDI - Class C minutes/consumer (faults)	<120
SAIFI - Class B outages/consumer (planned outages)	<0.35
SAIFI - Class C outages/consumer (faults)	<1.44
CAIDI - Class B minutes/consumer (planned outages)	<251
CAIDI - Class C minutes/consumer (faults)	<81

Table 40 - Performance Targets

These targets have been developed around the concept of continuous incremental improvement, while recognising that in the more remote areas, it is not realistic to expect improvements to reliability without significant expenditure, which is unlikely to be justified on a cost/benefit basis. Customer surveys and feedback suggest that generally customers are happy with the current levels of service and network performance. At the same time, generally customers expect that service levels will increase over time.

It is further noted that in the last three years, Marlborough Lines has failed to meet some of these targets, however these are still regarded as appropriate and accordingly they have not been increased.

10.7 Improvement initiatives

In line with the AMP objectives in Section 1, Marlborough Lines' improvement initiatives will broadly be in the areas of:

- Improving the knowledge of asset age, condition and remaining life.
- Optimising levels of service through continued consultation with consumers.
- Maintaining a detailed understanding of the demographic and economic drivers of demand.
- Better understanding the risks Marlborough Lines is exposed to, particularly physical risks to the Network.

- Maintaining efficient work processes through integration of WASP with existing asset data.

Specific projects along these lines to be undertaken during the 2010 year are:

Installation of further lightning arrestors in lightning prone areas are designed to minimise the impact of lightning storms on supply reliability. As more areas are identified to be prone to such events, further equipment will be installed to reduce the incidents of these events.

Similarly, the Company's extensive vegetation control programme is designed to limit the interference caused to the Network during wind storms, particularly prevalent in some of the more remote sections of the Company's Network. Continuance of these programmes is designed to maintain or possibly decrease the current levels of expenditure on outage driven maintenance. Additional resources have been made available to both liaise with tree owners and carry out tree trimming.

Use of the mobile generation purchased in 2006/07 will be used to reduce outage impact during planned work. Increased development activity resulted in more planned shutdowns. Ready connection points will be set up in appropriate areas to allow the quick and safe set up of the generator. Consideration is being given to the purchase of a 200kW unit for use with urban substations and smaller rural network (such as SWER) to further assist in improving performance.

Additional tie lines are being installed where these will provide reductions in outage times for faults and/or planned work.

Asset condition checks on the ten worst performing feeders will be increased from the normal five yearly cycle to a biannual check. Additionally specific areas known to be affected by wind storms, trees, lightning etc will be checked and reviewed to establish cost effective measures to improve reliability.

Appendices

A Asset Descriptions

A.1 33kV System

Marlborough Lines take supply at 33kV from Transpower's Blenheim substation. From Transpower, the 33kV sub-transmission Network distributes supply to the 33/11kV zone substations. Marlborough Lines has 14 zone substations throughout its network area, with three zone substations supplying Blenheim.

A 2.5MW generation station on the Waihopai River is embedded into the Marlborough Lines' Network via a 33kV line between the generation and Leefield zone substation.

750kW of wind generation is imbedded into the 11kV Network near to Ward zone substation.

The 33/11kV zone substations transform the voltage level down to 11kV. The 11kV lines then distribute supply to the 11kV/400V distribution transformers. The majority of customers take supply at 230/400V, with four of our larger customers taking supply at 11kV.

Of the total of 309km of 33kV line, 296km is overhead, most of which has been constructed since 1960. Lines constructed earlier than 1960 include galvanised tower lines between Waihopai Power Station and Blenheim and part of the line between Riverlands and Seddon. The Blenheim/Waihopai line was commissioned in 1927 to transfer energy from the new generation station to Blenheim. Much of this line remains unaltered from its original construction, although some short sections have been rebuilt to allow road widening and extra mid-span poles inserted to allow connection of 11kV spur lines and transformers. The aluminium conductor is mostly original, but with the addition of pre-formed line splices over each insulator to repair any conductor strand breakage. In recent years two towers have been replaced for road widening purposes. Recently below ground deterioration was detected on a proportion of the towers between Waihopai and Seddon. Some have already been changed. Planning is underway to replace others.

A further 33kV line built prior to 1960 runs between Blenheim and Pelorus Bridge near Rai Valley. This line was originally constructed by the New Zealand Electricity Department in the early 1940s as a 66kV transmission line carrying output from the Cobb Power Station to Blenheim. Ownership of this line was transferred to Marlborough Lines in 1970 following commissioning of the new 110kV tower line from Stoke to Blenheim.

This line is constructed using hardwood poles and double level crossarms, and is now operated at 33kV to provide supply to the Company's zone substations at Havelock, Linkwater and Rai Valley. Since 1970 a considerable number of poles have been changed to concrete or treated pine, and a further section in the Kaituna Valley replaced by a new double circuit 33kV line. The original copper conductors remain, and have had preformed line splices added where the original suspension clamps are attached to replace the strength of any broken strands. This line has recently been surveyed and poles numbered, and a programme is in place to ensure all the remaining hardwood poles are regularly tested to ensure timely identification of any defects.

In the early 1970s, a double circuit 33kV and 11kV line was constructed between Okiwi Bay and Elaine Bay, using a high proportion of larch poles treated with creosote. Several of these have subsequently been replaced and the removed pole checked for age-related deterioration. Whilst these checks have not revealed any systemic failure or significant problems, it is considered probable that poles of this type may need replacement over the next 5-10 years.

Type	Number	Average Age	Useful Life	Replacement Cost	Depreciated RC
11kV Distribution Lines Overhead	2,152	34	64	123,893,658	58,658,074
11kV Distribution Lines Underground	127	10	48	18,410,748	14,891,193
33kV Switchgear	217	14	39	3,723,857	2,423,538
33kV Transmission Lines Overhead	290	45	69	20,863,927	8,171,475
33kV Transmission Lines Underground	14	4	45	2,919,276	2,645,623
Consumer Service Connection	28,755	27	45	12,860,783	6,196,116
Distribution Substations	11,417	21	53	45,399,767	27,102,525
Distribution Switchgear	3,060	12	37	15,241,764	10,264,866
Isolating Substations	33	27	55	515,843	265,779
Land and spares	4	n/a	n/a	7,775,438	7,775,438
LV Distribution Lines Overhead	449	43	67	15,567,386	5,767,930
LV Distribution Lines Underground	255	13	46	23,686,193	16,979,475
LV Switchgear	2,778	12	45	5,576,415	4,078,042
Scada Equipment	115	6	15	653,939	408,716
System Control Equipment	7	22	38	1,093,155	589,963
Voltage Regulators	17	20	55	1,072,341	695,866
Zone Substation	272	16	54	23,721,439	16,493,127
Subtotals				***322,975,929***	***183,407,746***

Table 1 - Asset Valuation 1/4/2009

A.2 33kV Sub Transmission

The two figures below show the overall 33kV sub transmission system together with the zone substations and embedded generation.

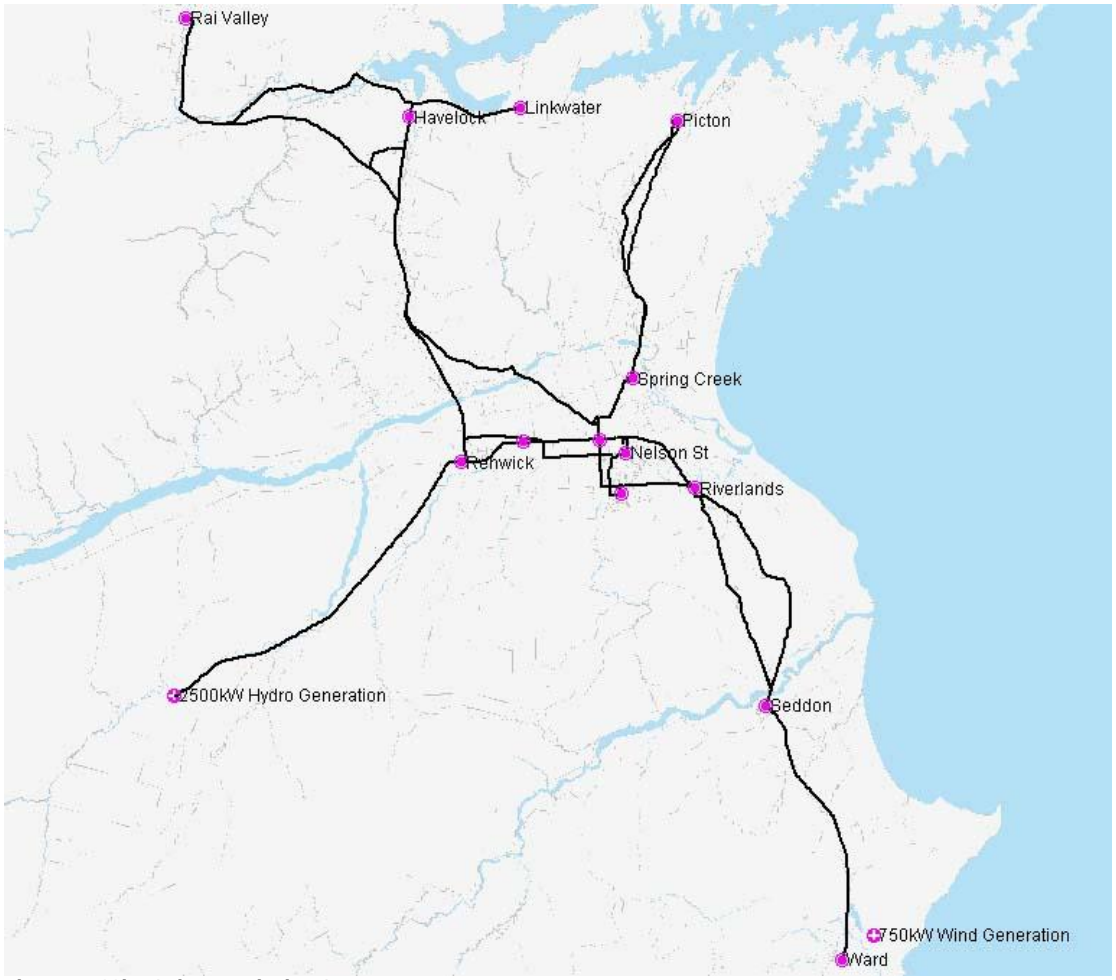

Figure 1 - 33kV Subtransmission System

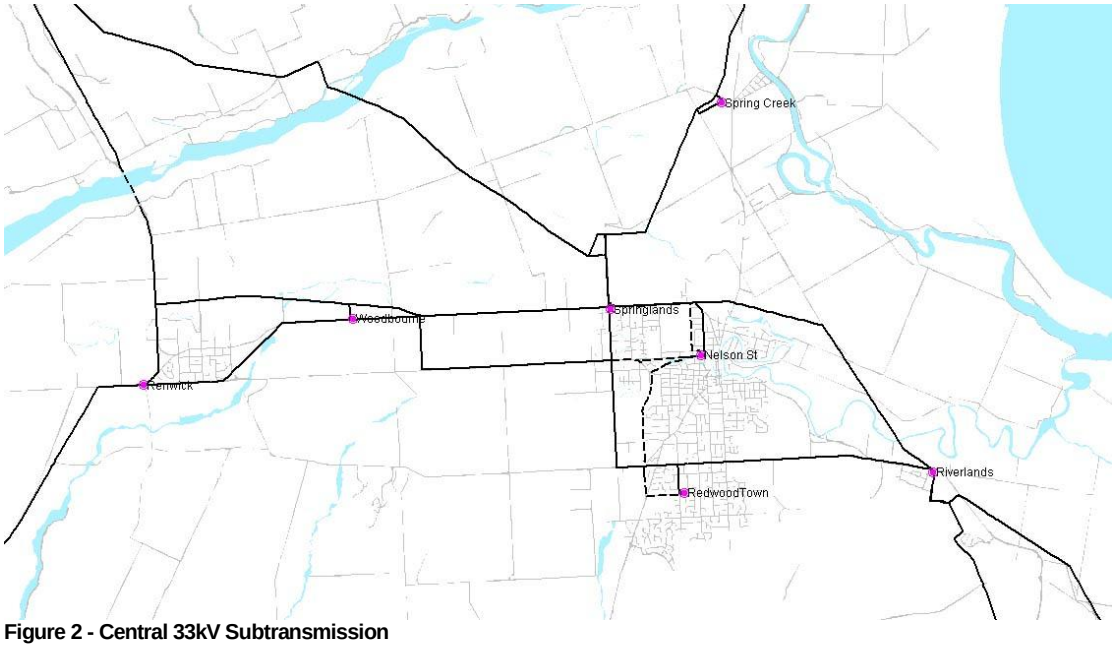

Figure 2 - Central 33kV Subtransmission

A.3 33kV Lines Overhead

There is 290 km of 33kV overhead, with an average age of 34 years compared with an expected average life of 69 years. The replacement cost of the 33kV overhead is approximately $21 million.

The age profile of the 33kV overhead lines is shown below.

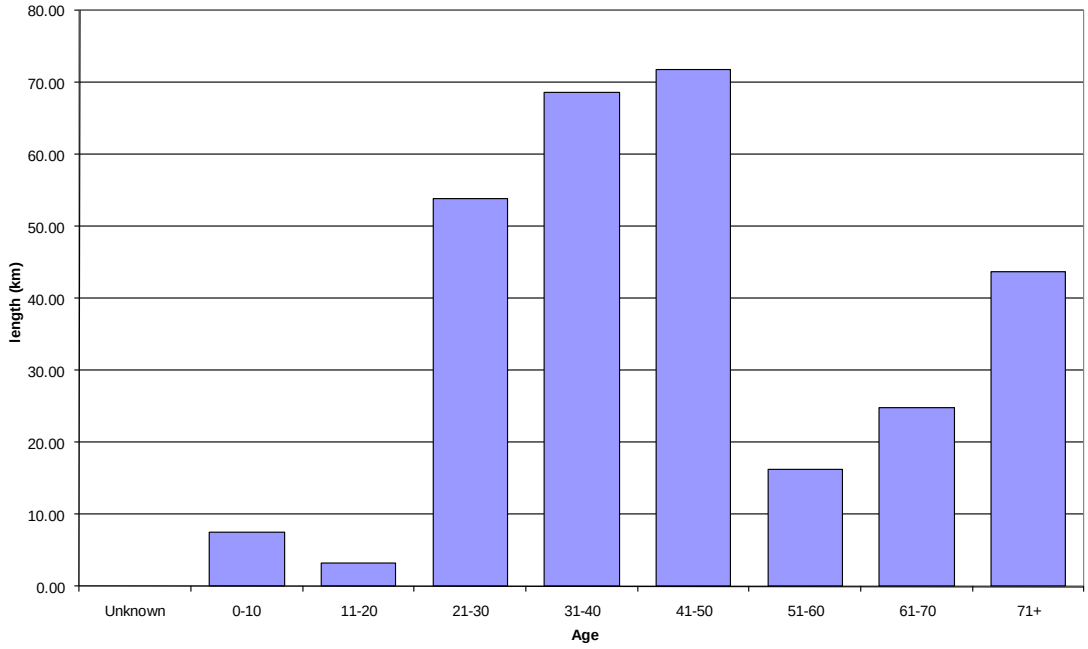

Figure 3 - 33 kV Line Age Profile

Around twenty percent of the existing 33kV Network is currently older than the maximum life allowed in the ODV handbook. Work is currently underway to replace some of the wooden lines and the metal towers. Investigation has shown that the original 1927 33kV towers near bitumen roadways have significant corrosion just below ground level. These have been strengthened and or replaced. In addition the 1956 hardwood 33kV line from Blenheim to Rai Valley is at the end of its life and is being replaced.

A.4 33kV Underground

The 33kV subtransmission cable underground assets are relatively new as shown below. The total length of cable is 14.3km, the average age is 4 years compared with an expected life of 45 years. The replacement cost of the cable is $2.9 million.

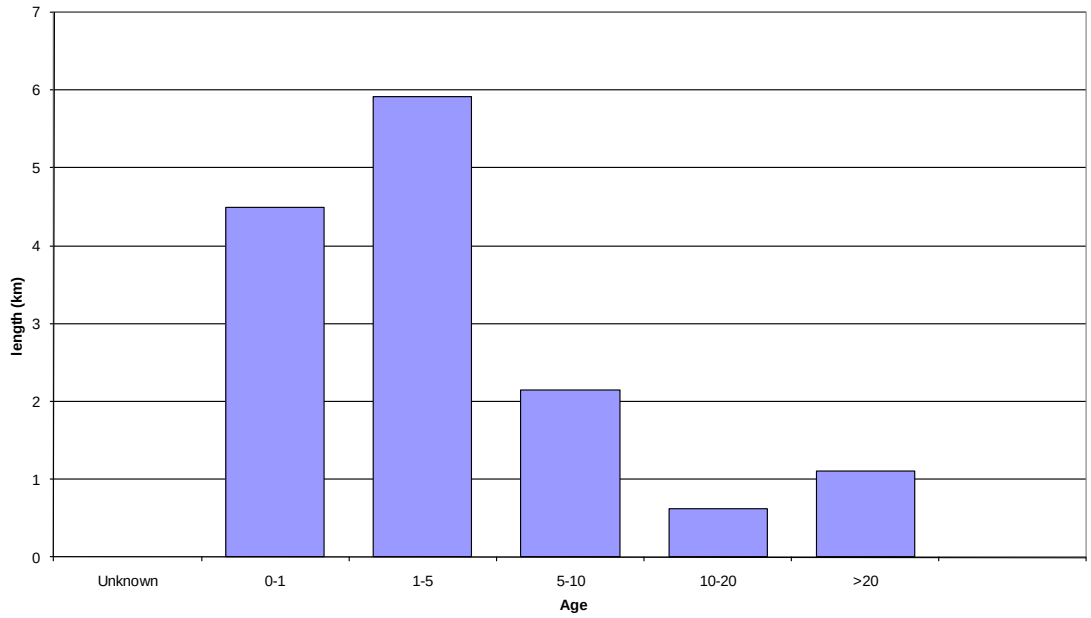

Figure 4 - 33KV Cables Age Profile

All of this cable will be less than 45 years old in 2020, and hence will not need renewal within the period of this AMP.

A.5 33/11kV Zone Substations

Zone substations transform the 33kV down to 11kV for reticulation to 11kV/400V transformers. All of the zone substations are equipped with on-load tap-changers and automatic voltage regulators. These are used to regulate the 11kV supply and maintain constant voltage. In the last ten years, Marlborough Lines has upgraded or refurbished 12 of the 14 zone substations and in the current years will upgrade the remaining two. In addition a new Zone substation is under construction to supply the south eastern end of Blenheim. This will reduce the loading on Redwoodtown substation. The average age of the substation is 16 years compared with an expected life of 54 years.

The total replacement cost of the zone substations is $23.7 million. The major components of the substations are transformers and switchgear.

A.5.1 33/11kV Zone Substation Transformers

The replacement cost of the transformers is $13.3 million or roughly half of the total value of the zone substations.

The age profile of these transformers for both total MVA and number of units is shown below. This shows that the newer units are larger (15MVA) than the older units.

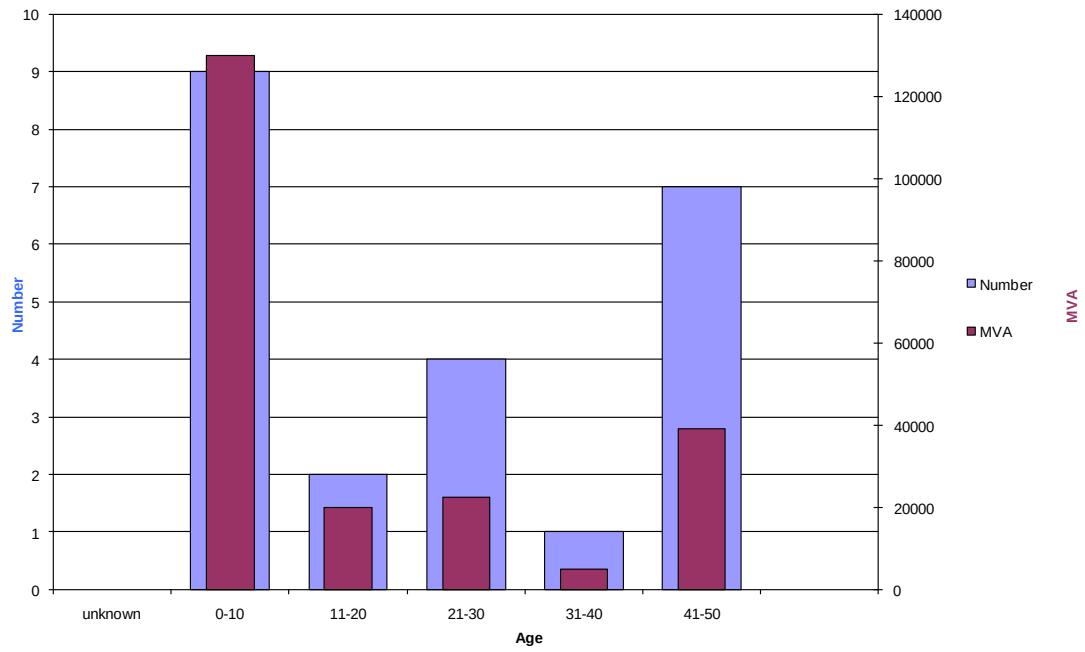

Figure 5 - Zone Substation Transformers Age Profile

Based on the expected life of 55 years only five transformers are due for renewal within the next ten years. Because of the importance of the transformers they are carefully monitored and inspected. Because of this, it is not expected that any of the transformers will require replacement in the next ten years.

A.6 11kV Overhead Lines

The 11kV overhead lines are the most significant asset class both in terms of quantity and value. The replacement cost of the 11kV overhead is $124 million and its average age is 34 years compared with an average expected life of 64 years.

The distribution Network is generally in a very tidy condition. Nearly half of the Network is constructed on concrete poles, and most of the balance on treated pine poles. Most conductors are aluminium, although some copper conductors remain in use on older lines. Additionally, some older spur lines use copper weld and galvanised steel conductors, typically located on short spur line sections of the Network where demand is relatively static.

A programme is in place to identify those areas where changes in demand may require upgrades to the capacity of the Network, generally by way of increases in the conductor size.
The backbone of the Network system is constructed at three phase with some spur lines and lines at the extremities of the Network being single phase, with 33 separate areas of single wire earth return.

All of distribution system currently operates at 11kV, with no remaining 6.6kV. All new rural construction is at 22kV and in within the period of this plan some areas will be upgraded to 22kV.

Most of the Network uses flat construction hardwood crossarms, although some limited areas have been altered to triangular construction in an endeavour to reduce faults from swan and duck strikes.

Most of the central area of the Network is capable of being ring-fed with supply available from at least two zone substations. This arrangement provides flexibility in the operation of the system, and enables supply to be maintained to most consumers in this area at times of emergencies or planned outages. However a significant portion of the Company's Network is supplied by way of long radial spur lines, which have no alternative supply capabilities.
Most of the overhead reticulation has been constructed since 1960. Significant growth in the number of connections and in the demand for electricity occurred in the 1960s and 1970s, and consequently considerable sections of the Network were upgraded at that time

The age profile of the overhead distribution lines is shown on the following chart:

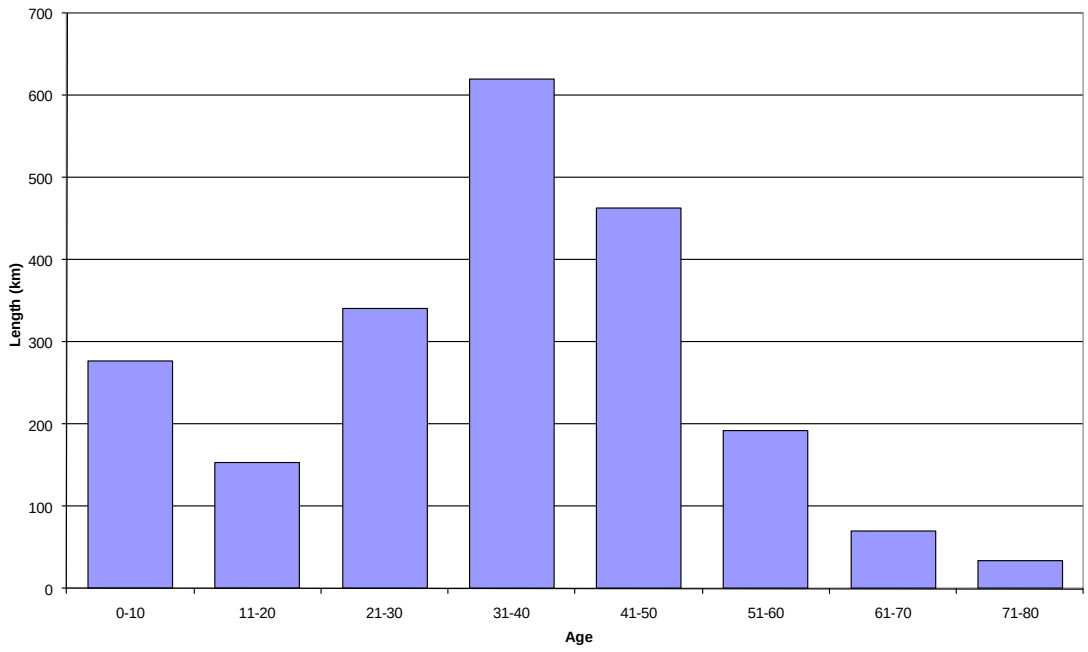

Figure 6 - 11kV Overhead Lines Age Profile

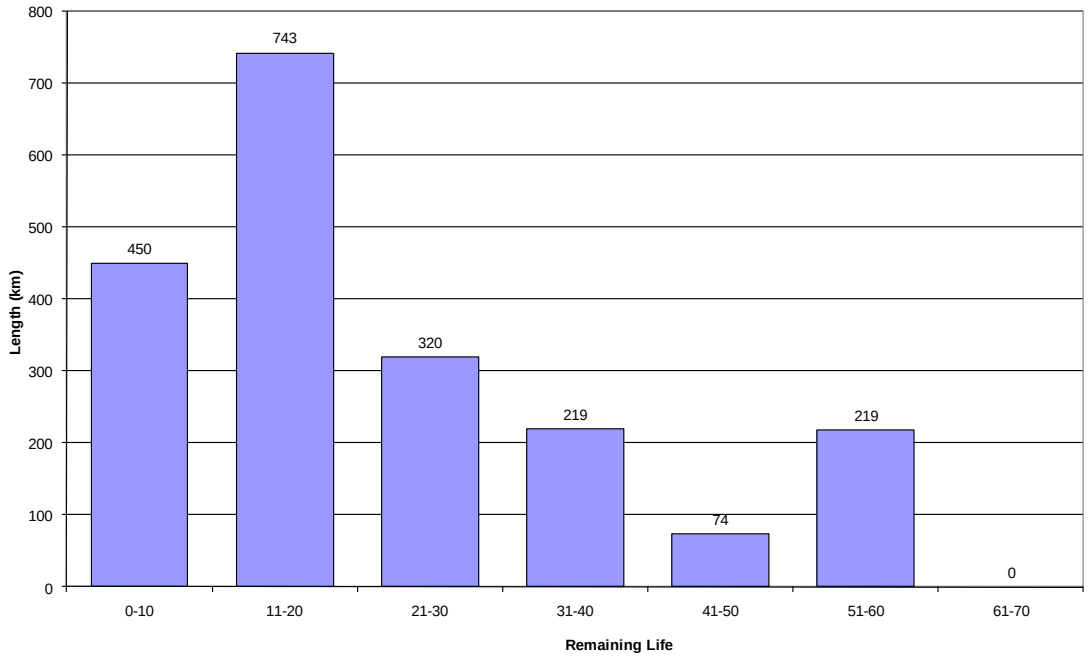

Figure 7 - Remaining Life 11kV Overhead Lines

The above figure shows the estimated remaining life for 11kV overhead lines using useful lives of 55 years for wooden poles and 70 years for concrete and metal poles. This shows that during the period of this AMP it will be necessary to renew approximately 450 km of 11kV Overhead lines.

A.7 Poles

Poles are a major component of overhead lines. To a large extend the condition of the pole determines whether a line needs to be replaced or can be maintained or upgraded.

The Network has been constructed on a variety of different pole types. Current practice is to utilise pre-stressed concrete poles where good access is available and treated pine in other areas. Since 1969 almost all of the lines constructed in the Marlborough Sounds have been on treated pine poles due to the difficult access tracks or the need to fly the poles to site by helicopter. Creosote-treated larch poles were used in the period 1971 to 1983. Iron rails have been used for minor works throughout the Network. In total there are 33,558 poles. The breakdown of pole types today is shown below:

The table below shows the total number of poles and the number assessed as being in a poor or fair condition. Any assessed as a hazard are red tagged and dealt with urgently. The data in the table is also shown in pie graphs on the following page.

Table 2 - Pole Numbers

Pole Type	*Number*	*Poor/Fair*	*Notes*
Galv Steel Column	137	18	Foundations - under repair
Tower Galvanised Steel	205	16	Corrosion damage
Iron Rail	2675	76	age
Concrete	1016	13	
Pre-Stressed Concrete	6155	8	
Reinforced Concrete	9280	129	
Tanalised Pine	11667	72	
Larch	412	144	replacement programme
Hardwood	878	170	replacement programme
Unknown	1133	13	
Total	*33558*	*659*	

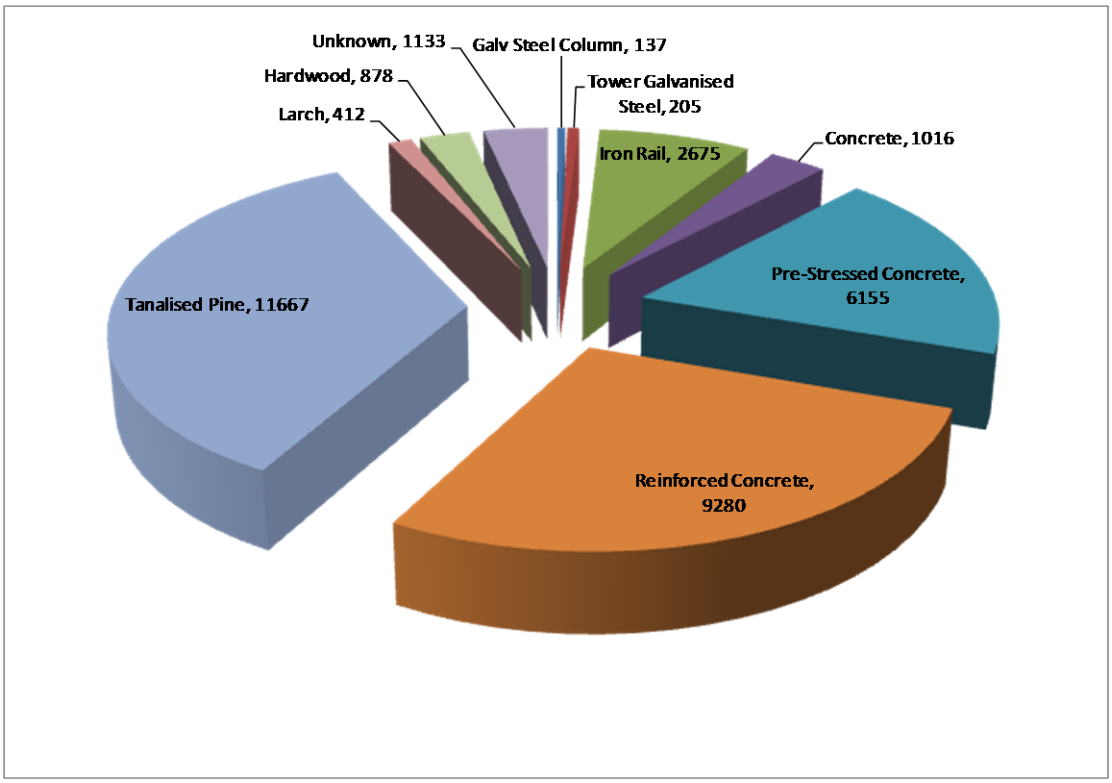

Figure 8 Pole Numbers

Regular monitoring of the condition of all poles is undertaken. Particular attention has been placed on monitoring older larch, hardwood and towers. Where any poles of this type are removed, they are thoroughly inspected and checked for damage or decay. This has not yet revealed any systematic failure or significant problems, however many of these poles are at the end of their useful life and will need replacement in the short to medium future.

The results of the condition monitoring of poles is summarised in the graph below:

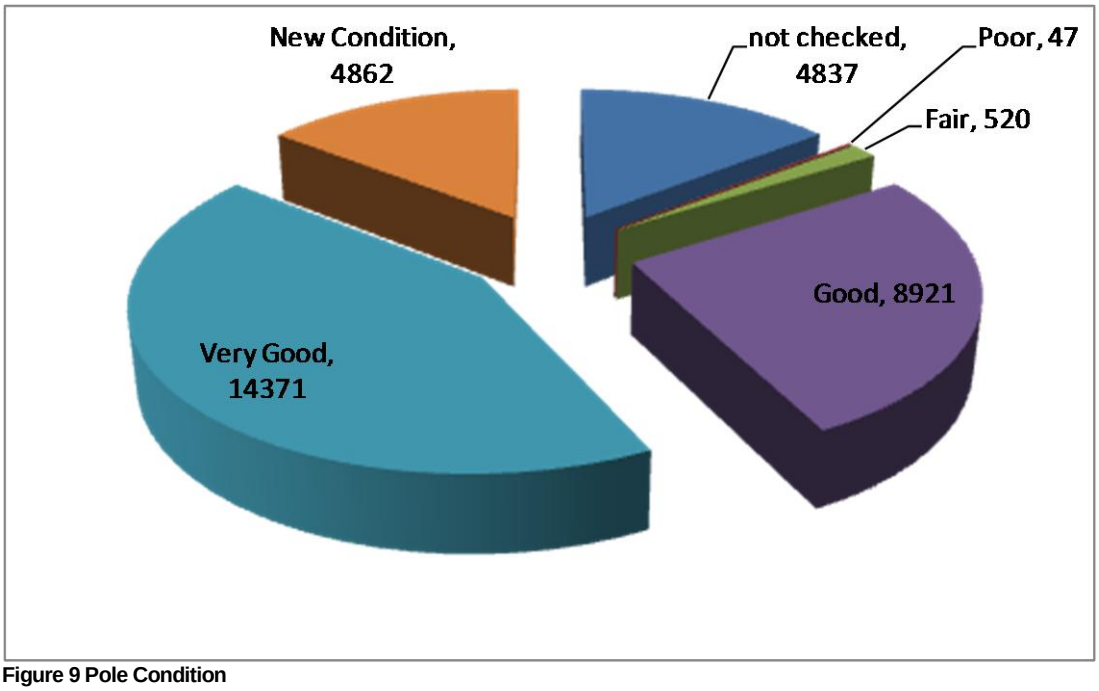

Figure 9 Pole Condition

A.8 11kV SWER Lines

Single Wire Earth Return (SWER) lines have been used extensively throughout the more remote sections of Marlborough Lines' Network, with a total of 550km of 11kV SWER lines currently in place. These lines can be constructed at significantly lower cost than the more traditional two and three wire systems, due to the ability to span longer distances without the possibility of mid-span wire crashing. This type of construction is ideally suited to areas of low population density, such as parts of the Marlborough Sounds, the upper Awatere Valley etc.

The primary disadvantages of this type of construction are that it provides only a single phase supply which can only deliver relatively low capacity. Stringent conditions related to earthing and interference with telecommunication systems apply to this type of construction, generally limiting the current in the 11kV system to 8 amps.

A small number of the 33 areas currently supplied by SWER systems currently have loads at or approaching the 8 amp current limit. Some work has been done in two areas to modify the construction system while for a third area, the obtaining of easements is delaying changes.

Consideration is also currently being given to international best practise, in order to ascertain whether higher currents could be operated without causing any safety or interference.

A.9 11kV Underground Cable

The 11kV underground reticulation is generally much newer than the overhead with an average age of 10 years and an average expected life of 48 years.

The age profile is shown on the following chart:

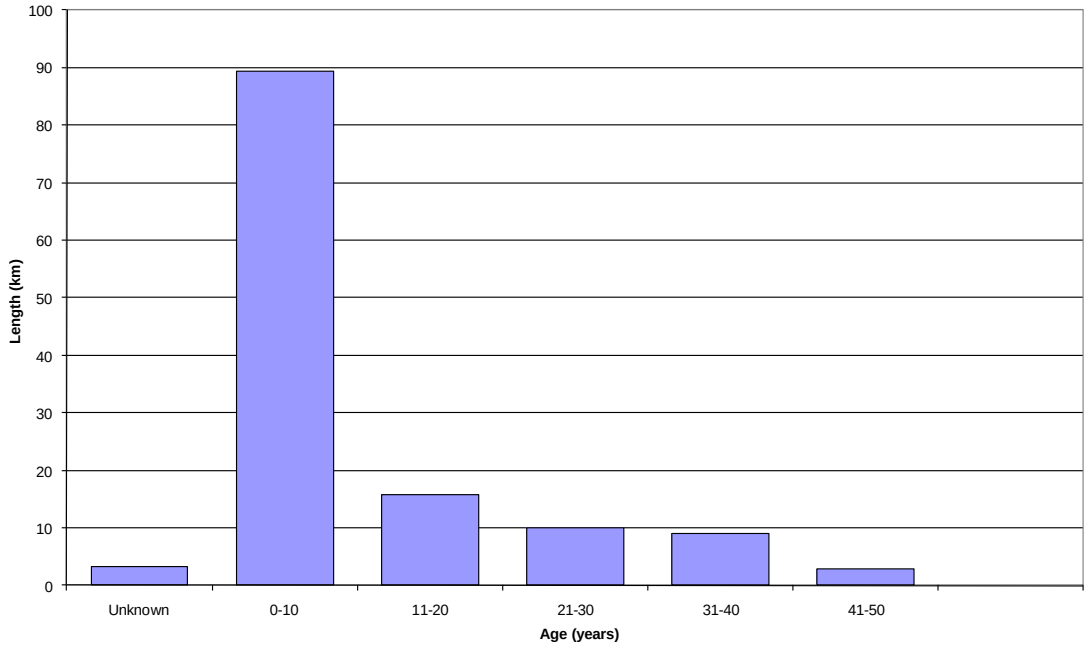

Figure 10 - 11kV Underground Cable Age Profile

The majority of these cables are XLPE, and the generally accepted useful life is 45 years, however there are reports of XLPE cables failing at 35 years. Based on 35 years, 9% or 19km of cable is at the end of its useful life with a further 12 km reaching the age of 35 years within the next ten years.

A.10 Distribution Transformers

Distribution transformers reduce the 11kV down to 230/400V. The majority of installations connected to the Network take supply at this voltage. The distribution substations, transformers and associated equipment (e.g. fuses) have a total replacement cost of $45.4 million with an average age of 21 years compared to an estimated average useful life of 53 years. The age profile of the MLL's 3720 distribution transformers is shown in the figure below:

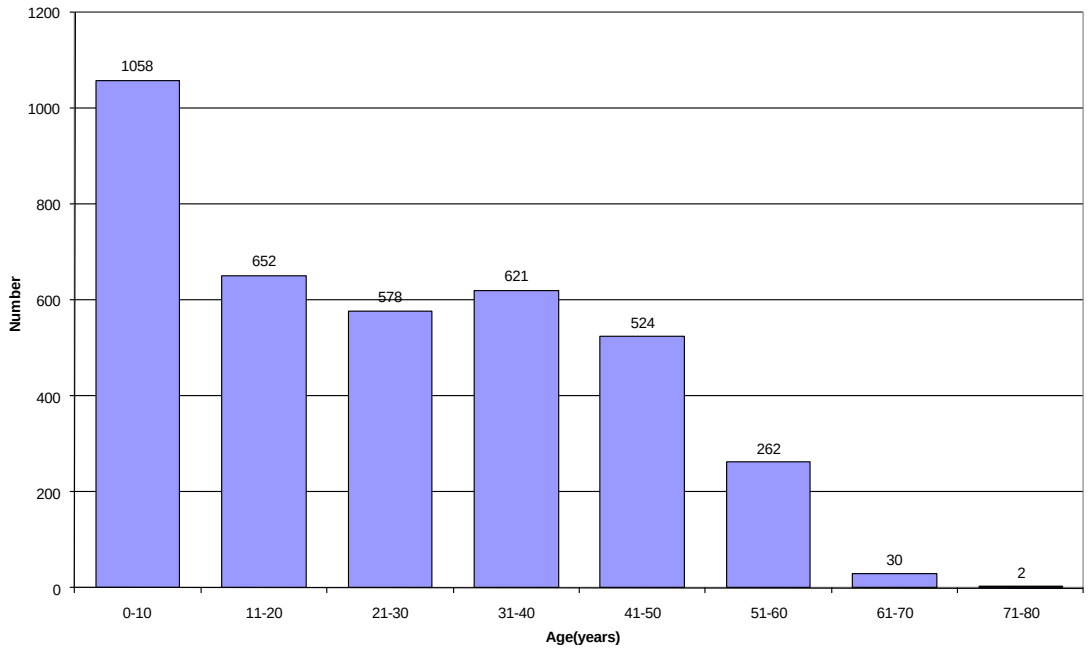

Figure 11 – Age Profile for Distribution Substations

Based on the ODV handbook useful life of 45 years, there are currently 129 transformers due for renewal, with a further 432 due for renewal in the next ten years. Using the extended life of 55 years, there will be 129 transformers due for renewal in the next ten years.

A.11 Distribution Switchgear

Distribution Switchgear covers a range of assets. The total replacement cost of these assets is $15.2 million with an average age of 12 years compared to an average expected life of 37 years, i.e. it is generally relatively new. This category can be further spilt into the various assets classes:

Table 3 Distribution Switchgear

Description	Number	RC	DRC	Average Age	Useful Life
11kV Air Break Switches	**798**	**4,302,120**	**2,797,055**	**12.9**	**35**
11kV Lightning Arrestors	**683**	**1,237,153**	**873,073**	**10.4**	**35**
11kV Fuses	**943**	**2,913,075**	**1,940,049**	**11.9**	**35**
11kV Switches	**23**	**729,749**	**456,693**	**15.0**	**40**
11kV Reclosers	**63**	**2,297,945**	**1,698,514**	**10.4**	**40**
11kV fault Locators	**144**	**363,156**	**244,992**	**11.4**	**35**
Ring Main Switches and Fuses	**148**	**3,396,447**	**2,253,832**	**13.7**	**40**

A.11.1 Pole Mounted Circuit Breakers and Sectionalisers

The use of pole mounted circuit breakers and sectionalisers along feeders helps to minimise the areas affected by faults and to decrease the time required for fault location and supply restoration. Maintenance of these switches is undertaken in accordance with the manufacturer's recommendations, and consequently varies according to the number of operations and faults on each circuit breaker. Since sectionalisers do not operate on fault currents, maintenance to these is generally at much longer intervals than for circuit breakers.

A.11.2 Oil Switches, Ring main Units

Marlborough Lines has eleven 11 kV/400V indoor substations. Some of these substations use Oil Circuit Breakers complete with over-current and earth fault protection. Elsewhere oil switches have been used throughout the underground system as they provide flexibility for switching at a lower cost than circuit breakers.

A.11.3 Air Break Switches

Air Break Switches are used to provide sectionalising and to allow for changes in configuration within the overhead Network. They are also used to provide visible breaks and enhance safety when undertaking work on the lines.

Where appropriate and where practicable live line techniques will be used to change switches where changed circumstances require different or higher rated switches to replace existing switches.

A.11.4 Fault Locators

These devices are located along overhead feeders and give indication of any observed fault currents. This assists in the location of faults and speeds up the location and restoration time. Advances in this technology have been rapid and a number of fault location devices with attachments which allow their use on poles with multiple circuits (older units are not capable of working reliably on such poles) have been installed. There are currently 144 fault locators installed throughout the Network. A number of fault indicators have been connected to the radio network and when operated by faults, now radio a message back to base for faster, more accurate response by fault staff.

A.12 400V Network

Marlborough Lines has 804 km of LV reticulation. Of this 449km is overhead and 255km is underground. The overhead has a replacement cost of 15.6 million and an average age of 43 years compared to a useful life of 67 years, while the underground is newer and has a replacement cost of 23.7 million with an average age of 13 years compared to an estimated useful life of 46 years. The age profile for the 400V Network is shown in the table below:

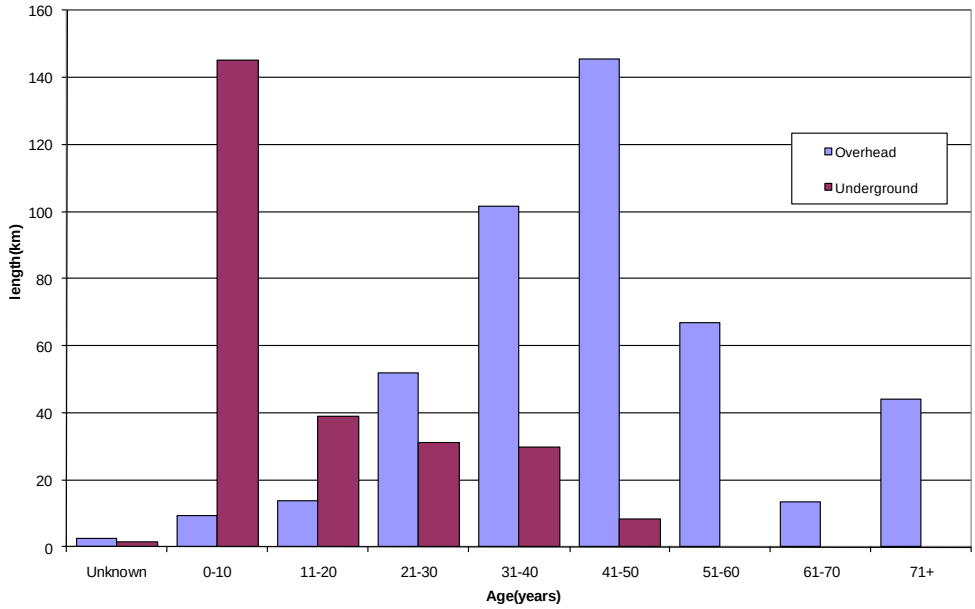

Figure 12 - LV Network Age Profile

Since the last AMP effort has been put establishing ages for the LV network. This is reflected is the relatively low quality with no age data.

A.13 SCADA System

Since 1985, planning information for the Network has been available from data logging equipment installed in each zone substation. It is recognised that the use of a SCADA system would allow more timely information and real-time condition monitoring for the zone substations and will also reduce the costs of switching. The first stage of a low cost SCADA system was commissioned during the 2000-2001 financial year and has been expanded in each of the recent years. The system has been designed to allow remote operation and monitoring of reclosers and load control. Cost/benefit analysis will be used to determine where remote operation/monitoring should be installed.

Presently all Zone substations are being monitored . The communications methods being used are: Wireless LAN, telephone (PSTN), VHF radio and CDMA phone.

A.14 Load Control System

The existing load control system uses a mixture of Zellweger K22 and decabit telegrams. They are injected into the system at 1050 Hz via 33kV coupling cells located in the switching structure alongside Springlands substation. Unfortunately the frequency of 1050 Hz gives rise to a number of problems. Due to the impedance and loading of the system (changed considerably since the plant was originally installed in the 1960s), signal amplification can occur in outlying areas. This can interfere with the operation of electronic equipment and manifest itself as noise in sound equipment, errors in clocks or malfunction of equipment such as microwaves, computers etc. With the increasing use of sensitive electronic equipment combined with increases in consumer problems, the Company decided to introduce a 217Hz frequency for ripple control. With all new receivers on the new frequency, it will eventually be possible to phase out the 1050 Hz signal system.

In the past year, changes to the Transpower South Island configuration have resulted in overloading of the 1050 Hz injection plant on a number of occasions. Investigations by Enermet have shown that the coupling cells are badly overloaded and accordingly the level of output signal has been decreased. Further changes to the Transpower configuration, in particular the addition of more 110/33kV transformer capacity at Blenheim is likely to cause further decreases in impedance at 1050 Hz and subsequent reductions in the level of signal available. This indicates that the 1050 Hz relays may not be able to operate reliability within 1-2 years and accordingly should be phased out as soon as practical.

At present work is underway to replace all of the Z22 relays. This will reduce the loading on the 1050 Hz injection equipment and will assist in prolonging its useful life.

Compact Fluorescent Lamps (CFLs) produce harmonics. This is particularly the case for the lower cost lamps which have minimal in-built filtering. Testing and analysis has indicated that the harmonics produced are likely to interfere with the 1050 Hz ripple signal, thereby hastening its demise.

A.15 Phone-in devices

To assist in locating faults and to ensure prompt attention to any unusual events in the Network, around 60 ”phone-in” devices have been installed. These devices monitor the line voltage and report any brief interruptions (auto-recloses), any permanent outages (faults or planned outages), and/or any out-of-limit voltages. They also phone in and advise when supply is restored to normal. The notifications are received by a PC which then advises appropriate staff of the event. This notification can be by fax, e-mail and cell phone text message. These devices have proved to be very useful in the early detection of abnormal conditions on the Network, and accordingly it is planned to install further devices over the next two years.

B Network Policies

B.1 Non-asset solutions

The most appropriate solution for a given problem depends on a variety of factors e.g. cost, benefits, risks, technical appropriateness. In determining whether a non-asset solution is the best option, it is necessary to consider its use in terms of how it relates to our overall objective of operating as a successful business. In general non-asset solutions are the preferred option where they:

- Are lower than overall cost or provide a better return than the best asset based solution; and
- Provide similar functionally to the asset based solution

For example, the Kenepuru feeder from Linkwater substation supplies some 1084 installations of which many are baches with only occasional occupancy. The 11 kV feeder is generally lightly loaded, except for a few days each year when the baches are occupied. In the event of substantial development in this area, there are a number of possible solutions.

The asset based solution is to upgrade part of the main line to 33 kV and install a small package zone substation in the Kenepuru area. There are some substantial costs associated with such a proposal. A possible non-asset solution is to provide each installation with ripple control on its water-heater (traditionally this has not been provided) and create a special channel for this area. This could provide substantial relief as the major loadings occur when bach owners all arrive at the beginning of holiday periods and turn on the heater, the water heater, and cook at the same time. This is common at the beginning of the Easter period. The use of a 'Kenepuru' ripple channel would allow deferment of the capital required for a full upgrade, and as such is likely to be a viable non-asset solution. The implementation of the new 217Hz ripple injection plant is allowing shedding of controllable load by areas. This, together with the solution proposed above will reduce some of the MD constraints.

Non-asset options broadly fit into two classes:

B.1.1 True non-asset solutions

This class of solutions aims to avoid or defer demand growth through the following means:

- Adopting tariff structures that signal costs to consumers, such as time periods or undesirable asset configurations (e.g. large motors without power factor correction). This can be difficult to implement because retailers may distort pricing information by repackaging line tariffs.

- Using load control to reduce peak demand. Current demand on cold mornings and evenings can exhaust all controllable hot water load. A combination of increasing use of load control combined with an increasing amount of load with little contribution to winter loadings (e.g. wine/dairy industry) has seen the system maximum demand remain relatively unchanged for the last few years, despite large increases in installed capacity and substation maximum demands.

- Promoting conservation and efficiency incentives. Marlborough Lines has a consumer advisory service which advises consumers on energy efficiency e.g. house insulation, hot water temperature settings etc.

B.1.2 Partial non-asset solutions

This class of solutions aims to accommodate demand growth principally through increasing the rating of existing assets, e.g.

- Installing forced cooling on ONAN transformers.

- Installing additional instrumentation so that assets can be more closely monitored and hence operated closer to maximum ratings.

- Recognising that older equipment often included generous design margins that can be exploited.

B.2 Distributed generation

Marlborough Lines recognises that distributed generation potentially provides value in the following ways:

- Reduction of peak demand at Transpower GXP's, with subsequent savings of upstream investment (including generation).
- Reducing the effect of existing network constraints.
- Avoiding investment in additional network capacity.
- Making better use of local primary energy resources thereby avoiding line losses.
- Avoiding the environmental impacts associated with large scale power generation.

However Marlborough Lines also recognises that distributed generation can have the following undesirable effects:

- Increased fault levels, requiring protection and switchgear upgrades.
- Increased line losses if surplus energy is exported through a network constraint.
- Stranding of assets, or at least of part of an assets capacity.
- Altering power flows which requires re-setting and recalibration of protection and controls.
- Adding very large point injections at lightly loaded points on the network.

Marlborough Lines encourages the development of distributed generation that will benefit both the generator and Marlborough. Marlborough does however note that the requirement to pass avoided transmission costs derived from distributed generation through to connected users is a major disincentive for distributed generation ie. Marlborough incurs costs but cannot capture a margin on the benefits arising from those costs.

For further information on the connection of Distributed Generation, please see the Distributed Generation information on our website http://www.marlboroughlines.co.nz

B.3 Redeployment of existing assets

Assets that are removed from service may be redeployed where it is economic to do so and at least a further 10 years of life is possible. Marlborough Lines routinely redeploys transformers and switchgear in this manner after they have been refurbished. Thorough inspection, testing and maintenance must be undertaken on all such equipment. The standards required for equipment to be connected to the Network are maintained within Marlborough Lines' ISO 9001:2000 quality assurance system and the Network standards. Contractors may only install second-hand equipment with specific approval from Network and should provide a minimum of a ten-year guarantee that the equipment is fit for purpose and free from defects.

Assets that are removed from service because they are uneconomic will not generally be redeployed. Assets removed from service because they are unsafe will not be redeployed nor will they be on-sold for further use.

B.4 Upgrade of existing assets

Marlborough Lines requires all upgrades of existing assets to meet approved investment criteria, the principal criteria being that an appropriate commercial return can be achieved for the capital deployed.

If the cost of capital cannot be recovered, there must be other compelling reasons for the upgrade such as public safety or regulatory compliance.

B.5 Installation of new assets

All extensions or enhancements to the Marlborough Lines' Network are required to meet approved investment criteria, the principal criteria being that that an appropriate commercial return can be achieved.

Where a new extension to the Marlborough Lines' Network or an enhanced supply is requested by a consumer, then the consumer requesting the extension or enhancement is responsible for the costs of installing the new assets.

Marlborough Lines may contribute to that investment subject to the following conditions:

- An economic assessment of the likely additional line revenue must demonstrate that Marlborough Lines' cost of capital can be met.
- The extension or enhancement is built to Marlborough Lines' technical and engineering standards.
- The extension or enhancement will vest in Marlborough Lines and the vestor will cease to have any interest in the extension or enhancement. In particular, Marlborough Lines may connect other consumers to the extension or enhancement at its sole discretion.
- Any necessary easements are completed on Marlborough Lines' standard terms and conditions.

B.6 Adoption of new technology

Unproven Technology will not be used in any location where its reliability might adversely impact on the reliability of supply or reduce safety. The Network will not be used as a test area for unproven technologies.

Marlborough Lines keeps a close watch on new technologies and best industry practice by reviewing technical publications, membership of industry groups and by active participation in industry initiatives. Where new technologies or work practices, including asset management techniques, can improve operational efficiency, increase performance, reduce costs, improve safety or otherwise provide benefits to Marlborough Lines or its stakeholders, they will be thoroughly investigated and if appropriate adopted.

B.7 Disposal of existing assets

Marlborough Lines reviews the cost benefit of maintenance, environmental effects, safety, reliability and operational improvements before deciding to dismantle, dispose or replace existing assets. Any disposal of materials such as oil or lead will be undertaken by suitably accredited contractors.

B.8 Safety

Marlborough Lines is committed to providing a safe environment for staff, customers and the public. Minimum standards are set by the relevant legislation: the Electricity Act 1992, the Electricity

Regulations 2003, the Health and Safety in Employment Act 1992 and the Health and Safety in Employment regulations 1995.
One key area within the ISO 9001:2000 and ISO 14001:1996 quality and environment systems, is safety. Procedures have been developed to cover hazard management, fire evacuation, oil spill, accidents, and earthquakes. Operational procedures cover additional areas such as Hiab and EPV operation, construction blasting, traffic management, ladder testing etc. The Company has been recognised by the Department of Labour as successfully implementing all of the management systems promoted in the Department's Achiever programme. In addition the Company has now achieved Tertiary level status for the ACC Work Place Safety Management Practices program.
The Company has systems in place to ensure all persons undertaking work on Network assets have appropriate qualifications, training and experience for the work being undertaken. Authorisation Holders Certificates document each person's competencies. All practical steps are taken to provide all employees and all contractors employees with good, safe working conditions.

B.9 Tangata Whenua

Marlborough Lines is committed to Te Triti o Waitangi/Treaty of Waitangi and recognises the unique role of tangata whenua as kaitiaki of the country's natural environment. Where appropriate, consultation will be held on any matters that affect Maori. In particular Marlborough Lines recognises the need for consultation on Wahi Tapu sites or areas.

B.10 Easements

To protect the viability of the Network, easements are required in the following circumstances:

***Relocation of existing assets*:** Where a landowner requests that a line or other asset owned by Marlborough Lines that supplies other customers or crosses other owners property is moved, an easement, of acceptable form to and in favour of Marlborough Lines Ltd is required prior to relocation of the line.

***New Assets where ownership is to be transferred to Marlborough Lines*:** Where ownership of new assets is to be transferred to Marlborough Lines, an easement of acceptable form to and in favour of Marlborough Lines Ltd is required. Where the assets are of the voltage at which the consumer takes supply (generally 230/400V), supply a single installation only, are entirely located on a single property and the landowner is the person responsible for their construction, easements are recommended, but not mandatory. Before any future installation can be connected easements must be provided.

Marlborough Lines monitors subdivision resource consent applications and recommends easements as part of the subdivision. This policy reduces the cost of establishing electricity supply, but does impose some risk on future landowners. Should subdivision occur without easements, it is possible that a future person may require the assets to be removed, thereby removing supply.

***New Subdivisions*:** Whenever practical any transformer required to supply the subdivision is installed on a small section that is converted to legal road as part of the subdivision completion. Whenever Network assets are to be located on private land, easements for these are obtained at the developer's cost as part of the final survey of the subdivision.

Where required, easements must be surveyed, signed, and ready for registration before connection to the Network will be allowed.

B.11 Capital Repayments

Where customers wish to connect to recently constructed assets, and where those assets were funded in part or whole by the existing customers, capital repayments to the original customers are due. These vary according to the cost of the original works, and the percentage of the original work being used by the new connection. For works constructed prior to 1 April 2000, these repayments will

be made up to ten years from the date of construction. For those constructed after 1 April 2000, such payments will be made for up to five years after construction.

B.12 Sounds Contribution

As a result of past Government polices and legislation, Marlborough Lines and its predecessors, Marlborough Electric and the Marlborough Electric Power Board have contributed considerable amounts of capital to establishing and maintaining supply into the Marlborough Sounds. In order to provide Marlborough Lines with a small return on the capital put into this area, all new connections must pay a connection fee to Marlborough Lines. In addition to this fee, some new connections require capital repayments to the customers who originally contributed to the cost of installing the works.

B.13 Network Enhancement Contribution

A contribution to the cost of providing the Network may be charged for new connections. The contribution is based on the area, the distance from the 33/11kV substation and the connected capacity.

B.14 Live Line Work

Live Line work is one technique that assists in reducing interruptions of supply. Within the Network, Live Line techniques have been utilised for:

- line taps for spur lines and/or transformer connections
- cross-arm changes
- bird-spike installation
- air break switch changing
- pole changing
- insulator changing
- hardware tightening
- tree cutting

In general, Live Line techniques are more costly than conventional shutdowns, if the costs of non-supply to customers are ignored. Marlborough Lines uses Live Lines techniques when:

- It is practical and safe to do so (i.e. earth blocks are available and appropriate procedures exist); and
- Costs are less than for a conventional shutdown; or
- More than 100 customer hours would be lost during a shutdown; or
- Major customers would be shutdown.

B.15 Maintenance

Maintenance is undertaken in order to preserve the function of existing assets. When considering maintenance, aspects including safety, capacity, security of supply and reliability are considered. Reviews of the condition assessment information, coupled with fault and reliability data enable maintenance to be directed into areas where maximum benefit can be gained. Marlborough Lines recognises the legislative requirement to maintain all existing supplies, and appropriate levels of maintenance are provided.

B.16 Line Charges

The current line charging structure is ICP based, under Interposed Use of System Agreements with retailers. With this structure of charges, retailers are billed line charges for individual ICPs connected to the Network.

Line charges comprise, for consumers with a supply capacity of up to 140kVA, of a daily fixed charge plus variable charges based on energy volumes consumed at the ICP. For consumers with capacity in excess of 140kVA, additional charges for capacity and winter maximum demand, both in kVA, apply.

The Company is reliant on retailers providing accurate and timely consumption data on an ICP basis to allow line charges to be correctly recovered. Consideration has been given to moving to some form of Point of Supply-based charging (GXP based), however the incumbent retailer has advised they would not agree to such a pricing structure while the current reconciliation system inadequacies continue. This matter may be reviewed following the implementation of global reconciliation, currently planned for May 2008.

B.17 Access on to Private Property

Marlborough Lines Network has many kilometres of line located on private property. Where the lines were constructed before 1993, Marlborough Lines is authorised by the Electricity Act 1992 to enter the property to undertake maintenance. Where lines have been constructed after 1993, easements are essential to protect the ability of Marlborough Lines to provide supply to customers further down the line.

Existing lines can only be upgraded with the consent of the landowner or if the land is not affected. Unfortunately if this is not possible, it may lead to the Network being unable to maintain good supplies and/or accept further expansion in outlying areas.

At all times, Marlborough Lines is aware of the need to take care, and its legal responsibilities when entering private property so as to protect the landowner's rights to use and enjoy their properties.

B.18 Access to Network

Retailer Access to the Network is provided via a Use of System Agreement. This is available to any Retailer.

Access for work is available to contractors who hold Authorised Holder Certification for Marlborough Lines Network. This essentially requires that the contractor is appropriately qualified, has competent staff and appropriate safety systems. Further details on the Authorised Holder Certification system are available from the Operation Manager. Approval is required prior to any work being commenced and notification of all completed works must be given.

B.19 22kV Construction

With the increasing loads in the rural areas and the low marginal cost of using 22kV insulated equipment, the company has introduced a requirement that all new construction to be connected to the 11kV Network in rural areas must be insulated to 22kV levels.

B.20 Pole Types

Due to problems with the quality of timber poles, all new construction must use pre-stressed concrete poles, except where specific conditions exist and approval is obtained from the Network.

B.21 Vegetation Control

One of the major issues facing the Marlborough Lines' Network is vegetation control. Significant areas of the reticulation pass through forestry areas, native bush or have trees/bush located nearby. Marlborough Lines' current policy is to arrange all required tree trimming near to HV lines at no cost to the landowner or tree owner. This helps to ensure that clearances are maintained and reduces the problems arising from trees contacting live conductors. It is recognised that the Electricity (Hazard from Trees) Regulations provide for different practices, however until they have been fully implemented, the investment in keeping trees and vegetation clear from lines is essential to ensure reliable operation of the Network.

Monitoring of vegetation clearances varies according to the relative significance of the Network asset, and the type of vegetation. For example, 33 kV lines are generally checked on a six monthly basis with most other HV lines being checked at least five yearly.

B.22 Ownership of Assets

For the ownership and therefore maintenance responsibilities for any new assets to be transferred to Marlborough Lines the following must occur:

- The assets must be constructed of suitable materials and in accordance with good industry practice; and
- Easements must be established if required; and
- The contractor must warrant that the work is free from defects and provide suitable guarantees to repair any defects arising from poor workmanship or sub-standard materials that occur within the first ten years after construction.

B.23 Overhead or Underground Construction

Overhead construction is much lower cost than underground construction (typically 1/6 to 1/3 of the cost of underground). Overhead lines tend to have higher maintenance costs, although faults in an underground system can be difficult to locate and expensive to repair. Marlborough District Council District planning requirements require all new construction in the urban areas to be underground. Elsewhere, overhead construction is preferred because of the lower costs.

Most of the central business district in Blenheim, Picton, Renwick and Havelock is reticulated by way of underground cabling. The Company, in conjunction with the Marlborough District Council has converted most of the reticulation on the main roads leading into Blenheim to underground.

Further underground conversions will only be undertaken in areas where the Territorial Authorities require the overhead reticulation to be removed and costs are met. The value restrictions of the ODV valuation criteria are such that the full cost of underground reticulation cannot be included in the ODV. Until this unsatisfactory situation is addressed, further overhead to underground reticulation will not be undertaken.

B.24 Stores

The items held in stock in the Marlborough Lines' Store include, emergency spares for the Network, stock for work due to proceed, and stock for contracting purposes. Items that do not fall into one of these categories are not required to be maintained in the Store and will be scrapped or sold as appropriate.

Operation of the Store adheres to the ISO 9001:2000 quality assurance system. Procedures are in place to control the way products are purchased and stored. The stock is comprehensive and stored in purpose-built, alarmed, secure buildings. The total inventory is recorded within the companies

accounting computer system; this includes programs for purchase, storage and issue of goods, and gives real-time indication of stock status. The system provides for stock-out notification to ensure that products are replaced as needed and to ensure that adequate emergency stock levels are maintained.

Where appropriate, backup supply of some items has been arranged with key suppliers. For example, concrete poles are held both in our own storage area and with the local manufacturer. The Store is manned during normal working hours and emergency staff have access outside these hours. Most items contained in the Store stock are laid out in sequential bays with descriptions on each bin and computer inventory numbers. Details such as suppliers and stock movements are recorded in a database to allow quick access to information on the various components used within the Network.

B.25 Fault Service

Marlborough Lines operates a 365 day, 24 hr a day fault service. Repairs to Network equipment are carried out at no cost to affected customers. Where any person damages Network equipment, the full cost of repair will be sought from the person causing the damage. Where repairs are required within the customer's installation, all work is chargeable to the customer.

B.26 Obligation to Supply – Post 2013

In accordance with the Electricity Act 1992, from 2013 on Marlborough Lines will no longer have a legislated obligation to maintain supply to customers. The existing obligation only applies to those premises which have not been disconnected and have not changed ownership since 1993, and consequently the obligation does not currently apply to many premises. Marlborough Lines' intention is to continue to maintain supply to all existing and new premises and consequently, the Company does not envisage any changes to its operation or policies after 2013.

While this is the current intention any future restrictions or constraints on investment or returns will mean the Company may need to reconsider its intention to continue supply.

C Risk Register

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
Full Supply Outage - Transpower Transmission Network Failure	Transpower Transmission Network Failure	Elect	The inability of the Transpower transmission network assets to safely convey electricity within the supply regulations, through the loss of key equipment at the Blenheim GXP or multiple transmission line failures.	Moderate	Considerable
Full Supply Outage - Retailer Major Generation Failure	Retailer Major Generation Failure	Elect	Major generation failure causing the unavailability of electricity within the supply regulations to the Marlborough region.	Moderate	High
Partial Supply Only - Transpower Transmission Network Failure	Transpower Transmission Network Failure	Elect	The inability of the Transpower transmission network assets to safely convey electricity within the supply regulations, due to the loss of transmission assets i.e. a supply constraint (above the Blenheim GXP).	Moderate	Moderate
Partial Supply Only - Retailer Major Generation Failure	Retailer Major Generation Failure	Elect	Major generation failure causing diminished supply availability of electricity (within the supply regulations) to the Marlborough region.	Moderate	Considerable
Major Earthquake Damage to ML Distribution Assets	Natural Environment Impact on ML Distribution Assets	Env	Major natural environment impact on ML distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.	Moderate	Considerable
Price Path Threshold Regime Breach	Commerce Commission Threshold Regime Breach	Bus	Price Path threshold regime breach, leading to investigation and possible targeted control of ML (price setting)	Moderate	Considerable
Double 33kV Circuits on Common Poles	ML Distribution Network Failure	Elect	The inability of the ML distribution network assets to safely convey electricity within the supply regulations. 33kV feeders supplying Spring Creek, and Picton.	Some	Considerable
Quality Threshold Regime Breach	Commerce Commission Threshold Regime Breach	Bus	Quality threshold regime breach, leading to investigation and possible targeted control of ML (price setting)	Some	Considerable
Non-major Earthquake Damage to ML Distribution Assets	Natural Environment Impact on ML Distribution Assets	Env	Non-major natural environment impact on ML distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.	Some	Moderate
33kV Overhead Line Failure	ML Distribution Network Failure	Elect	The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - high wind speed activity or snow loading.	Some	Moderate
Single 33kV Supply to Redwoodtown Zone Sub	ML Distribution Network Failure	Elect	The single 33kV supply to Redwoodtown zone sub means that a failure in this line or the equipment that connects it to the wider network, will result in a zone substation outage.	Some	Some

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
33kV UG Cable Failure Due to 3rd Party (excavation) Damage	ML Distribution Network Failure	Elect	33kV UG cable failure causes the loss of supply to ML distribution network assets and therefore the loss of a subtrans circuit or a zone substation.	Low	Moderate
Lightning Storm Damage to ML Distribution Assets	Natural Environment Impact on ML Distribution Assets	Env	A lightning storm resulting in damage to ML distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.	Low	Moderate
Power TX Failure	ML Distribution Network Failure	Elect	The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.	Low	Considerable
High Winds Causing Damage to ML Distribution Assets	Natural Environment Impact on ML Distribution Assets	Env	Natural environment impact on ML distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.	Low	Moderate
Landslide Damage to ML Distribution Assets	Natural Environment Impact on ML Distribution Assets	Env	Natural environment impact on ML distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.	Low	Some
ML Staff or Contractor Injury / Incident	ML Distribution Network Access and Control Breakdown	Bus	A network incident or personnel injury, due to the breakdown of the ML network access and control systems.	Low	Moderate
11kV Cable Failure	ML Distribution Network Failure	Elect	11kV cable failure causing the inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.	Low	Some
Ring Main Unit Failure	ML Distribution Network Failure	Elect	The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake or flood activity.	Low	Some
ABS & HV Fuse Failure	ML Distribution Network Failure	Elect	The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - lightning or high wind speed activity.	Low	Moderate
11kV Overhead Line Failure	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - high wind speed activity or snow loading.*	*Low*	*Moderate*
Single 33kV Supply to Linkwater Zone Sub	*ML Distribution Network Failure*	*Elect*	*The single 33kV supply to Linkwater zone sub means that a failure in this line or the equipment that connects it to the wider network, will result in a zone substation outage.*	*Low*	*Some*
Single 33kV Supply to Rai Valley Zone Sub	*ML Distribution Network Failure*	*Elect*	*The single 33kV supply to Rai Valley zone sub means that a failure in this line or the equipment that connects it to the wider network, will result in a zone substation outage.*	*Low*	*Some*

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
Single 33kV Supply to Leefield Zone Sub	*ML Distribution Network Failure*	*Elect*	*The single 33kV supply to Leefield zone sub means that a failure in this line or the equipment that connects it to the wider network, will result in a zone substation outage.*	*Low*	*Some*
Single 33kV Supply to Ward Zone Sub	*ML Distribution Network Failure*	*Elect*	*The single 33kV supply to Ward zone sub means that a failure in this line or the equipment that connects it to the wider network, will result in a zone substation outage.*	*Low*	*Some*
Fault Security Constraint at Linkwater Zone Sub	*ML Distribution Network Failure*	*Elect*	*100% of the time this sub only has a "n" fault security level, meaning any fault issues at this sub would definitely result in a network outage.*	*Low*	*Some*
Fault Security Constraint at Havelock Zone Sub	*ML Distribution Network Failure*	*Elect*	*100% of the time this sub only has a "n" fault security level, meaning any fault issues at this sub would definitely result in a network outage.*	*Low*	*Some*
Fault Security Constraint at Rai Valley Zone Sub	*ML Distribution Network Failure*	*Elect*	*100% of the time this sub only has a "n" fault security level, meaning any fault issues at this sub would definitely result in a network outage.*	*Low*	*Some*
11kV UG Cable Failure Due to 3rd Party (excavation) Damage	*ML Distribution Network Failure*	*Elect*	*11kV UG cable failure causes the loss of supply to ML distribution network assets and therefore the loss of an 11kV circuit or a feeder.*	*Very low*	*Some*
33kV Cable Failure	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.*	*Very low*	*Moderate*
Indoor Switchgear Failure	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.*	*Very low*	*Moderate*
Double 11kV Circuits on Common Poles	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations.*	*Very low*	*Moderate*
Transformer Oil Spill (In-Situ or in Transit)	*ML Distribution Assets Impact on Natural Environment*	*Env*	*Major natural environment impact caused by transformer oil contaminating soil, waterways or stormwater drains, etc.*	*Very low*	*Moderate*
Vegetation Clearance from ML Overhead Distribution Assets	*Vegetation Control*	*Elect*	*Failure to maintain clearance reduces network reliability, would breach a statutory requirement (tree regs 2003), incurs significant 'catch up' costs and may present a serious safety risk to staff & general public.*	*Very low*	*Moderate*
Availability of Roading Network	*ML Distribution Network Failure*	*Elect*	*Analysis and past experience has revealed that restoration of power supply during civil defence emergencies is very dependant on the availability of the roading network for access.*	*Very low*	*Low*

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
Poor Workmanship Faults	*ML Distribution Network Failure*	*Elect*	*Poor workmanship faults resulting in the inability of the ML distribution network assets to safely convey electricity within the supply regulations.*	*Very low*	*Some*
400V Overhead Line Failure	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - high wind speed activity or snow loading.*	*Very low*	*Some*
400V UG Cable Failure Due to 3rd Party (excavation) Damage	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations.*	*Very low*	*Low*
Land Access Difficulties	*Land Access Difficulties*	*Reg*	*ML is unable to access land to site its equipment or get access across to construct / upgrade existing assets*	*Very low*	*Moderate*
Ground Mounted TX Failure	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity or flood.*	*Very low*	*Some*
Pole Mounted TX Failure	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - lightning or earthquake activity.*	*Very low*	*Some*
Single Power Tx at Linkwater Zone Sub	*ML Distribution Network Failure*	*Elect*	*The single 33-11kV power tx at Linkwater zone sub means that a failure in this piece of equipment, will result in a zone substation outage.*	*Very low*	*Very low*
Single Power Tx at Havelock Zone Sub	*ML Distribution Network Failure*	*Elect*	*The single 33-11kV power tx at Havelock zone sub means that a failure in this piece of equipment, will result in a zone substation outage.*	*Very low*	*Very low*
Single Power Tx at Rai Valley Zone Sub	*ML Distribution Network Failure*	*Elect*	*The single 33-11kV power tx at Rai Valley zone sub means that a failure in this piece of equipment, will result in a zone substation outage.*	*Very low*	*Very low*
Single Power Tx at Leefield Zone Sub	*ML Distribution Network Failure*	*Elect*	*The single 33-11kV power tx at Leefield zone sub means that a failure in this piece of equipment, will result in a zone substation outage.*	*Very low*	*Very low*
Single Power Tx at Spring Creek Zone Sub	*ML Distribution Network Failure*	*Elect*	*The single 33-11kV power tx at Spring Creek zone sub means that a failure in this piece of equipment, will result in a zone substation outage.*	*Very low*	*Very low*
Single Power Tx at Ward Zone Sub	*ML Distribution Network Failure*	*Elect*	*The single 33-11kV power tx at Ward zone sub means that a failure in this piece of equipment, will result in a zone substation outage.*	*Very low*	*Very low*

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
Maintenance Security Constraint at Linkwater Zone Sub	*ML Distribution Network Failure*	*Elect*	*45% of the time this sub only has a "n" maintenance security level, meaning any maintenance activity during these times would definitely involve a shutdown. Maintenance security achieved by 11kV tie.*	*Very low*	*Very low*
Maintenance Security Constraint at Havelock Zone Sub	*ML Distribution Network Failure*	*Elect*	*35% of the time this sub only has a "n" maintenance security level, meaning any maintenance activity during these times would definitely involve a shutdown. Maintenance security achieved by 11kV tie.*	*Very low*	*Very low*
Maintenance Security Constraint at Riverlands Zone Sub	*ML Distribution Network Failure*	*Elect*	*40% of the time this sub only has a "n" maintenance security level, meaning any maintenance activity during these times would definitely involve a shutdown. Maintenance security achieved by 11kV tie.*	*Very low*	*Low*
Maintenance Security Constraint at Ward Zone Sub	*ML Distribution Network Failure*	*Elect*	*20% of the time this sub only has a "n" maintenance security level, meaning any maintenance activity during these times would definitely involve a shutdown. Maintenance security achieved by 11kV tie.*	*Very low*	*Very low*
Fault Security Constraint at Riverlands Zone Sub	*ML Distribution Network Failure*	*Elect*	*20% of the time this sub only has a "n" fault security level, meaning any fault issues at this sub during this time would definitely result in a network outage.*	*Very low*	*Low*
Fault Security Constraint at Seddon Zone Sub	*ML Distribution Network Failure*	*Elect*	*10% of the time this sub only has a "n" fault security level, meaning any fault issues at this sub during this time would definitely result in a network outage.*	*Very low*	*Very low*
Fault Security Constraint at Spring Creek Zone Sub	*ML Distribution Network Failure*	*Elect*	*5% of the time this sub only has a "n" fault security level, meaning any fault issues at this sub during this time would definitely result in a network outage.*	*Very low*	*Low*
Fault Security Constraint at Ward Zone Sub	*ML Distribution Network Failure*	*Elect*	*20% of the time this sub only has a "n" fault security level, meaning any fault issues at this sub during this time would definitely result in a network outage.*	*Very low*	*Very low*
Distributed Generation - Fuel Cells	*Disruptive Technologies*	*Bus*	*Disruptive technologies have the potential to lower ML revenues and hence asset value (i.e. island networks that only need back up supply therefore line charge but no delivery charge)*	*Insignificant*	*Moderate*
Micro Generation Interconnection	*Disruptive Technologies*	*Bus*	*The impact disruptive technologies on the ML network supply quality, voltage regulation, etc.*	*Insignificant*	*Moderate*

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
Land Access Difficulties	*Land Access Difficulties*	*Reg*	*ML is unable to access land to site its equipment or get access across to service / inspect existing assets or vegetation.*	*Insignificant*	*Moderate*
400V Cable Failure	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.*	*Insignificant*	*Very low*
Car versus Pole or Equipment	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - high traffic density, access constricted areas and poor network design.*	*Insignificant*	*Moderate*
400V Box Failure	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - vehicle damage or flood.*	*Insignificant*	*Some*
Access Track Clearance	*Vegetation Control*	*Elect*	*Constant effort is required to keep tracks clear so that assets can be accessed in the Marlb. Sounds. Failure to do so makes the network less reliable and increases network fault repair/response times.*	*Insignificant*	*Some*
Adequate Fuel Supply	*ML Distribution Network Failure*	*Elect*	*Analysis and past experience has revealed that restoration of power supply during civil defence emergencies is very dependant on the availability of adequate fuel supplies.*	*Insignificant*	*Some*
Fault Security Constraint at Nelson Street Zone Sub	*ML Distribution Network Failure*	*Elect*	*2% of the time this sub only has a "n" fault security level, meaning any fault issues at this sub during this time would definitely result in a network outage.*	*Insignificant*	*Insignificant*
General ML Network Vandalism and Public Nuisance	*Vandalism and Public Nuisance*	*Bus*	*Disruption to the operation of ML electricity distribution network through general acts of vandalism and public nuisance i.e. shooting insulators to graffiti*	*Insignificant*	*Some*
Site Access Control	*Health & Safety Issues (staff and general public)*	*Reg*	*Situations or events in relation to the ML electricity distribution network construction program which lead to health and safety issues for ML staff and the general public*	*Insignificant*	*Moderate*
Flooding Causing Damage to ML Distribution Assets	*Natural Environment Impact on ML Distribution Assets*	*Env*	*Natural environment impact on ML distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.*	*Insignificant*	*Some*
Resource Management Act Issues	*Resource Management Act Issues*	*Reg*	*ML is unable to progress a network expansion or upgrade project due to RMA issues.*	*Insignificant*	*Some*
Maintenance Security Constraint at Woodbourne Zone Sub	*ML Distribution Network Failure*	*Elect*	*2% of the time this sub only has a "n" maintenance security level, meaning any maintenance activity during these times would definitely involve a shutdown. Maintenance security achieved by 11kV tie.*	*Insignificant*	*Insignificant*

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
Fault Security Constraint at Woodbourne Zone Sub	*ML Distribution Network Failure*	*Elect*	*2% of the time this sub only has a "n" fault security level, meaning any fault issues at this sub during this time would definitely result in a network outage.*	*Insignificant*	*Insignificant*
Electricity Complaints	*Electricity Complaints*	*Reg*	*Complaints resulting in reputational damage to ML*	*Insignificant*	*Some*
Latent Material Defects	*ML Distribution Network Failure*	*Elect*	*Material defects resulting in the inability of the ML distribution network to safely convey electricity within the supply regulations.*	*Insignificant*	*Some*
High Load Damage to Lines and Equipment	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations. Highest risk - unescorted loads.*	*Insignificant*	*Some*
Lack of Maintenance Related Network Failure	*ML Distribution Network Failure*	*Elect*	*The inability of the ML distribution network assets to safely convey electricity within the supply regulations.*	*Insignificant*	*Moderate*
ML Substation Design	*ML Distribution Assets Impact on Natural Environment*	*Env*	*Poor design leading to a negative impact on the environment surrounding ML substation assets i.e. control of SF6 gas, assets not blending into the environment, poor noise control.*	*Insignificant*	*Some*
Vandalism at the Blenheim GXP	*Vandalism and Public Nuisance*	*Bus*	*Disruption to the operation of ML electricity distribution network through acts of vandalism at the Blenheim GXP.*	*Insignificant*	*Considerable*
Construction Site Security	*Vandalism and Public Nuisance*	*Bus*	*Disruption to the operation of ML electricity distribution network through acts of vandalism and public nuisance at network construction sites.*	*Insignificant*	*Moderate*
Resource Management Act Issues	*Resource Management Act Issues*	*Reg*	*ML is unable to progress network maintenance work due to RMA issues.*	*Insignificant*	*Very low*
Loss of Tacit Institutional Knowledge	*Knowledge Management*	*Bus*	*The loss of detailed background data (often uncodified) relating to the ML asset base i.e. how to access equipment, likely fault locations, etc.*	*Insignificant*	*Some*
Skill Gaps	*Knowledge Management*	*Bus*	*Skill gaps relating to the ML asset base i.e. either equipment becomes technically obsolescent (no one can maintain it) or ML can't attract the skills it need in the marketplace.*	*Insignificant*	*Very low*
Chemical Spray (use and storage)	*ML Distribution Assets Impact on Natural Environment*	*Env*	*Major natural environment impact caused by the use of chemical sprays i.e. overspray drift, on-site mixing polluting waterways, unsafe storage or transit (fume inhalation).*	*Insignificant*	*Moderate*
Fire Damage to Buildings and Equipment	*Fire Damage to Buildings and Equipment*	*Bus*	*Damage to ML buildings and equipment caused by fire (network and support infrastructure).*	*Insignificant*	*Low*

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
Trained and Competent Staff and contractors	*Health & Safety Issues (staff and general public)*	*Reg*	*Situations or events in relation to the ML electricity distribution network which lead to health and safety issues for ML staff and the general public*	*Insignificant*	*Moderate*
Network Asset Site Security	*Vandalism and Public Nuisance*	*Bus*	*Disruption to the operation of ML electricity distribution network through acts of vandalism and public nuisance.*	*Insignificant*	*Moderate*
Data Record Unavailability	*Data Management and Record Access*	*Bus*	*Issues relating to the availability and accuracy of ML network data (assets and asset performance / condition).*	*Insignificant*	*Moderate*
Unlawful or Unsafe Network Connection	*ML Distribution Network Access and Control Breakdown*	*Elect*	*The inability of the ML distribution network to safely convey electricity within the supply regulations, due to the breakdown of the ML network access and control systems i.e. unlawful or unsafe network connection*	*Insignificant*	*Moderate*
Extended Recovery From Network Outage	*ML Distribution Network Access and Control Breakdown*	*Elect*	*Longer than necessary outage, due to the breakdown of the ML network access and control systems*	*Insignificant*	*Moderate*

D Glossary of Terms

ABS – Air Break Switch – used in the 33kV and 11kV Networks.
GIS – Geographic Information System – a way of storing information in a computer such that the location of the equipment is also stored and various maps/views can be produced.
GPS – Global Positioning System. Receivers utilise satellites to accurately locate themselves on the earth's surface. This information then used to locate items such as power poles.
CAIDI for the Total of All Interruptions (Customer Average Interruption Duration Index)
CAIDI is the average duration of an interruption of supply for consumers who experienced an interruption of supply in the period. The CAIDI for the total of all interruptions is the sum obtained by adding together the interruption duration factors for all interruptions *divided by* the sum obtained by adding together the number of electricity consumers affected by each of those interruptions.
CAIDI =

$$\frac{\text{Sum of [No. of Interrupted Consumers x Interruption Duration]}}{\text{Sum of [No. of Interrupted Consumers]}}$$

in minutes/consumer interrupted

EPV – Elevating Platform Vehicle – Used in Live Line work and for ease of maintenance on various assets.
Hiab – Trade Name for truck mounted hydraulic crane.
kWh – measure of energy.
Live Line – various techniques for working on the Network with the power on. Procedures range from connection of transformers to complete pole replacement.
MapInfo – GIS software currently used by Marlborough Lines
MDC – Marlborough District Council.
MVA – 10^6 VA. Measure of apparent power.
Number of Faults per 100km of Prescribed Voltage Line
This is a measure of the number of faults in relation to the total length of the network 6.6kV and above. Lower frequency for line related faults, than for a like line business, would suggest more effective line maintenance, though a very low figure could indicate over investment.
Ripple Control – System which uses frequencies >50Hz to transmit information across power system. Mainly used to control water heating/night store loads and street lighting.
SAIDI for Total of Interruptions (System Average Interruption Duration Index)
SAIDI is the average total duration of interruptions of supply that a customer experiences in the period. The SAIDI for the total of interruptions is the sum obtained by adding together the interruption duration factors for all interruptions *divided by* the total customers.
SAIDI =

$$\frac{\text{Sum of [No. of Interrupted Consumers x Interruption Duration]}}{\text{Total Number of Connected Consumers}}$$

in minutes/connected consumer/year

SAIFI for the Total Number of Interruptions (System Average Interruption Frequency Index)
SAIFI is the average number of interruptions of supply that a consumer experiences in the period. The SAIFI for the total number of interruptions is the sum obtained by adding together the number of electricity consumers affected by each of those interruptions *divided by* the total consumers.
SAIFI =

$$\frac{\text{Sum of [No. of Interrupted Consumers]}}{\text{Total Number of Connected Consumers}}$$

in interruptions/connected consumer/year

SWER – Single Wire earth Return. System which uses a single wire (compared with two for convectional single phase or three for three phase) to transmit power. Marlborough Lines uses this at 11 kV.
Thermovision - using infra-red technologies to locate hot spots/faults in Network Assets.

E Reader Survey Form

We hope that you have found this document useful and informative. To assist us in refining the document or in reviewing our asset management practices we would welcome your feedback. Please complete any relevant sections of the form below and return it to us:

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Suggestions for improving the report

Suggestions for improving our asset management practices
