Marlborough Lines Ltd

Asset Management Plan

March 2011

Issue B
Printed 28/03/2011
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Table of Contents

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Appendices

List of Figures

List of Tables

1. Summary

1.1 Plan objectives & background

By its very nature an Asset Management Plan (AMP[1]) has to be a dynamic document and will be reviewed from time to time consistent with changing customer requirements and Marlborough Lines Limited's (MLL) ongoing maintenance and surveillance of the Network.

This Asset Management Plan (AMP), along with MLL's other plans, policies and practices demonstrates that MLL 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 MLL on 31 March 2011, and the next AMP is expected to be prepared and issued in January 2012.

The AMP primarily interacts with MLL's 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 2011 to 31 March 2021.

MLL 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

MLL is based in Blenheim, a town with an enviable reputation for high sunshine hours. We take our supply from the Transpower Grid via three 110kV circuits to a single point of supply (Grid Exit Point – GXP) in the Blenheim suburb of Springlands. Supply to Marlborough then radiates out to a number of very isolated rural areas including the Marlborough Sounds, Molesworth Station, New Zealand's largest farm at the top of the Awatere valley, and the southern Marlborough coast; an area bordered by the Pacific Ocean on one side and the inland Kaikoura mountains on the other.

In 2009/2010, MLL conveyed 384 GWh of electricity to 24,073 consumer connections with an after-diversity maximum demand of 70.2MW. MLL's consumers are predominantly domestic and small-to-medium commercial – the largest industrial consumer consumes less than 4% of the total energy volume.

MLL's sub-transmission network is based on a radial topology around the Blenheim GXP which supplies fourteen 33/11kV zone substations that in turn supply 3,800 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] Note a list of common used abbreviations can be found in appendix D.

1.3 Proposed service levels

Aside from the assets themselves, MLL has to have regard to the potential interference to the Network by trees and access to lines, particularly in the Marlborough Sounds areas. Here, 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 2010	Target
Class B SAIDI	88	90
Class C SAIDI	215	120
Total SAIDI	303	210
Class B SAIFI	0.55	0.35
Class C SAIFI	1.55	1.44
Total SAIFI	2.00	1.79

Note SAIDI (System Average Interruption Duration Index) is the average total duration of interruptions of supply that a customer experiences for the year (i.e. the number of minutes a typical customer is without power for the year) and SAIFI (System Average Interruption Frequency Index) is the average number of interruptions of supply that a consumer experiences in the period (i.e. the number of times a typical customer loses power for the year).

The principal reliability target for 2011 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 MLL and the direction MLL is taking. In 2010, the customer minutes lost were greater than anticipated, however this can be attributed to exceptional storm events. For 2011, MLL has a focus on Network Automation and Vegetation Management, which is intended to improve performance.

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 MLL focuses on the prevention of outages themselves in recognition that restoration of supply can be time consuming and expensive.

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

1.4 Development and lifecycle plans

Marlborough has enjoyed sustained 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 past decade, however the global financial crisis (GFC) and its effects on the local economy have reduced this to close to zero in the past year. It is expected that growth will remain static for the next year, then pick up to 1-3% thereafter.

One of the catalysts for MLL's growth has been viticulture and over the last year this sector has experienced a significant economic downturn. This has slowed the need for ongoing investment in increased capacity.

MLL has a maintenance program in place that is detailed in section 7 of this document. The expected operational expenditure for 2011/2012 is $7.12 million.

The budgeted capital expenditure for 2011/2012 is $12.79 million. Key development activities that MLL expects to undertake this financial year include further Network Automation, renewal of 33 kV line Lansdowne to Riverlands, renewal of 11kV lines Tirohanga to Kekerengu, Pelorus to Rai Valley, and Wairau Valley and installation of 11kV switchgear to Rai Valley.

1.5 Risk management

MLL's business is the conveyance of electricity, which has a very low tolerance to risk.

To ensure this exposure remains within acceptable levels, MLL has adopted the systemic approach to risk identification and control as outlined in Electricity and Gas industries – safety systems for Public Safety (NZS 7901:2008).

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

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

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

3. The most significant network risks for MLL 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. In the event of a severe earthquake, it can be expected that damage will occur to the underground network, particularly in the CBD areas of Blenheim and Picton. The means for addressing such an event can only be determined at the time, but may include running temporary lines and cables above ground.

5. MLL’s 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 can result in multiple Zone substations losing supply. Consumers in the immediate vicinity of any such vehicle accident can have supply interrupted for the duration of the time required to repair the damage. However, alternative supply routes available within MLL’s 33kV and 11kV networks would allow supply to be restored to all other consumers by manual switching to alternative feeds.

7. MLL’s 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

MLL’s 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 well trained for any eventuality.

Following on from the Christchurch earthquakes in September and February, MLL is reviewing the Emergency Preparedness Plan, and also giving consideration to the location of the control room. This is intended to ensure that the control room has ready access to key resources during major events.

1.6 Undergrounding

Discussions are currently being undertaken with the Marlborough District Council (MDC), with a view to reinstating an overhead to underground conversion programme now that MLL 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 MDC.

1.7 Performance evaluation

During the past 12 months, the Network has had a number of severe storm events but otherwise 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 2010 year, there were 215 minutes per consumer lost due to faults and 88 minutes lost due to planned outages. This equates to an overall reliability of 99.942%. There were 340 faults with 317 faults on the 11kV system and 10 faults on the 33kV system.

The increase in faults is due to a number of factors including adverse weather and trees. In particular, forestry on the French Pass feeder from Rai Valley resulted in 35 SAIDI minutes of outages.

NB: if the extreme weather event of 27 December 2010 is included, this feeder contributed a total of over 91 minutes of SAIDI.

MLL has identified opportunities to make improvements in the Network with the objective of improving network and asset performance. In summary these are:

- Installation of automation and remote controllable equipment to allow better fault isolation and faster restoration of supply following a fault. MLL has allocated a budget of $1.5 million in the 2011/2012 year.

- Greater maintenance focus on poorly performing feeders and sections of line which influence reliability

- Further consideration of further use of generators to maintain supply past areas where logging is occurring

- Project management training will ensure that all relevant staff use similar approaches and tools for project management. It will incorporate consideration of best practice and up-to-date project management techniques. All planning staff will undergo training within the 2011/2012 year

- Increased promotion of the risks of trees present to the reliability of supply, in conjunction with a program to seek greater clearances between trees and lines.

2. Plan Background and Objectives

MLL’s Asset Management Plan (AMP) is the foundation document that translates MLL’s data, analysis, procedures, policies and strategic aims into physical actions bounded by performance criteria and timeframes. It is also utilised to communicate its electricity supply network intentions to its internal and external stakeholders.

2.1 Background

MLL is the electricity lines business that conveys electricity throughout Marlborough to in excess of 24,000 consumer connections (ICPs) on behalf of a number of energy retailers. The figure below indicates MLL’s position in the electricity industry supply chain.

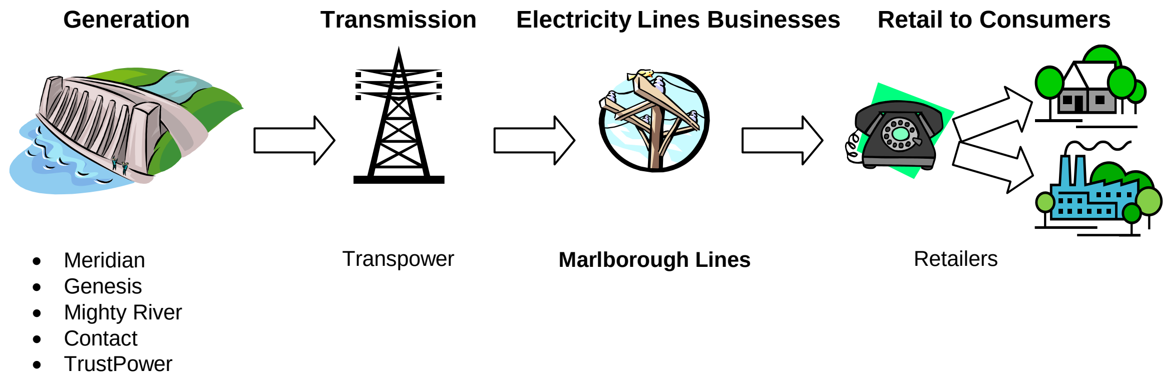


Figure 1 - Electricity Industry Structure

The wider MLL group also includes the following entities:

- A 50% stake in Nelson Electricity, which has its own AMP and is independently disclosed.
- A 51% stake in OtagoNet which has its own AMP and is independently disclosed.
- A 13.9% shareholding in Horizon Energy Distribution Ltd which has its own AMP and is independently disclosed.
- 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 MLL’s annual reports.

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

2.2 Purpose of this AMP

The purpose of this AMP is to provide a framework that assists to ensure that MLL:

- 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 now, and in the future, and issues that 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 relative to its network business, and that it has processes in place to mitigate identified risks.
- has made adequate provision for funding and resourcing all phases of the life cycle of network assets.
- makes decisions within structured frameworks at each level within the business.
- has an ever-increasing knowledge of its asset components in terms of location, age, condition and the overall network's likely future behaviour as it ages.

Disclosure of the AMP in this format will also assist MLL 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 MLL's assets (these lie in other parts of the business), but rather a description of the thinking, policies, strategies, plans and resources that Marlborough uses and will use to manage the assets.

This report covers the period 1 April 2011 to 31 March 2021 and was approved by the Board of MLL on 31 March 2011.

The next AMP is expected to be prepared and issued in January 2012, but the plan is a dynamic document and by its very nature must be subject to continuous review to ensure that customer's expectations are met.

2.3 Planning & operating contexts

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

Issues include:

- Customer Requirements

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

- Government policy objectives, such as the facilitation of distributed generation, public safety and appropriate pricing.

- MLL's commercial goals, which are primarily to provide a commercially acceptable dividend and increase shareholder value.

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

- Advancing technologies such as customer generation which could impact conventional lines businesses.

- Possible changes to the Marlborough climate, which may include increased frequency of storms, and hotter, drier summers which may impact upon salt deposition and/or primary production.

- Local, national and global economic cycles, in particular the relative value of viticulture and dairy products compared to other pastoral commodities, which may drive the rate of vineyard and dairy conversions.

- Interest rates and 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.

- Regulatory Limitations which may inhibit MLL's ability to make appropriate investment decisions.

It is also recognised that while MLL's assets and asset configuration will be shaped by the strategic issues, the assets will also be influenced (and sometimes constrained) by technical issues that are independent of the strategic context.

Some of the issues that are independent of MLL's strategic context include:

- Technical regulations related to matters such as interference and harmonics.
- Asset configuration, condition and deterioration. These physical parameters may limit the rate at which MLL can reconfigure its physical assets to meet 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 MLL's risk exposure might depend on the strategic context could

relate 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 legislation.

2.4 Key Planning Documents

MLL's key planning documents are:

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

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.
- Have regard, among other things, to the desirability of ensuring the efficient use of energy.

In achieving our objectives, we will:

- Develop and maintain transmission, reticulation and distribution systems responsive to customer requirements.
- Ensure that all resources – financial, physical and human are utilised efficiently and economically.
- Ensure that commercial and productivity targets are met.
- Meet the requirements of the market 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.
- Have careful regard for the environment and ensure that any impact of our activities is minimised or, where possible, integrated within the environment.

- Ensure that all legislative powers are used fairly and in accord with the principles of natural justice.
- Be a good employer.

2.7 Statement of Corporate Intent (SCI)

MLL's SCI is a requirement under Section 39 of the Energy Companies Act 1992, and forms the principal accountability mechanism between MLL'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 2011. The following extracts are from the SCI 2010/2011.

Projected Parent Company Income and Expenditure 2010/11	
Income	$(000)
Network Revenue	33,851
Discounts	(6,464)
Contracting Trading	17,223
Interest Income	30
Investment Income	6,606
Other Income	8,240
TOTAL	**59,486**
Expenditure	
Transmission Charges	4,808
Trading Cost of Sales	13,894
Maintenance and Operation	14,430
Administration Expense	4,817
Interest expense	1,083
Depreciation	7,508
Other Expenditure	
TOTAL	**46,540**
Net Surplus Before Tax	,12,946
Taxation	2,566
Tax Paid Surplus	10,380

Projected Capital Expenditure 2010/11	$(000)
33kV Sub Transmission Assets	6,198
11 & 22kV Overhead Distribution	3,031
Low Voltage Overhead Distribution	63
Underground Reticulation	2,886
Zone Substations	1,547
Test Equipment	40
Radio Equipment	-
Plant and Tools	170
Vehicles	-
Land and Buildings	965
Office and Computer Equipment	812
TOTAL	**15,712**

SCI Performance Targets

(a) MLL'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 MLL business. The calculations also include valuation of MLL'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 different to the 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) MLL's intended financial and operational network targets for the coming financial year are:

(i) To achieve, in the MLL parent company, an overall rate of return on equity of at least 6.92% (calculated according to generally accepted accounting principles). MLL 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. MLL remains committed to achieving a realistic and reasonable commercial rate of return in the medium term.

(ii) To continue in relation to the investments in external businesses to seek to have those businesses managed with the intention of providing a 10% rate of return on equity. As noted above MLL 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 MLL's Network to not exceed an average of 1.5 hours compared to an average of 1.69 hours for the years 2007/2008/2009.

(v) Consumer hours lost on MLL's system through internal faults to not exceed an average of 2.0 hours compared with an average of 2.63 hours for the years 2007/2008/2009.

(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) MLL's anticipated dividend to be paid to the Marlborough Electric Power Trust in the 2010/2011 financial year will be $1.75m.

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

(ix) MLL 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.

(x) MLL shall provide its shareholder, the Marlborough Electric Power Trust with an updated Five Year Financial Model at the commencement of each financial year

2.8 Interaction between Planning Documents

The interaction between MLL's 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.

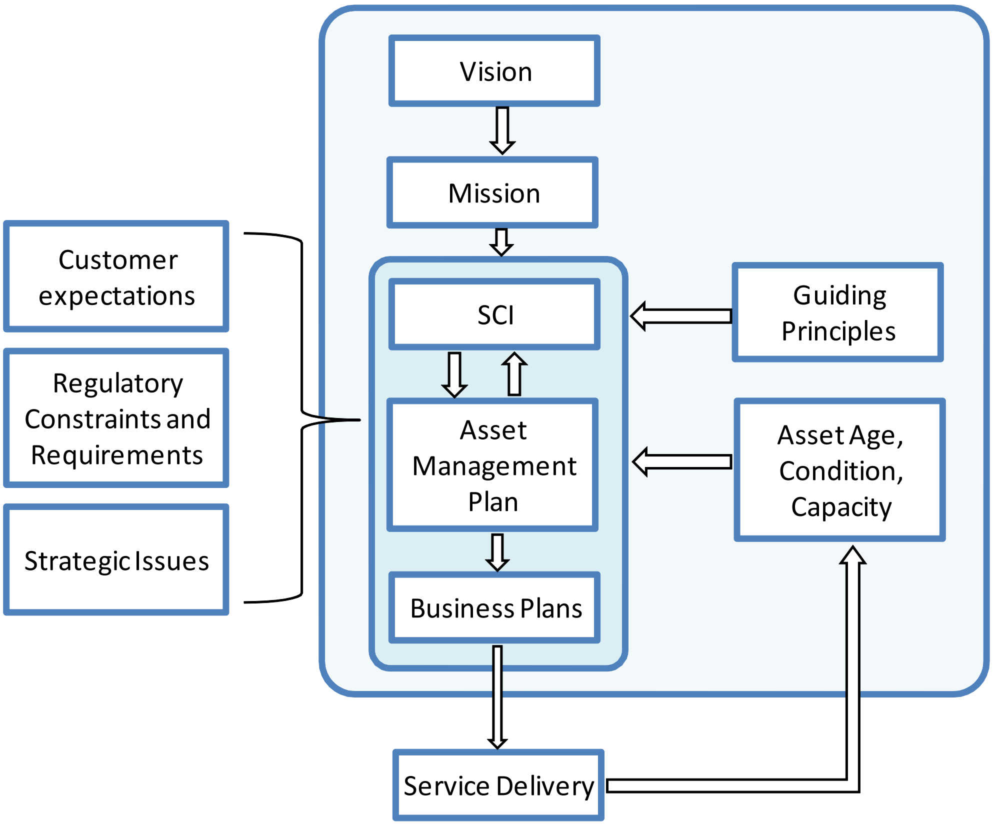


Figure 2 – Interaction between Major Planning Documents

Table 1 outlines the principal guides to decision making within MLL.

Category	Description of guide	Decisions to be guided
Policies	Vision	All decisions.
	Mission	All 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 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 MLL approved limits or controls are needed to reduce risk.
	Contingency plan	Responses to defined contingent events.
	Annual business plan	Allocation of resources to activities.
Standards	ISO 9001:2008	Critical business processes.
	ISO 14001:2004	Minimise effects of activity on environment
	OHSAS 18001:2004	Maximise safety of staff, contractors and public.
	AS/NZS 4360	Risk assessment & mitigation.
	NZS 7901	Public Safety Management System (working towards completion, audit and certification during 2011/12)
	Technical eg. IEC, BS	Technical design & engineering.
	Financial eg. GAAP, FRS	Financial reporting & disclosure.
Legislation	Electricity Act 1992	
	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 Regulations	Most decisions related to Network assets
	Electricity Information Disclosure Requirements	What needs to be disclosed and by when

Table 1 - Guides to decision making

2.9 Stakeholders

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

- has a financial interest in MLL (be it equity or debt) and/or;
- pays money to MLL (either directly or through an intermediary) for delivering service levels and/or;
- are physically connected to the Network and/or;
- use the Network for conveying electricity and/or;
- supplies MLL with goods or services (including full-time labour) and/or;
- is affected by the existence, nature or condition of the Network (especially if it is in an unsafe condition) and/or;
- 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 MLL's key internal and external stakeholder groups as well as the nature of their relationships with MLL.

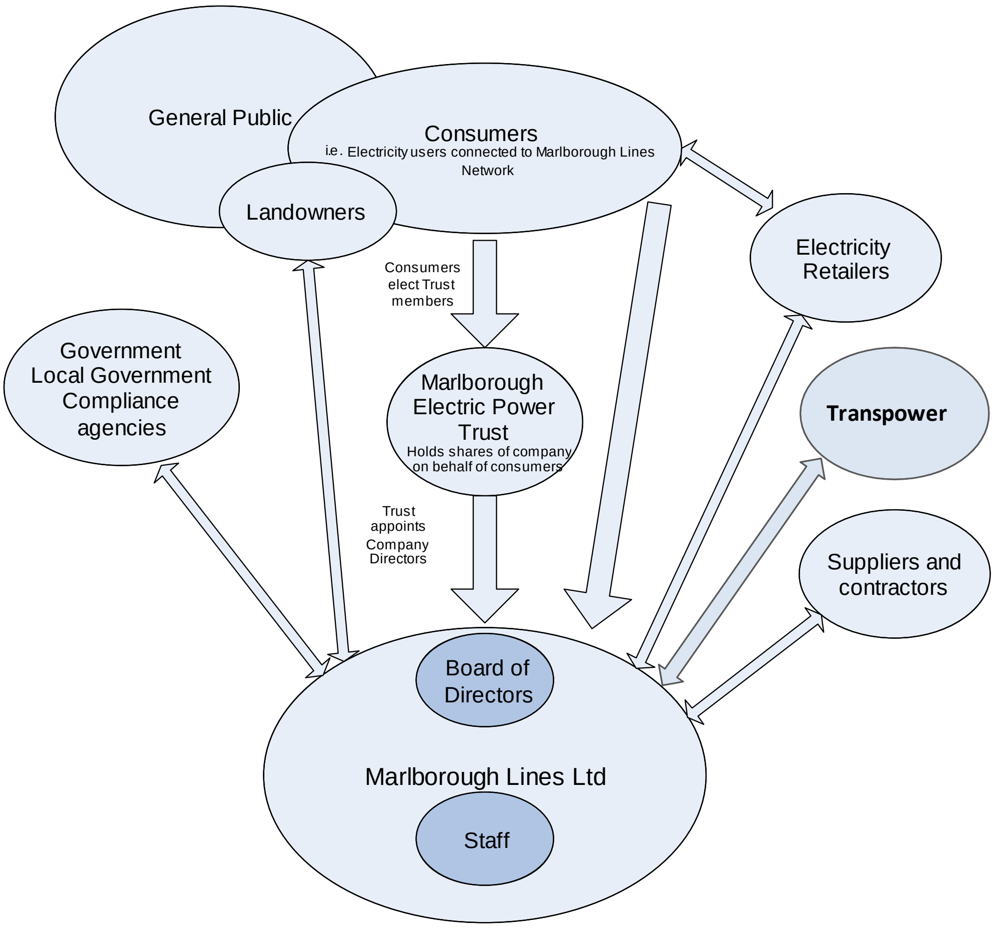


Figure 3 - Stakeholders

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 Authority					✓	✓
Electricity and Gas Complaints Commission			✓		✓	
Ministry of Consumer Affairs			✓		✓	

Table 2 – Stakeholder's Interests

Figure 4 - Group of School Children watching live line Work

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 MLL staff • By adhering to MLL 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 MLL'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 Authority	• Weekly update • Release of discussion papers • Briefing sessions • Analysis of submissions on discussion papers • Conferences following submission process • Information on Electricity Authority's website
Electricity and Gas 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 or providing funding for MLL (and to retain ownership).	• MLL will accommodate stakeholders' needs for long-term viability by delivering earnings that are sustainable and reflect an appropriate commercial return on employed capital.
Price	Price is a key means of both gathering revenue and signalling underlying costs. Getting prices wrong has economic implications for MLL & consumers. Within any electricity network it is inherent in the pricing methodology that there will always be elements of cost sharing / cross subsidisation between customer groups, e.g. non-domestic / domestic, power / average user, and urban / rural. To eliminate this cross subsidy would create major customer dissatisfaction in some customer groups. Regulations currently require that increases in the cost of supply in rural areas should not exceed the rate of increase in urban areas. Government policies of this kind together with the low user fixed charge only serve to further distort the relationship between cost of supply and price. It is also salient Retailers repackage network pricing which further distorts the cost of supply to ICPs.	• Failure to gather sufficient revenue to fund reliable assets will interfere with consumers' business activities. MLL's pricing methodology is expected to be cost-reflective, but issues such as the Low Fixed Charges requirements distort signals relative to the cost of supply. • Consideration is given to the effects of price changes.
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 and ensuring the assets are of a quality and standard to meet customer requirements.
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 assets are structurally sound, live conductors are well out of reach, all enclosures are kept locked, all exposed metal is securely earthed, assets are built and maintained in accordance with best practice. • 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.
Compliance	MLL 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

In practice, most activities result in a need to balance a number of different issues, e.g. quality, cost, time. Finding a balance acceptable to all stakeholders, requires that the various solutions are carefully considered and priorities evaluated according to the specific circumstances and environment. The general priorities, in order of highest to lowest, for managing conflicting stakeholder expectations and interests are given below:

1. **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. Safety is fundamental to the way MLL will undertake any activity.

2. **Viability**: MLL will give high priority to viability, because without it MLL will cease to exist which makes all other considerations moot.

3. **Return**: MLL recognises the need to operate as a successful business and provide a commercial rate of return. This ensures that funding will be available for future activities and hence supply is available to consumers.

4. **Supply quality**: This is important to consumers to allow them to operate their homes and businesses in a reliable and safe manner.

5. **Environment:** As a socially responsible organisation, MLL will give priority to looking after the environment and safeguarding the sustainability of the community.

6. **Compliance:** MLL will give priority to compliance, noting that compliance which is safety related will be given highest priority.

7. **Energy Efficiency:** MLL will give lower priority to Energy Efficiency than to Compliance.

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

In practice, the priority given to issues may vary slightly from those above, according to the issue(s) and the affected stakeholders.

In meeting the objectives outlined MLL will meet its obligations and responsibilities in accord with its internationally accredited ISO systems for management, health and safety and the environment.

2.11 Planning periods adopted

In line with previous AMPs, a rolling 10 year horizon has been adopted covering the period 1 April 2011 to 31 March 2021. The activities for the first three years of the AMP are more certain, and the activities for the first year form the basis of MLL's 2011/2012 business plan, which is currently being implemented.

The activities described in this AMP are considered appropriate to provide, maintain and operate assets that will meet projected levels of service. Should levels of service change or there be a change to anticipated customer requirements, greater or lesser levels of activity may be required subject to MLL's ability to fund those activities.

2.12 Accountabilities for asset management

MLL'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 Act has recognised this accountability and has removed the price path threshold for beneficially owned lines businesses such as MLL.

It is also salient that MLL undertakes independent surveys of customers at least annually and for a period of several years the overall satisfaction levels were in the order of 94%, greater than for other service providers in other sectors of the electricity industry.

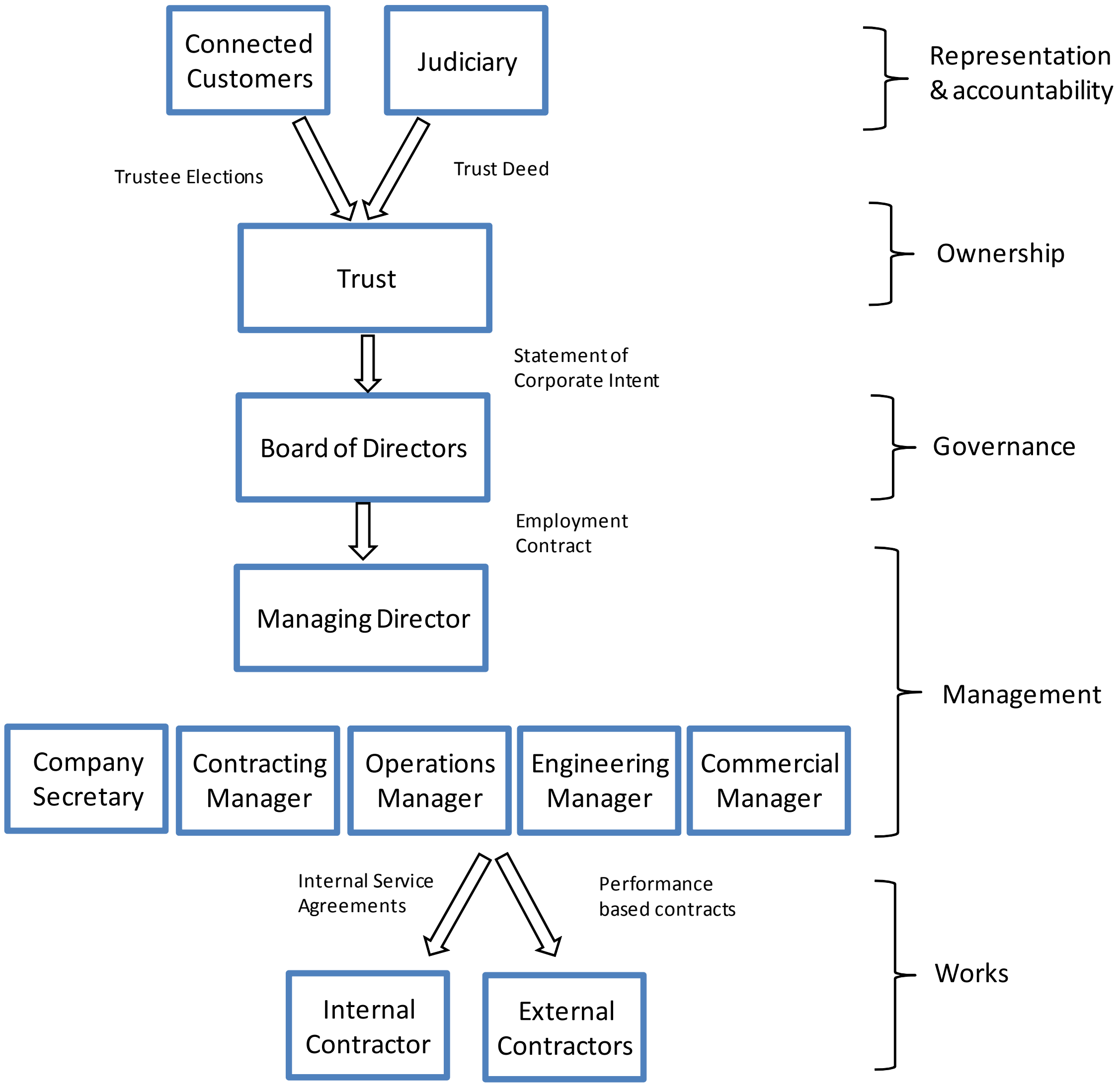


Figure 5 - Accountabilities for Asset Management

2.12.1 Accountability at ownership level

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

- Leo McKendry
- Tim Smits
- Paul Ham
- Ross Inder
- John Cuddon
- 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.

- The provisions of the Trustee Act 1956.

2.12.2 Accountability at governance level

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

- Des Ashton
- Ross Butler
- David Dew (Chairman)
- Ken Forrest (Managing Director)
- Terry Shagin
- Jo Buckner
- 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.

The Board approve the annual budgets and AMP. Each month it receives reports relative to the overall performance of MLL and key activities undertaken.

2.12.3 Accountability at Chief Executive level

The Managing Director, Ken Forrest, is accountable to the directors primarily through his employment contract and required objectives of the Board.

2.12.4 Accountability at management level

The second tier of management reports to the Managing Director. Accountability for asset management at the second tier is split two ways:

- Responsibility for minute by minute continuity and restoration of supply lies with the Operations Manager, Brian Tapp, principally through control and dispatch, switching and fault restoration. The Operations Manager also has responsibility for asset maintenance.

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

Accountability for the key area of line pricing lies with the Commercial Manager, Ms Katherine Hume-Pike. Accountability for all administrative and financial activities lies with MLL Secretary, Mr Geoff Hoare.

The key accountabilities of the four second tier managers are to the Managing Director, through their respective employment contracts and required performance criteria.

2.12.5 Accountability at works implementation level

MLL has an in-house contracting department. This operates as a separate division of MLL. With the implementation of the Electricity Industry Reform Act 1998, many lines business sold their contracting operations. MLL recognised that it was very unlikely that active competition would be present in the Marlborough market and therefore chose to retain its contracting staff, rather than being subject to limited competition and consequent price gouging.

MLL Contracting undertakes the majority of the work on the MLL Network. 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.

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

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

2.12.6 Board Reporting

MLL's regular board reports include the following:

- The Capital Expenditure program (progress and spend against budget).
- The maintenance program (progress and spend against budget).
- Incidents and major outages
- Any major changes to asset management processes or practices.

On a quarterly basis the Board receives a report on Legislative Compliance and Risk Management, which includes:

- All health and safety accidents and near-misses.
- All incidents of third party contact with the Network.
- Details of major customer works

2.13 Systems and processes

MLL makes use of a wide range of systems, processes and technology assets to capture, utilise, 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 6 below outlines the key information flows occurring at MLL, while Table 5 outlines the repositories of network information. MLL has migrated most of its paper records to computer-based systems, which are available on its internal intranet.

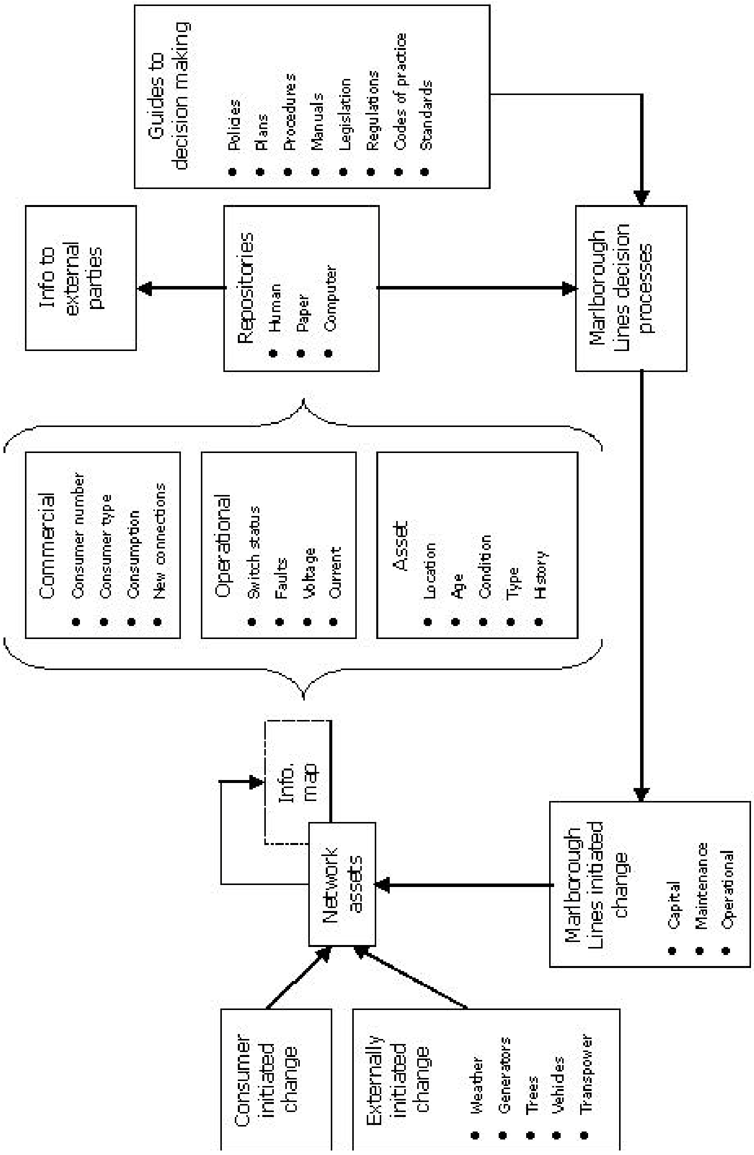


Figure 6 - Key Information Flows

Repository	Information	Key users
Asset Information(EMS-WASP)	• Zone substation assets • Location • Technical specifications • History • Test records • Network outages • Financial data	Most staff.
GIS (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. (essentially historic data only)
Design records & project files	• Calculations etc	Engineering staff
Easement records	• Land-owner details • Agreements	Engineering, operations & contracting staff.
ODV database	• All network component ages & conditions.	Most staff.
Various maps	• Asset location	All staff as required.
SCADA	• Network status eg. loads, switch positions etc. • Faults & outages • Inspection data	Engineering, operations & development staff.
Fault record sheets	• Description & duration • Likely cause	Operations manager, Network management and staff.
Switching instructions & drawings	• Operating instructions	Network & operations staff & contracting staff
Finance 1	• Financial data • Inventory • Payroll	Administration, Stores, reports used by many.
GenTrack	• Connection data • Billing data • ICP management • Load control relays not owned by MLL	Operations and administration staff Commercial Manager
Emergency Response Plan	• Information for use in civil emergencies, e.g. earthquake. Major storms etc	Engineering contracting & administration staff during severe events

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 is databases which contain increasingly accurate information in relation to asset types and locations.

2.14 ISO system

MLL recognises the importance of adopting best practice in its management. It also recognises it is important to provide confidence that its various management practices are consistent with required standards.

Accordingly MLL has gained and maintained internationally recognised ISO accreditation for its:

- Management Systems – ISO 9001:2008;
- Environmental Management – ISO 14001:2004; and
- Occupational Health and Safety – OHSAS 18001:2007.

MLL is one of the few New Zealand companies to have met these international criteria.

The ISO 9001 quality management system ensures that MLL's procedures and work practices meet with recognised industry best practice. Compliance with the systems procedures is integral to MLL's operations and, as such, regular audits are completed.

As part of its accredited ISO 14001:2004 environmental management system one of MLL's key objectives is:

"MLL 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 MLL's activities upon the natural and built environment as well as the local community. All areas of MLL's 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.

Because MLL regards safety as an integral part of its business it was one of the first of a few New Zealand companies to achieve OHSAS 18001:2007 accreditation. This is in addition to the company's ACC Tertiary status, which enables MLL to gain a 20% reduction in ACC premiums.

2.15 Network Standards

The Network Standards 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 MLL.

The Standards contain information and drawings to be used in designing network assets and detail the procedures for design approval and construction. These standards and policies help ensure that public safety is considered at the design phase and assist MLL in meeting its obligations under the Electricity (Safety) Regulations 2010, and reliability of supply consistent with the requirements of the Commerce Commission.

2.16 Information technology

The principal asset management system at MLL is WASP, an assets and works management program, which 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 MLL's 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, it is 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 improvements are incremental and hence the quality is improving over time. The principal asset categories where further improvement is required are:

- Vegetation management
- Low voltage overhead lines
- Low voltage underground cables
- 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 MLL 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 MLL.

2.16.2 Network development data support

The WASP works management system is linked through to the Finance 1 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 MLL account structure. The result is that any historic comparison must be manually completed to a large extent.

2.16.3 Performance measurement

All of MLL's core systems utilise Microsoft SQL databases so reporting across multiple systems is simplified. MLL 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 MLL's 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. System Assets

MLL's Network originally began as three historically distinct networks:

- The Marlborough Electric Power Board, which commenced supply in 1927 from its own 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.

MLL is based in Blenheim, a town with an enviable reputation for high sunshine hours. We take our supply from the Transpower Grid via three 110kV circuits to a single point of supply (Grid Exit Point – GXP) in the Blenheim suburb of Springlands. Supply to Marlborough then radiates out to a number of very isolated rural areas including the Marlborough Sounds, Molesworth Station, New Zealand's largest farm at the top of the Awatere valley, and the southern Marlborough coast; an area bordered by the Pacific Ocean on one side and the inland Kaikoura mountains on the other.

A key implication of the geographical location is difficult access to some areas, with many Sounds areas only accessible by boat or helicopter. Access can be particularly limited or constrained under civil emergency events such as storms, earthquake and major fires.

The Marlborough network conveys energy to in excess of 24,000 consumer connections with an after-diversity maximum demand of 70 MW. MLL's consumers are predominantly domestic and small-to-medium commercial consumers, with the largest consumer representing approximately 3% of total energy volume.

3.1 Asset configuration

MLL currently operates three voltage levels of assets:

- A 33kV sub-transmission network based on a radial duplicated feeders that provides (n-1) security of supply to the 33kV bus at all zone substations, except Rai Valley, Linkwater and Ward. About 4% of the 33kV is underground.
- An 11kV distribution network largely radial with some meshing in urban and higher density rural areas that provides additional security of supply. About six percent of the 11kV (by line length) is underground.
- A 400V (LV) reticulation network with significant meshing in urban areas. About 41% of the LV is underground. Due to the loading configuration 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.

In the 2012/13 financial year it is intended that the line from Rai Valley to Okiwi Bay will be operated at 22kV rather than the existing voltage of 11kV to increase its capacity and improve voltage delivery to ICPs.

The Network area is depicted in the following Figure 6, with the 33kV zone substations shown as blue triangles and the 11kV lines shown in red.

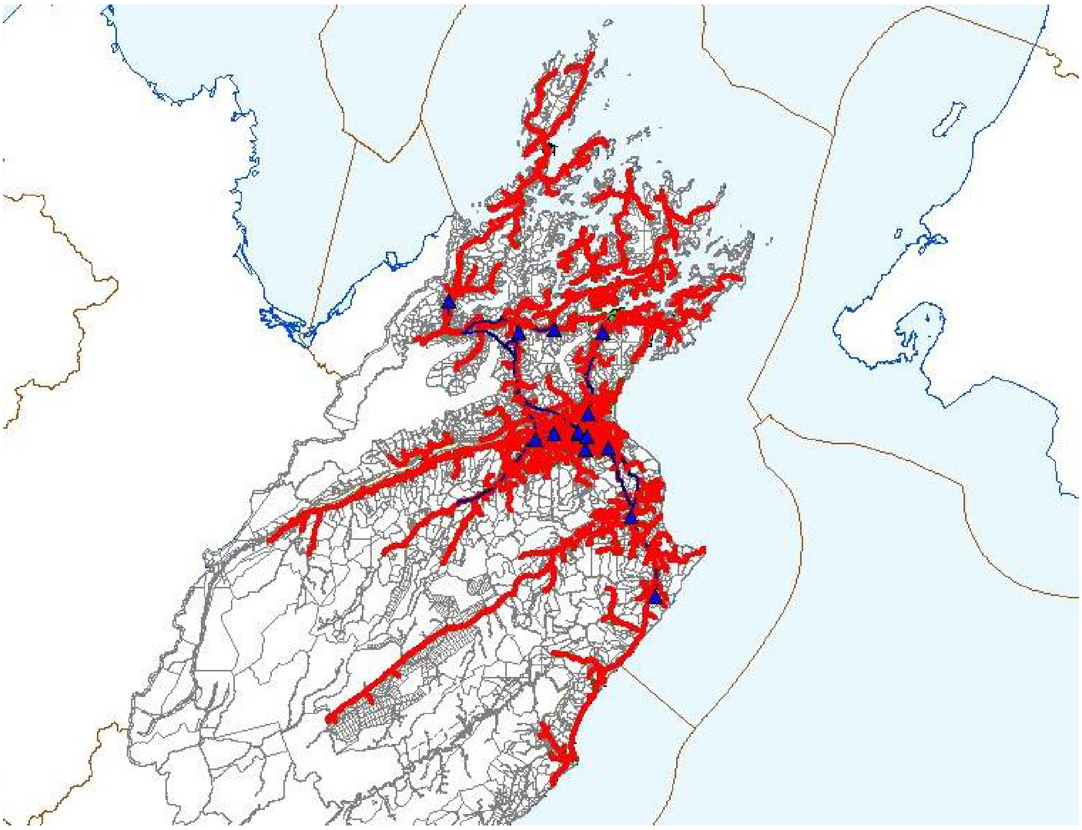


Figure 7 - MLL Network

Each of the 15 zone substations has between two and six 11kV feeders radiating outwards, with some meshing possible in urban areas. These feeders collectively supply 3,800 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.

Lightning protection is generally installed on all overground to overhead transitions and in areas prone to lightning.

The 110/33kV transformer configuration at Transpower's Blenheim GXP of two 50MVA banks and a 60MVA bank limits MLL's demand to a nominal 100MVA in the event of a transformer failure, i.e. more than the current maximum demand.

Key features of MLL's distribution substations include:

- Typically 200 or 300kVA in urban areas.
- Fused on the HV side
- LV cables with HRC fuses.
- LV typically runs along both sides of the street ie. no multiple service lines crossing the street.
- LV runs are typically limited to 350m to prevent loss of voltage.

Further details on network design are contained in the Network Standards.

3.2 Load Characteristics

During 2009/2010 the Network delivered 384GWh of electricity to in excess of 24,000 customers. The peak load was 70.2 MW. The five largest loads collectively used 26.2GWh (6.8% of total) of electricity, while the single largest used 11.2GWh (2.9% of total). These loads are spread across a diverse range of activities from food processing to supermarkets.

The natures of Marlborough's ten largest electricity consumers are:

Size	Nature of business	Nature of demand
1	Primary processing	Constant year round
2	Government agency	Constant year round
3	Winery	Cyclic with harvest season
4	Primary processing	Constant year round
5	Winery	Cyclic with harvest season
6	Winery	Cyclic with harvest season
7	Primary Processing	Constant year round
8	Primary Processing	Constant year round
9	Primary Processing	Constant year round
10	Primary Processing	Constant year round

Table 6 - MLL's 10 largest Consumers

Generally the load on the MLL Network consists of a large number of smaller customers and consequently while the loss of any large load would affect operation of the Network, the effect would be relatively minor compared to the overall effect of changes to the economy or a decline in 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 MLL, than the loss/gain of two or three of the largest customers.

3.3 Identification of assets by class

The table below identifies the major classes of assets that make up the MLL Network:

Type	Number	Average Age (years)	Average useful Life (years)	Replacement Cost $	Depreciated RC $
33kV Switchgear	247	9.7	39.3	4,591,659	3,483,996
33kV Transmission Lines Overhead	291	42.0	69.0	21,354,935	9,210,369
33kV Transmission Lines Underground	14	5.9	45.0	2,964,279	2,572,682
Zone Substation	299	17.9	54.6	27,409,802	18,325,288
Scada Equipment	115	7.6	15.4	653,939	333,954
System Control Equipment	7	24.2	38.4	1,093,155	545,759
Land and spares	3	n/a	n/a	4,289,776	4,289,776
Subtransmission and Control				*62,357,545*	*38,761,825*
11kV Distribution Lines Overhead	2,139	34.5	64.0	124,566,959	57,411,162
11kV Distribution Lines Underground	142	11.9	47.5	20,827,723	15,949,934
Distribution Substations	11,529	23.5	52.6	46,188,583	25,981,563
Distribution Switchgear	3,157	12.3	37.2	16,086,883	10,887,124
Isolating Substations	35	30.4	55.0	541,975	244,609
Voltage Regulators	17	21.9	55.0	1,072,341	664,922
11kV Network				*209,284,465*	*111,139,314*
LV Distribution Lines Overhead	437	45.2	66.7	15,082,696	5,251,988
LV Distribution Lines Underground	309	14.0	45.6	28,126,540	19,525,121
LV Switchgear	2,778	13.9	45.0	5,576,415	3,863,248
Consumer Service Connection	29,085	25.6	45.0	12,976,427	6,796,046
LV Network				*61,762,078*	*35,436,403*
Total				*333,404,088*	*185,337,542*

Table 7 - Major Classes of Assets

The values are based on the unaudited accounting valuation of Network assets as of 31/12/2010. This is based on the previous valuation, with subsequent asset additions and deletions added and depreciation updated. The average age of the assets versus the average useful life is also shown. Note the number is the count of all assets in that category and may include multiple asset types, e.g. transformers, distribution substations and HV fuses for distribution substations are all included under Distribution Substations.

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. MLL's policy is to obtain minimum lifecycle cost and in doing so considers the particular criteria pertaining to individual assets or groups of assets within the overall network.

3.4 Justification for asset classes

Delivery of electricity to consumers requires MLL to own and operate the classes of assets described in sections 3.1 and 3.3.

A measure of asset justification is the consideration of customer needs, and acceptance of prudent levels of risk commensurate with the need to deliver what users regard as an essential service. The Canterbury earthquakes have reinforced the need to give proper and careful consideration to the elimination of potentially useful assets from the customer base. It is interesting to note that with both the Canterbury earthquake last year, and the most recent one in February 2011, MLL's large mobile generators proved invaluable in providing an emergency supply yet such generators do not form part of the regulatory asset base.

A further indicative measure is the degree of optimisation applied by the ODV valuation methodology, and accordingly the ratio of ODRC to DRC reinforced the need for the MLL asset justification. This ratio is typically in excess of 98.8%, meaning that very little optimisation is necessary and that the assets deployed are justified.

Justification for key classes of assets are 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.
Load management Equipment	Reduces load on network and helps limit overall load on Upper South Island, reducing Transpower charges.

Table 8 - Justification for asset classes

All current and projected levels of service can be justified by current best power engineering practice.

3.5 Regional Issues

3.5.1 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 tracked vehicles or helicopter. Some areas do not have road access and can only be accessed by boat or at the time of storm on foot. Much of the area has a climate that encourages rapid vegetation growth, leading to the need for tree trimming and vegetation control on typically 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 where concrete poles are used subject to concrete spalling.

MLL 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. In the Sounds area, there are on average 0.4 customers/km of line compared with 7.2 customers/km on average for the entire Network.

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. This holiday occupation also leads to much lower diversity of demand than would traditionally be expected from more usual areas. In effect the nature of the load drives demand in the opposite direction to what is desirable i.e to a poorer load factor.

All of these various factors increase both the cost of construction and operation/maintenance of the distribution system. The situation is exacerbated by the fact that revenue from these customers does not meet the costs incurred and subsidy is required from other customer groups. A significant issue facing MLL 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. MLL has limited easements over line routes. Therefore, any upgrade to the capacity of the lines which necessitates further supports being erected, will require new 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.

MLL 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 restoration after momentary faults.

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

Many areas in the Sounds are subject to severe windstorms. MLL 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. In addition, the current tree legislation severely restricts the ability of MLL to proactively remove potential hazards. For example, it only allows trimming of trees in very close proximity to the lines.

It is not realistic to expect that reliability to consumers in the Marlborough Sounds area will equate to that of urban areas, particularly when MLL is not assisted by the current legislation pertaining to protecting power lines from interference by trees. Irrespective MLL will utilise its best endeavours consistent with best industry practice to maximise reliability of supply. Overall it must be recognised the lines are in a remote location, cannot be duplicated, and are subject to ongoing aging. MLL’s position is not assisted by a limited control regime. As appropriate, parts or sectors of the lines will need to be replaced.

The reticulation in the Marlborough Sounds includes the aerial crossings of three navigable water ways with significant spans. Each of these spans have been in service for a number of years and because of the arduous environment in which they operate and the frequency of shipping it will be necessary to replace the existing conductors and all associated hardware.

The reticulation in the Marlborough Sounds has been constructed using treated pine poles and at the time of construction it was anticipated the poles would have a life of 35-40 years, but because of the treatment of the poles had not been proven over a 40 year period, some uncertainty remained.

Over years the treated pine poles have been routinely tested and proven to be in good condition. However, tests conducted in recent months has determined that a relatively small batch of poles from a particular manufacturer have begun to fail and at the time of this report is intended that some 100 poles will be replaced to maintain the integrity and reliability of the network.

Because of the location of these poles their replacement will typically be by helicopter and inherently expensive.

In order to improve capacity and reliability of supply, mobile generators may be used 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.

It may also be that mobile generators will be used to furnish supply when large scale logging is undertaken in the vicinity of radial lines supplying a significant number of customers.

3.5.2 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.

The sheltered nature of the inland valleys and the pastoral nature of the land use with relatively small areas of trees and forest lead to high reliability of supply in these valleys.

3.6 Demographics

At the time of the 2006 Census, MLL'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 MLL's network area resident population are:

- An older population than the national average, with a median age six 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 MLL 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.

3.7 Key economic activities

Marlborough's key economic activities include:

- Food and vegetable processing
- Grape growing and wine making.
- Fishing, shellfish farming and processing.
- Pastoral farming.
- Dairying.
- Forestry.
- Timber processing.
- Woodbourne Air Force base.
- Tourism.
- Engineering manufacture.

The area's fortunes are therefore 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, particularly in relation to climate change and nitrogen-based pastoral farming.
- Government policies on siting of major defence installations.
- Access to water for crop and stock irrigation.
- Algae bloom and rough seas within shellfish farming areas.

The impact of these issues is broadly as follows:

Issue	Impact
Shifts in market tastes for wines, mussels and salmon	• May lead to an expansion/contraction of demand by these industries. The conversion of pastoral land into vineyards has slowed although some land previously thought not suitable for grape production has been converted. This has lead to increases in demand in areas where electrical load had been static for many years. • With the downturn in the viticulture industry it may be that subject to the availability of water some of the land occupied by the less successful vineyards will be utilised for dairying.
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 9 - Impact of Key Economic Activities

3.7.1 Other drivers of electricity use

Other drivers of electricity use include:

- Low inland temperatures during winter. Minus five degree frosts are common in many areas beyond the lower Wairau.
- The use of heat pumps as air conditioners in the summer time.
- Increased utilisation of electricity as polluting sources of energy are replaced.
- Population increase with influx of those departing Christchurch following its earthquake.

3.7.2 Network provision for generation

Aside from the need to meet increased customer demand in the utilisation of electricity, it also may be necessary for MLL to extend or increase the capacity of its network to provide for new sources of generation, particularly hydro and wind.

MLL has already extended its network to enable the connection of wind generation and discussions with further potential generators are ongoing.

MLL is committed to facilitating the connection of new generation to its network subject to generators meeting appropriate technical and commercial criteria.

3.7.3 Energy and demand characteristics

Key energy and demand figures for MLL's Network the year ending 31 March 2010 are as follows:

Energy	Max demand	Load factor	Long-term trend
384 GWh	72.1 MW	62%	Load has historically been increasing at approx 3% p.a, however the recession has resulted in this flattening out over 2010.

Table 10 - MLL 2010 Key Network Values

The following base assumptions are used for demand forecasts:

- The resident population will continue to grow at about the average rate of the last five years.
- 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 cease.
- The mussel and salmon industries will continue to grow at the average rate of the last five years for the planning horizon.
- The current level of forest harvest will continue.

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

- Sufficient generation will be available to supply all load and Transpower will provide and maintain the assets required to deliver supply to MLL.

- 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 load management will have little effect on load growth, which is mainly driven by economic factors.

- The current recession will have a constraining 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. Primarily demand and consumption is related to weather. A cold winter with increased levels of heating or a dry early summer with significant utilisation of irrigation are the major factors. Equally the weather can impact on the volume of wine and food products that are processed.

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	-2.5%	3.8%	2.3%	1.2%
Energy	-0.9%	2.1%	2.3%	0.9%
Transformer capacity	0.7%	2.2%	3.9%	0.9%

Table 11 - Overall Growth Rates

Note the rate used for planning is less than the average over the last ten years, but greater than the last year to reflect the current recession and the expectation that the recession or Global Financial Crisis (GFC) will end. Ultimately if load growth doesn't occur, it is simpler to defer growth related capital expenditure, than it is to be unprepared to cope with the growth.

Further factors which may influence actual growth are:

- energy demand associated with discretionary products such as salmon and wine may decline and impact on Marlborough as a result of the GFC.
- the number of new connections may decline and/or existing installations disconnect as a result of the GFC.
- development funds may be diverted away from the region as the Christchurch earthquake dampens an already weak economy.
- escalating Middle East tensions, causing a rise in the price of petrol and diesel, may further dampen an already weak economy.
- The planned Defence Force consolidation in the Manawatu may impact the Woodbourne Air Force base, with a subsequent knock-on effect for the Marlborough community.
- The possible resettlement of Christchurch families after the 22 February 2011 earthquake may offset some of the above mentioned downward forces.

The values in Table 11 show the effect of the local economy on load growth. In the last year, this has been slightly negative after ten years of load growth of 2-3%. In looking at overall growth, values of zero growth are assumed for the next two years. Thereafter 1.2% for maximum demand growth and 0.9% energy have been used. This is because the load is becoming more “peaky” which results in a declining load factor and less efficient utilisation of capital. Regardless it is important to recognise network investment is primarily driven by the need to provide for increased demand and not energy conservation. 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. MLL’s historical demand and projected demand are shown in Figure 7, while Table 13 disaggregates the projected growth over the 14 zone substations.

It is also salient that the overall risks of the timing of network investment are asymmetrical. It is better to have invested prior to the need for increased capacity than after customer supply has been restricted. To wait until the demand exists is too late.

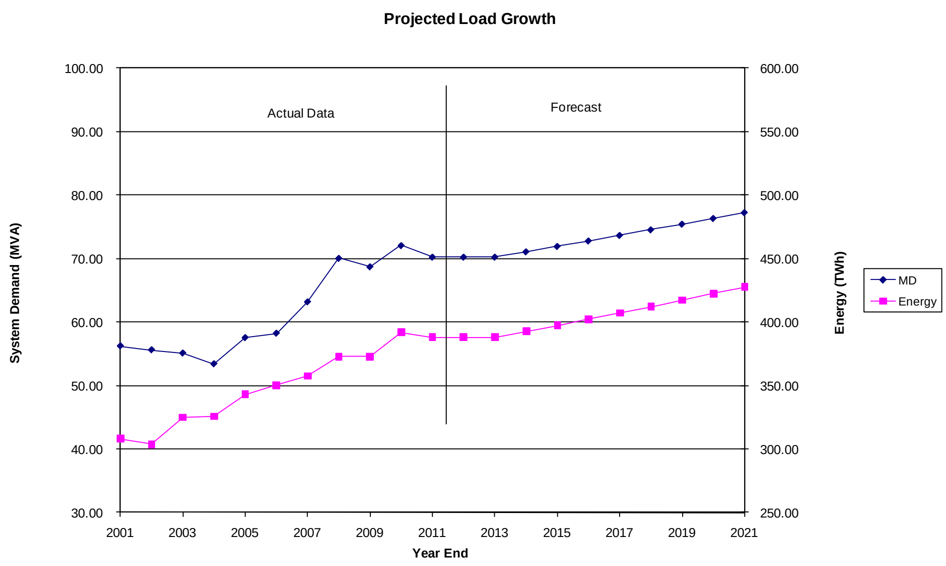


Figure 8 - Projected Load Growth

3.8 Transpower Point of Supply/Transmission Lines

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

MLL has a single Transpower grid exit point at Blenheim (corner of Murphy's and Middle Renwick Roads) where supply from the national grid enters MLL's Network. Blenheim's Grid Exit Point (GXP) 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.

There are two Stoke-Blenheim 110kV circuits installed on single towers. These circuits are rated at 67MVA each.

During 2002, all South Island Line Companies 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 MLL'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. MLL 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 GXP comprises two banks of three single phase 50MVA units and a third 60MVA three phase unit. The 60MVA unit was commissioned in January 2011.

The bulk supply characteristics are summarised below:

GXP	Demand	Voltage	GXP rating		Line rating	
			(n) rating	(n-1) rating	(n) rating	(n-1) rating
Blenheim	70 MVA, controllable to about 64MVA	110/33kV	160/172 MVA	100/112 MVA	189/202 MVA	110/136 MVA

Table 12 - Blenheim GXP

Changes to the Transpower charging scheme mean that MLL's peak charges are based on its contribution to the twelve highest Upper South Island Coincident Peaks. MLL works 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 and these were used successfully in the winter of 2010 to manage load.

The graph below shows the load duration curve on Transpower's Blenheim GXP for the calendar years 2005 to 2010.

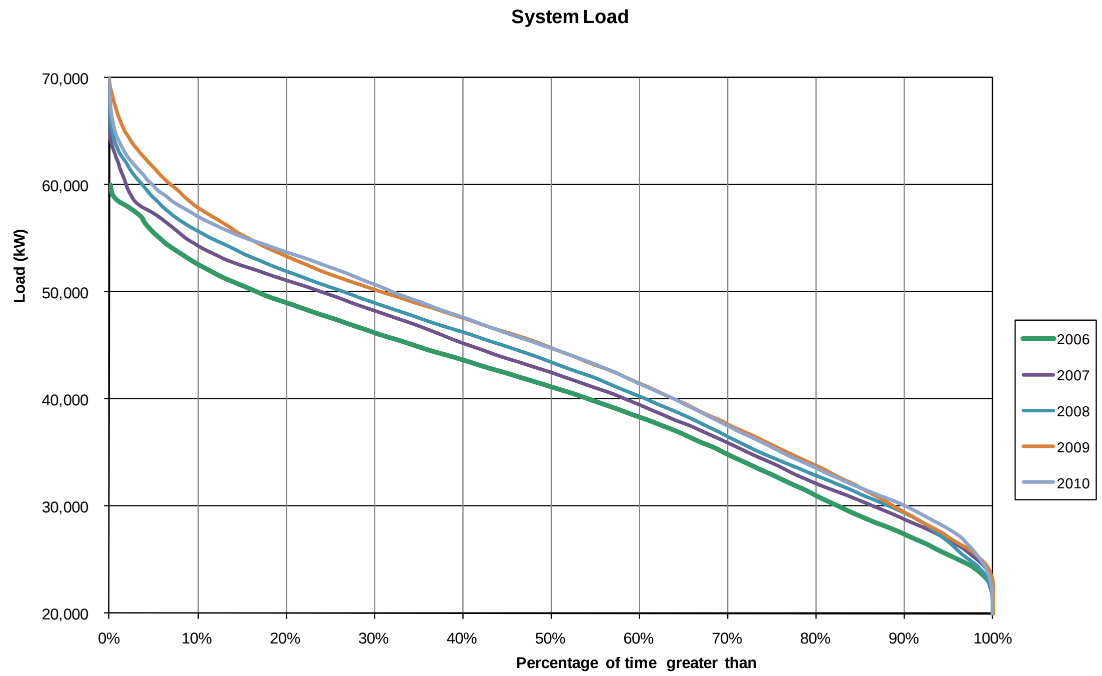


Figure 9 – Blenheim Load Duration

This graph clearly shows the increase in load for the years 2006 to 2009. In the 2010 year the average load was 0.1% lower than the average load in 2009. This can be attributed to a mild winter, lower levels of irrigation and the general downturn in the economy.

3.9 Local Generation

Trustpower operates a 2.4MW 'run-of-river' generator at Waihopai which is embedded into MLL's 33kV Network. This plant was originally built in 1927 by the Marlborough Electric Power Board and upgraded in 1999. Output of this generator is dependent on rainfall in the catchment area.

Energy 3 has two wind farms. At Weld Cone, near MLL's Ward substation there are three 250kW turbines, while at Lulworth just north of the Ure River, four 260kW turbines are installed. The units at Weld Cone began generation in February 2010 and the Lulworth units commenced in January 2011. Both schemes are embedded into MLL's Network at 11 kV.

The potential wind resource in the Marlborough Sounds and on the East Coast is significant, however the development of substantial wind farms will require construction of new lines to convey the output to load centres.

Trustpower operates the Branch Power Scheme and has been granted resource consent to extend this scheme. 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 MLL's existing 33kV line in the Wairau Valley. MLL understands that Trustpower does not currently have all of the land or agreements necessary to build the scheme.

The Wairau Hospital and a number of wineries and local businesses have small diesel generators which are used for load management and emergency power supply. Some of these units are capable of embedded operation.

At the time of writing, one small wind turbine (15kW) was installed at a residence and one other domestic customer was looking at the installation of a solar array (5kW).

There has been discussion concerning tidal power generators at the entrance to Tory Channel, however no resource consent has yet been applied for, and such generation is relatively unproven.

Embedded generation produced a total of 10.5GWh in the 2009/2010 year and to the end of February has produced a total of 12.1GWh in the 2010/2011 year.

Figure 10 - Lulworth Wind Generation

3.10 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. However, hardwood poles, including larch, are starting to deteriorate, and 45 years seems a reasonable estimate of useful life for these poles.

Concrete poles are showing little if any signs of aging. In the last ten years, there have been less than ten concrete pole failures and/or replacement due to signs of aging out of a total population of approximately 15,000. Most of the failures have been due to adverse environment, e.g. salt spray on concrete poles or external damage.

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

Until recently, treated pine poles have shown few signs of aging. Continuous monitoring has revealed that one batch of poles (approximately100) installed in 1969 has reached the end of its life. It is considered that this is due to a failure of treatment process rather than a systemic problem.

Accordingly it is considered that a life of 55 years for treated pine poles is realistic.

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's river valleys being relatively benign.

3.11 33kV System

3.11.1 Lines

MLL takes supply at 33kV from Transpower's Blenheim substation. The Transpower substation has three 110kV/33kV transformers supplying three 33kV buses. From Transpower, the 33kV sub-transmission Network distributes supply to the 33/11kV zone substations. MLL has 15 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 embedded into the 11kV Network near the Ward zone substation and a further 1040 kW is embedded into the 11kV just north of the Waima/Ure River.

3.11.2 Substations

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 301km of 33kV line, 286km is overhead, most of which has been constructed since 1960. Lines constructed earlier than 1960 include galvanised tower lines between Waihopai Power Station and Renwick and part of the line between Riverlands and Seddon and the old hardwood to Rai Valley.

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. Below ground deterioration was detected on a proportion of the towers between Waihopai and Blenheim and these have been replaced. Further work will be required in the future.

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 (formerly the Marlborough Electric Power Board) in 1970 following commissioning of the new 110kV

tower line from Stoke to Blenheim, and as a condition for the former MEPB's agreement to proceed with the reticulation of the Marlborough Sounds.

This line was constructed on 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 hardwood poles are now at the end of their useful life and are being progressively replaced.

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 poles checked for age-related deterioration. These poles are at the end of their useful lives and are being progressively replaced.

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

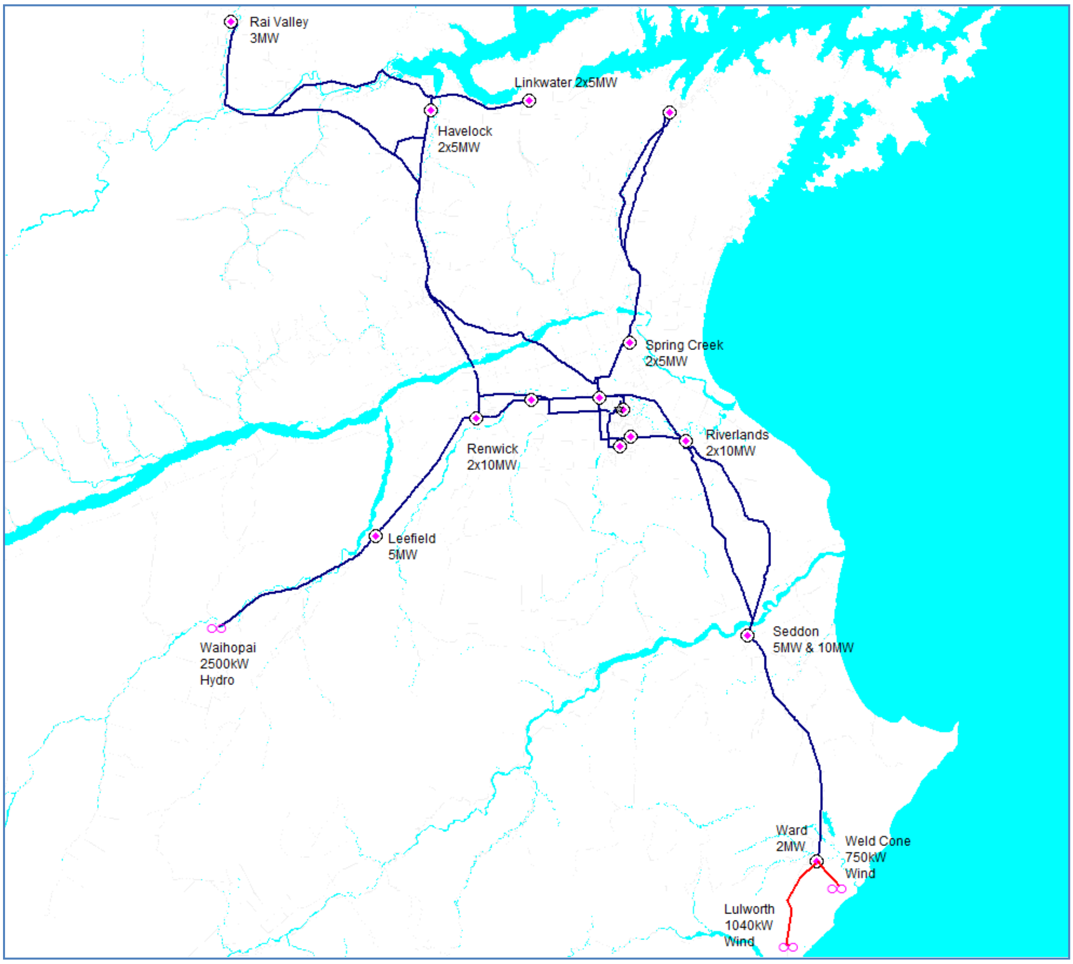


Figure 11 - 33kV Subtransmission System

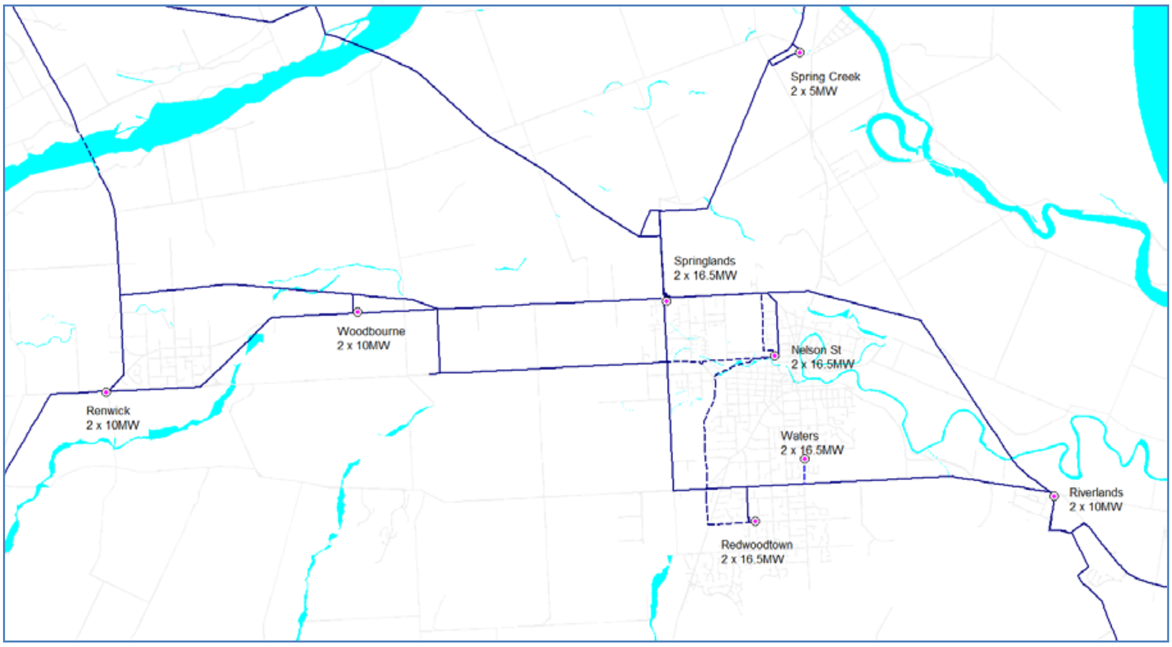


Figure 12 - Central 33kV Subtransmission

3.12 33kV Lines Overhead

There is 286 km of 33kV overhead lines, with an average age of 42 years compared with an expected average useful 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.

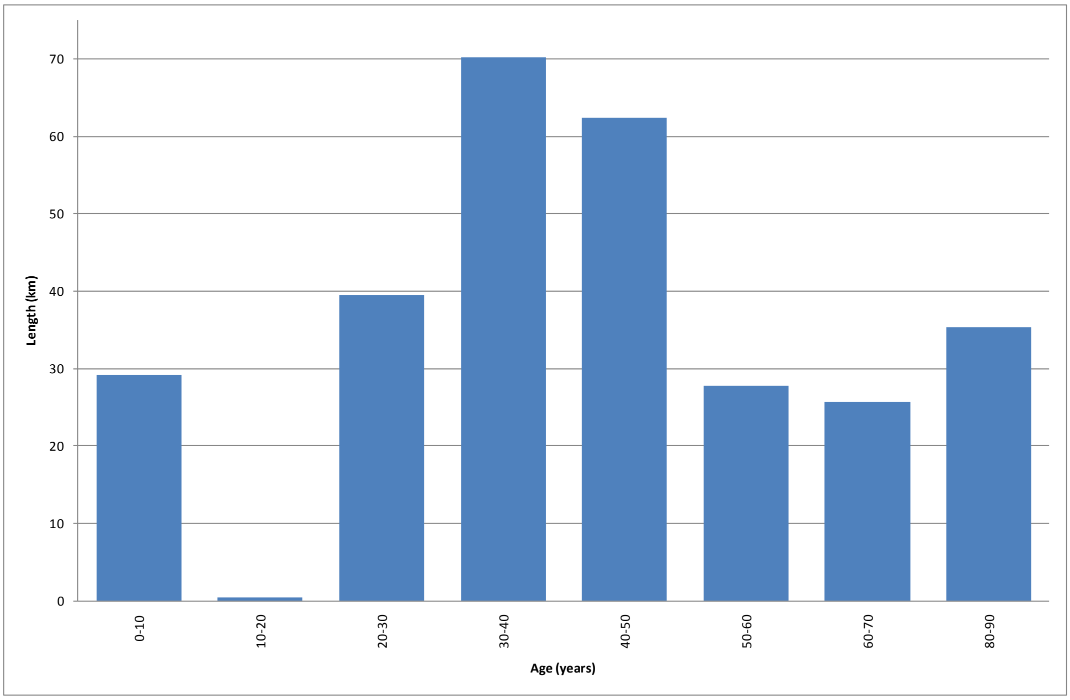


Figure 13 - 33 kV Line Age Profile

Around 20% of the existing 33kV Network is currently older than the maximum life provided in the ODV handbook. Where appropriate 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.

3.13 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 9.7 years compared with an expected life of 45 years. The replacement cost of the cable is $3.0 million.

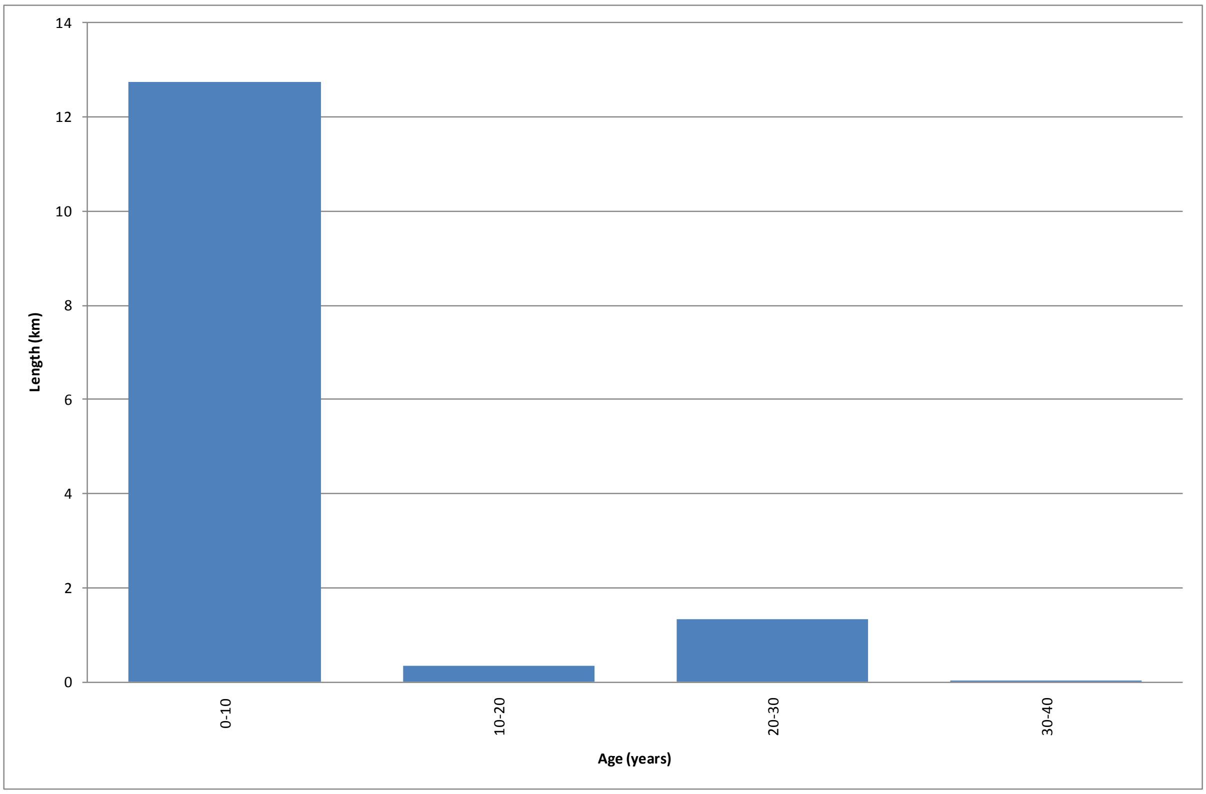


Figure 14 - 33KV Cables Age Profile

All of this cable will be less than 45 years old in 2021, and hence will not need renewal within the period of this AMP.

3.14 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 to regulate the 11kV supply and maintain constant voltage. In the last ten years, MLL has upgraded or refurbished 14 of the 15 zone substations and in the current year will upgrade the remaining one. The average age of the substations is 11 years compared with an expected life of 55 years.

The total replacement cost of the zone substations is $27.4 million. The major components of the substations are transformers and switchgear.

3.14.1 33/11kV Zone Substation Transformers

The replacement cost of the transformers is $15.7 million which is just over half of the total value of the zone substations.

The age profile of these transformers is shown below.

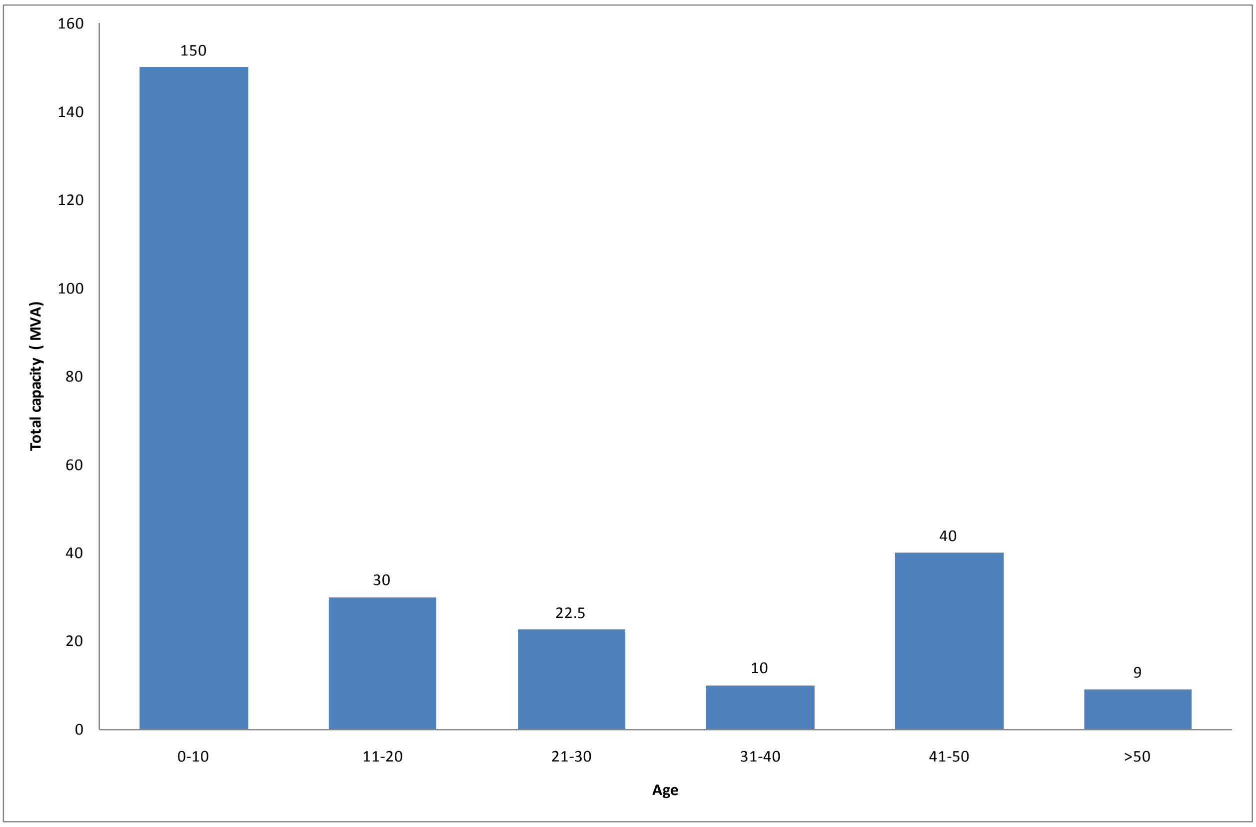


Figure 15 - Zone Substation Transformers Age Profile

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

Figure 16 - Waters Zone Substation

3.14.2 Zone Substation Loadings

Substation	T1 Capacity kVA	T2 Capacity kVA	MD 2010	Estimated MD 2015	Estimated 2015 Reserve	Estimated MD 2020	Estimated 2020 Reserve
Leefield	5,000		990	1,000	4,000	1,025	3,975
Linkwater	5,000	5,000	3,850	4,271	729	4,951	49
Havelock	5,000	5,000	2,770	2,840	2,160	2,985	2,015
Nelson St	16,500	16,500	12,170	12,477	4,023	13,113	3,387
Picton	16,500	16,500	7,220	7,550	8,950	8,336	8,164
Rai Valley	3,000		2,200	2,301	699	2,418	582
Redwoodtown	16,500	16,500	15,700	10,075	6,425	10,853	5,647
Renwick	10,000	10,000	8,920	10,287	-287	11,925	-1,925
Riverlands	10,000	10,000	11,100	11,832	-1,832	14,396	-4,396
Seddon	10,000	5,000	5,350	5,817	-817	7,078	-2,078
Spring Creek	5,000	5,000	3,780	4,234	766	4,791	209
Springlands	16,500	16,500	12,230	12,538	3,962	13,178	3,322
Ward	2,000	2,000	890	894	1,106	894	1,106
Waters	16,500	16,500	3,970	6,884	9,616	7,600	8,900
Woodbourne	10,000	10,000	7,940	8,370	1,630	9,426	574

Table 13 - Zone Substation Loadings and Growth

For planning purposes the growth figures used take into account the factors identified in section 3.7.2 and use the actual changes in installed transformer capacity and projected demand together with the type of loads and the local economy, as a basis for assessing the future load growth.

All of MLL's substations other than Leefield and Rai Valley have n-1 reliability, e.g. for a substation to have a firm n-1 16MVA rating it must have two transformers of 16MVA.

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 customer requirements and the proximity of other assets from which additional security can be obtained.

From the table above, Riverlands and Seddon substations are already loaded beyond their n-1 capacity and Renwick will be loaded beyond its n-1 level by 2015.

Increased industrial development at Riverlands, along with MDC plans to upgrade the waste water treatment at Hardings Rd, means that increased capacity in this area is required in the short to medium term and accordingly construction of Cloudy Bay substation is planned for 2012/2013.

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 2011/2012. The 5MVA unit will be installed at Rai Valley in 2012.

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.
MLL currently has land available for future construction of Zone Substations at Cloudy Bay industrial park, Hammerich's Road and Marlborough Ridge Development.
Ward substation has 1790 kVA of wind driven induction generators connected, i.e. more than the connected load and close to the n-1 capacity of the substation.

The faults levels at the Zone substations (after commissioning of third transformer at Blenheim GXP) are given in Table 14 below:

Location	33KV 3Ø Fault Level (amps)	33kV 1Ø Fault Level (amps)	11kV 3Ø Fault Level (amps)	11kV 1Ø Fault Level (amps)
Transpower	6,500	1,500	n/a	n/a
Springlands	6,400	1,500	8,709	10,237
Nelson Street	5,601	1,495	8,176	9,742
Redwoodtown	4,600	1,413	7,640	2,958
Spring Creek	4,194	1,363	4,936	2,673
Woodbourne	3,834	1,302	6,943	8,345
Riverlands	2,829	1,159	4,992	5,421
Renwick	2,690	1,077	5,030	6,337
Picton	2,051	808	5,221	2,235
Seddon	1,763	832	3,807	4,985
Leefield	1,632	1,114	2,089	2,476
Havelock	1,165	577	1,921	2,382
Ward	979	507	1,648	2,015
Linkwater	898	467	2,059	2,753
Rai Valley	748	404	1,262	1,537

Table 14 - Fault Levels

All of the existing switchgear and equipment is suitable for the fault levels.

Graphs showing the zone substation loadings for the 2010 calendar year are included in appendix B.

3.15 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 $125 million, with an average age of 35 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 have copper weld and galvanised steel conductors, typically located on short spur line sections of the Network where demand is relatively low and 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 including 33 separate areas of single wire earth return.
All of the distribution system currently operates at 11kV, with no remaining 6.6kV. All new rural construction is at 22kV and, within the period of this plan, it is expected that 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 MLL'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 charts:

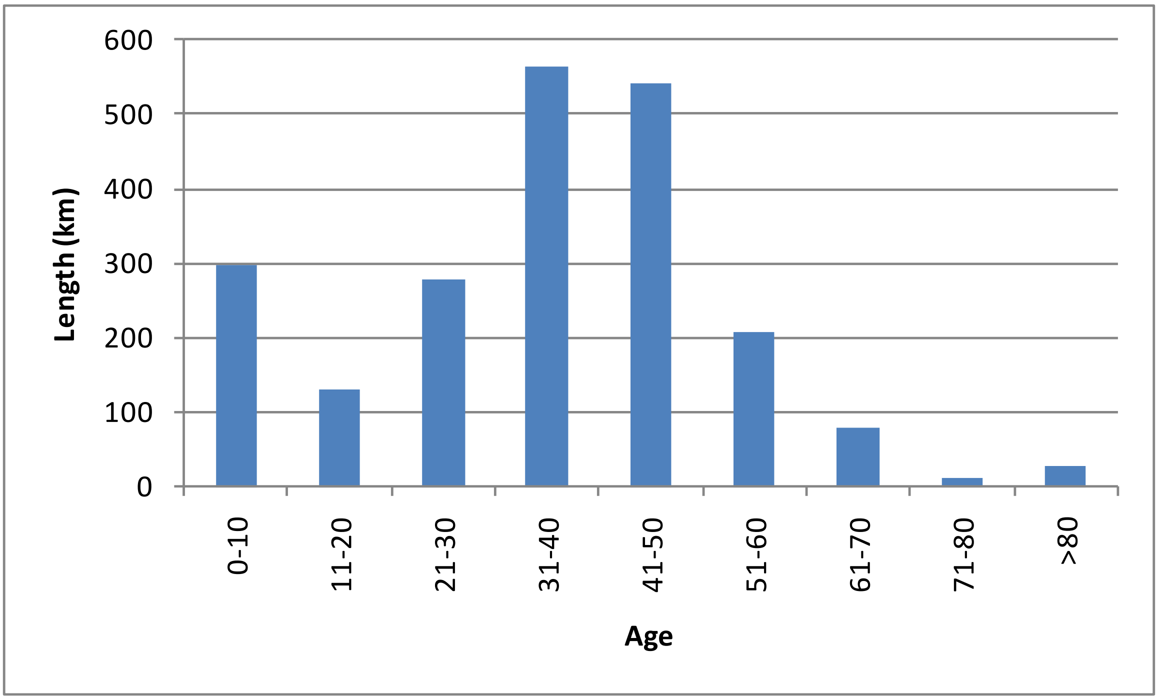


Figure 17 - 11kV Overhead Lines Age Profile

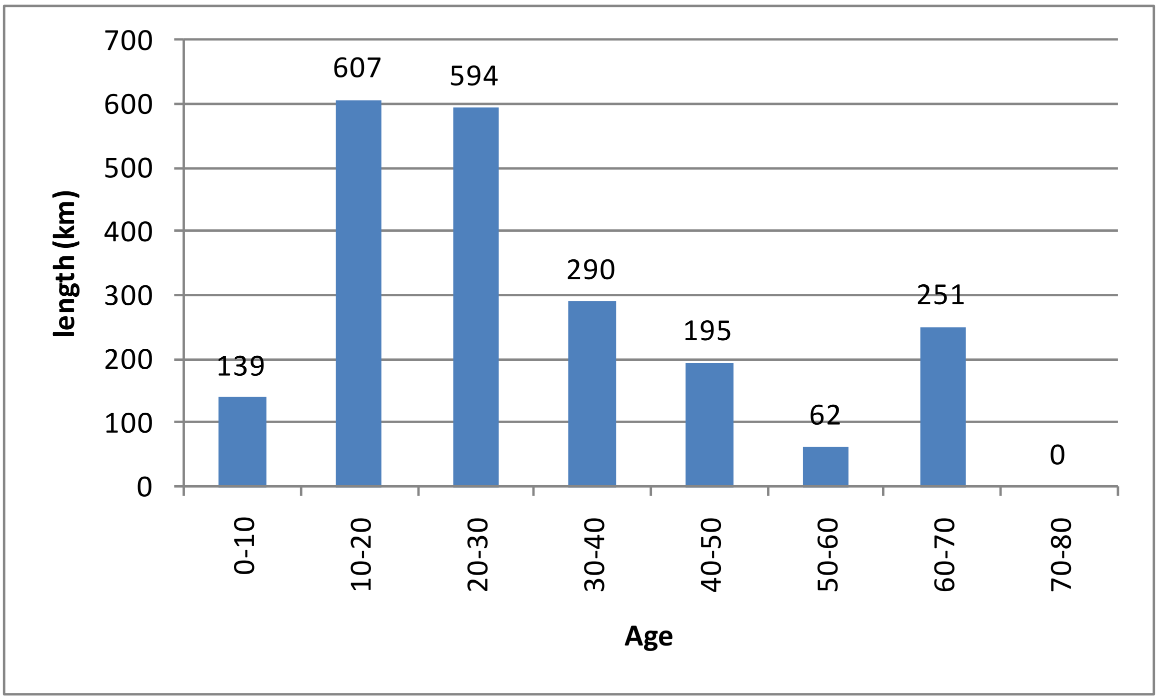


Figure 18 - Remaining Life 11kV Overhead Lines

The above figures show 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 indicates that during the next 10 years 139 km of 11kV overhead lines will reach the end of their useful lives, however in the following ten years a further 607 km will reach the end of their useful lives. MLL should be replacing 40-50km of the older lines each year to avoid lumps in expenditure and resource requirements. The targeting of the lines in poorest condition, and those requiring upgrade for capacity, will minimise expenditure while optimising the useful life of lines.

3.16 Poles

Poles are a major component of overhead lines. To a large extent, the condition of the poles 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. Where large spans of heavy conductors are required tubular steel poles are utilised. 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 on the next page 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.

Type	High Voltage		Low Voltage		Total		Notes
	Number	poor/fair condition	Number	poor/fair condition	Number	poor/fair condition	
Galv Steel Column	216	0	0	0	216	0	new
Hardwood	220	22	601	140	821	162	getting close to end of life
Iron Rail	1892	8	759	48	2651	56	EEA guide recommends no climbing
Larch	221	141	162	24	383	165	getting close to end of life
Pre-Stressed Concrete	5896	8	595	2	6491	10	newer/generally good condition
Reinforced Concrete	7694	95	2341	16	10035	111	older, some on East Coast showing reinforcing
Tanalised Pine	7769	32	3997	27	11766	59	generally 30-40 years old, low numbers of failures
Tower Galvanised Steel	200	3	0	0	200	3	very old, need replacement
Unknown	536	1	733	9	1269	10	
Subtotals	*24644*	*310*	*9188*	*266*	*33832*	*576*	

Table 15 - Poles

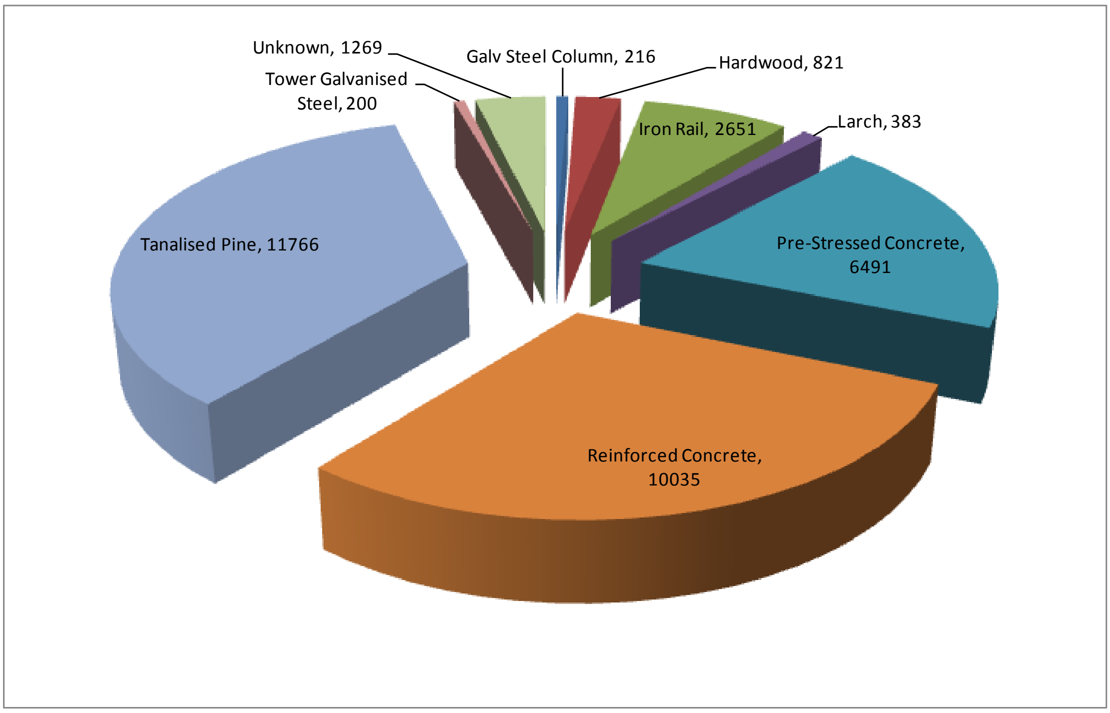


Figure 19 - Pole Numbers

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.

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

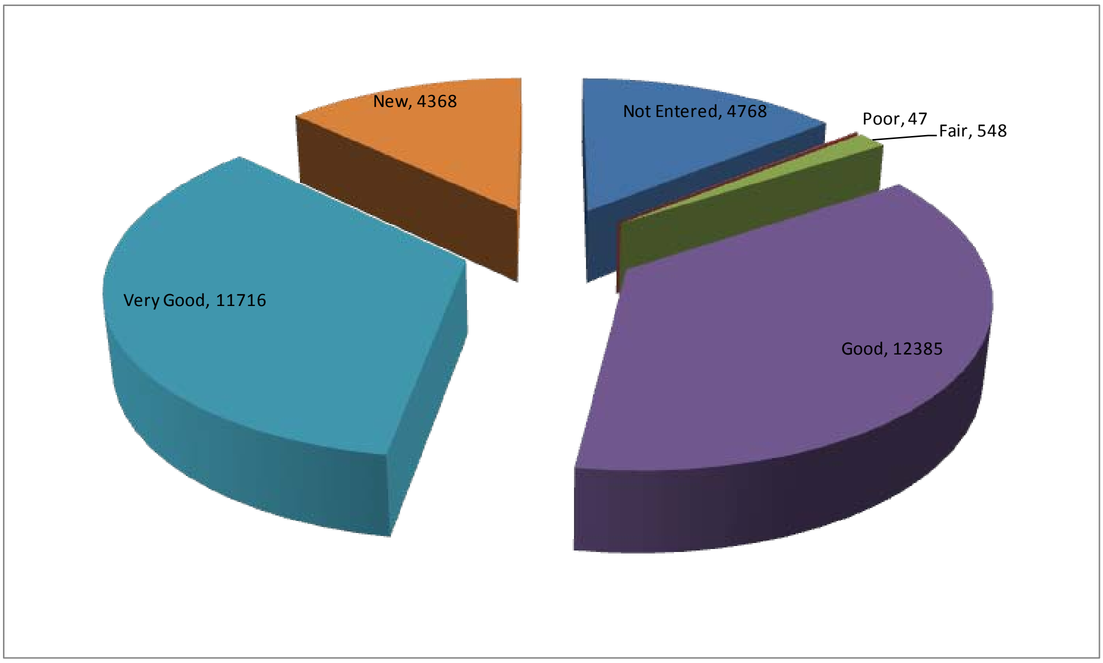


Figure 20 - Pole Condition

Poles which are of the greatest concern are wooden poles and iron rails and, in particular, those carrying 11kV or 33kV lines, as these affect the greatest number of customers. The figure below shows the number and age of these poles.

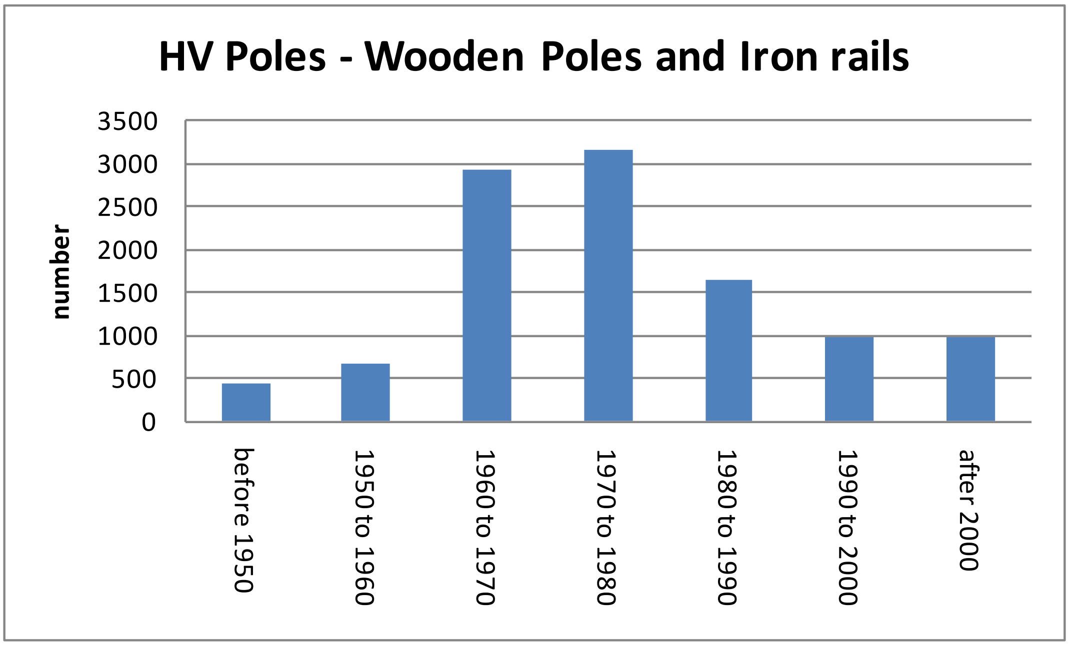


Figure 21 - Wooden Poles and Iron Rails

3.17 11kV SWER Lines

Single Wire Earth Return (SWER) lines have been used extensively throughout the more remote sections of MLL's 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 clashing. This type of construction is ideally suited to areas of low population density, such as parts of the Marlborough Sounds and the upper Awatere Valley.

The primary disadvantage of this type of construction is that it provides 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.

The EEA have prepared a guide on HV SWER earthing, however at present this is only in draft form.

3.18 11kV Underground Cable

The 11kV underground reticulation is generally much newer than the overhead with an average age of 12 years and an average expected life of 47 years.

The age profile is shown on the following chart:

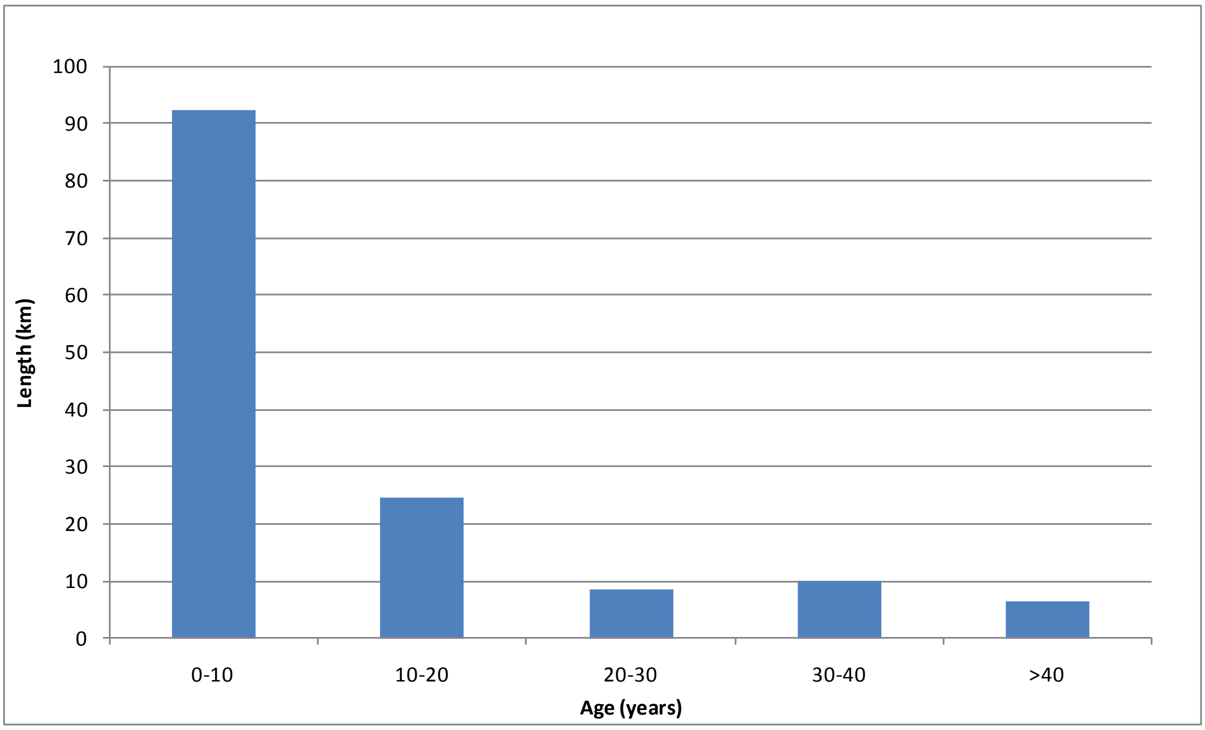


Figure 22 - 11kV Underground Cable Age Profile

The majority of these cables are XLPE, the generally accepted useful life of which is 45 years, however there are reports of XLPE cables failing at 35 years. Based on 45 years, one km of cable is at the end of its useful life with a further 10 km reaching the age of 45 years within the next ten years.

3.19 Distribution Transformers

Distribution transformers reduce the 11kV down to 415/240V. The majority of installations connected to the Network take supply at 415/240V. The distribution substations, transformers and associated equipment (e.g. fuses) have a total replacement cost of $46.2 million, with an average age of 24 years, compared to an estimated average useful life of 53 years. The age profile of MLL’s 3790 distribution transformers is shown in the figure below:

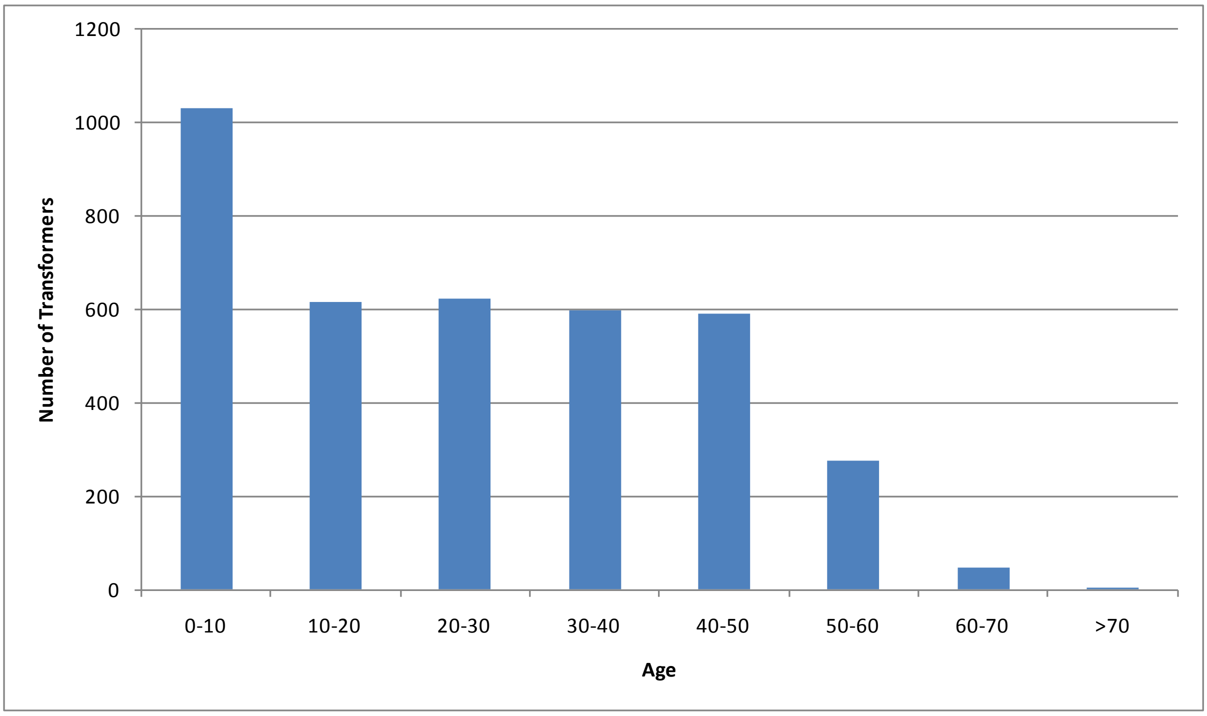


Figure 23 – Age Profile for Distribution Transformers

Based on the ODV handbook useful life of 45 years, there are currently 609 transformers due for renewal, with a further 508 due for renewal in the next ten years. Using the extended life of 55 years, there will be 609 transformers due for renewal in the next ten years.

Figure 24 - Transformers in Taylor Pass Yard

3.20 Distribution Switchgear

Distribution Switchgear covers a range of assets. The total replacement cost of these assets is $16.1 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:

Description	Number	RC	DRC
Isolators	805	4,478,187	3,050,474
Lightning Arrestors	650	1,108,669	726,592
Fuses	1027	3,186,655	2,100,706
Reclosers, Oil Switches and RMUs	551	7,005,058	4,824,406
Fault Finder	124	308,314	184,945
Subtotals	*3,157*	*16,086,883*	*10,887,124*

Table 16 - Distribution Switchgear

3.20.1 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.

3.20.2 Oil Switches, Ring main Units

MLL has eleven 11 kV/400V indoor substations. Some of these substations use Oil Circuit Breakers (OCBs) 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.

3.20.3 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 replace switches when circumstances dictate replacement.

3.20.4 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, 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.

3.21 Mobile substations/generators

MLL has a 900kVA/11kV trailer-mounted mobile generator and a 550kVA/415V skid-mounted generator, both of which are 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. MLL currently has no mobile substations.

In the last year the 900kVA generator was used for a total of 337 hours and saved 234 SAIDI minutes as well as avoiding the notification logistics associated with shorter outages.

The generator was also used to reduce load during key periods of loading on the upper South island. This helped to minimise Transpower charges. Additionally it was utilised in Kaiapoi following the 2010 Canterbury earthquake.

The company has ordered a further 550kVA mobile generator and associated transformer for delivery in the 2011 year.

The Canterbury earthquakes have reinforced the need for a network company to have some mobile generation for immediate use.

3.22 400V Network

MLL has 746 km of LV reticulation, of which, 437km is overhead and 309km is underground. The overhead has a replacement cost of $15.1 million and an average age of 45 years compared to a useful life of 67 years, while the underground is newer and has a replacement cost of $28.1 million with an average age of 14 years compared to an estimated useful life of 46 years. The age profile for the 400V Network is shown in the table below:

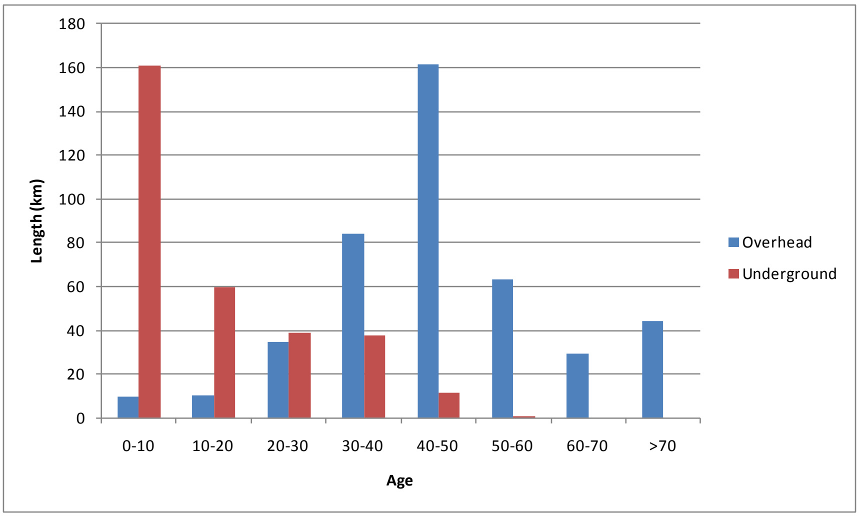


Figure 25 - LV Network Age Profile

3.23 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. With the phasing out of CDMA, a wireless radio network is being installed to ensure reliable communication is available for SCADA.

3.24 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, are 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 reliably within the short to medium term and should be phased out as soon as practical.

In the past year all of the Z22 relays were phased out. This will reduce the duty cycle/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.

3.25 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-reclosers), 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/or cell phone text message. These devices have proved to be very useful in the early detection of abnormal conditions on the Network.

3.26 Control room

MLL currently does not have control from which all aspects of its operations are manually monitored / controlled on a 24 hour basis.

Switching of the network is controlled from a central location and monitoring of the network is undertaken automatically by computerised equipment.
The manner in which switching and control of the network is undertaken is currently being reviewed together with the merits or otherwise of establishing a new control room from which all aspects of network operation will be controlled.

Figure 26 - Helicopter lifts Steel Pole into Position on Cobb Line

4. Proposed Service Levels

MLL'S assets provide connected consumers with a bundle of service levels in return for a monthly line charge (paid to MLL 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 MLL's consumers are happy with MLL and the direction MLL 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 nor the converse of better supply.

- **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 MLL 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 and 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 MLL to influence these factors. Many end-users do not understand or differentiate between their provider of Network services and their energy retailer.

To facilitate interaction between those directly connected to the network and MLL, the company has made available fridge magnets to all ICPs encouraging calls to MLL in the first instance. This approach has enabled faster restoration of supply.

The principal customer oriented measures of service monitored by the Commerce Commission are SAIDI and SAIFI. However, what is of greater concern to individual customers is the number and duration of loss of supply events which directly affect their own installation, together with the events which cause any inconvenience. It is for this reason MLL works proactively within the network and engages directly with customers to minimise any potential inconvenience incurred by irregularities of supply.

4.1 Consumer service levels

4.1.1 Network Service levels

The principal regulatory consumer oriented targets set for MLL are:

- SAIDI and SAIFI.
- 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	Restoration:	
			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 17 - Network Supply Restoration Objectives

MLL regularly undertakes surveys of consumers' views. These continue to indicate that consumers are very satisfied with MLL's performance and the direction MLL 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 18 and Table 19 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

Table 18 - Target SAIDI and SAIFI.

Measure	Target 2010/11 and beyond
Overhead 33kV	<5
Underground 33kV	0
Total 33kV	<5
Overhead 11kV	<260
Underground 11kV	0
Total 11kV	<260

Table 19 – Target Maximum number of faults

4.1.2 Non-network service levels

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

- Promptness of new connections
- Handling of complaints
- Overall consumer satisfaction

MLL surveys a sample of its ICPs at least annually to ascertain overall satisfaction levels and also provides regular newsletters to its consumers to keep them updated on topical matters, and provides the opportunity for comment.

The company provides a website as a further interface and maintains a telephone operator service rather than impersonal computerised answer systems which typically serve to infuriate rather than assist customers.

4.1.3 Financial performance levels

MLL has a range of financial performance measures. These are detailed in the Statement of Corporate Intent (see section 2.7 for more detail) and summarised below:

- For the MLL parent company to achieve an overall rate of return on equity of at least 6.92%
- For investments to provide a 10% rate of return on equity
- To provide dividend to Marlborough Electric Power Trust ($1.75m in 2010/2011 year)

4.2 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 New Zealand Transport Agency (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.

Other examples include pavement reinstatement, requirements of councils, Department of Conservation (DOC) and NZTA's tree cutting requirements.

Figure 27 - MLL staff assist with movement of oversize load along road

4.2.1 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 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 when high load days in Marlborough are not coincident with the upper South Island maximum demand. Whilst this may reduce the network load factor, the real benefit is that customer service is improved.

- **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 MLL's system. Because MLL has no control over the reliability of this data, MLL cannot offer any warranty that the calculated volume of energy lost in any year is accurate. In general terms, the losses derived for the MLL 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 fewer 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).** MLL 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. During 2006/2007 changes to MLL'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.

To a large extent load factor and capacity utilisation measures are of interest only because they are essentially beyond the control of the network operator.

MLL's targets for these measures are summarised in Table 20 below:

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

Table 20 - Summary of efficiency measures

4.2.2 Electrical codes of practice

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

- Electricity (Safety) Regulations 2010.
- Maintaining safe clearances from live conductors (NZECP34:2001).
- Power system earthing (NZECP35:1993).
- Harmonic levels (NZECP36:1993).
- SWER load limitation to 8A (NZECP41:1993).

4.2.3 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 MLL's employees and contractors.

4.2.4 Local government

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

4.2.5 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.

4.3 Justification for targets

Justifying target levels of reliability is complex, and requires several factors to be considered. The reasons MLL 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, substantial changes in expenditure would be required. Significant increases in expenditure cannot be contemplated given these lines are typically uneconomic. Irrespective MLL is constantly reviewing its practices and the advance of technology with the objective of maximising reliability of supply. Simply a long radial line for which there is no alternative supply must inherently be subject to outages. A secondary effect of this type of Network is that SAIDI figures can vary significantly year to year depending on the location of faults e.g. faults near the beginning of a radial feeder cause all connected customers to lose power.

- 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 MLL's 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 can affect the reliability, as shutdowns are sometimes required to undertake the work.

- Over the last ten years, MLL has only bettered the target of 210 minutes once. This suggests that it is too rigorous but from a management perspective there is no benefit in setting measures which are achieved regardless of extreme weather events.

Hence MLL justifies its target SAIDI on customers' 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.

In 2011/2012 it is planned to install more reclosers and expand the SCADA system to improve reliability and reduce fault restoration times.

5. Development and Lifecycle Plans

MLL 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 MLL's 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 will follow.

This plan assumes that consumers will continue to want and be willing to pay for a reliable power supply from MLL's Network.

Long-term investment in the Network is dependent on MLL being able to achieve a commercial return on investment.

5.1 Planning criteria

MLL 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. That they:

- 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 to environment, e.g. in the Sounds fit within the context of low consumer density.

The key criteria considered for the 11kV/415V 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 MLL 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. The planning criteria ("trigger points") for each asset class are described in section 5.2 below.

5.2 Trigger points for planning purposes

MLL 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 21.

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 within 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 within 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, with rapid transformer replacement, or use of mobile generator	
11kV distribution network	Current exceeds 90% of thermal rating for more than 15 hours per year	Meshed Feeder - 50% of load restored within 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 21 - Summary of planning trigger points

5.3 Development Options

A range of options are 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 MLL. 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 subset 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 MLL'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 22 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 22 - Summary of approaches to trigger points

In identifying solutions for meeting future demands for capacity, reliability and security of supply, MLL 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 MLL will generally be adopted, if it meets a consumer's reasonable expectations.

In prioritising development work, MLL takes the following approach:

- Top priority is given to addressing capacity constraints, as component over-loading can lead to over-heating, reduction in asset life, fire, explosion and cascade tripping (security of supply is implicit within this).
- Second priority is given to reliability.
- Third priority is given to voltage.
- Fourth priority is given to renewal of assets at the end of their lives.

MLL's reasoning for taking the approach above, is that over-loading can lead to prolonged outages for many customers, whilst reliability related outages can lead to short outages for a few customers, and voltage related problems don't usually result in outages ie. activities are prioritised in order of decreasing customer impact.

5.4 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 MLL recognises the following practical issues:

- The current regulatory constraints on investment, and the ability of MLL 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 may make it preferable to install additional capacity rather than have to return in the short to medium future. This is especially so when it is considered network assets typically have long lives, far in excess of the regulatory period and the ten year horizon of this Plan.

- 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.

MLL’s guiding principle is therefore to minimise the level of investment ahead of demand while minimising the costs associated with doing the work.

5.5 Configuration analysis

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

- The continuing growth of vineyards and dairying 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 two or three phase 11kV or conversion to 22kV. In some cases conversion is also driven by the requirements of ECP41.

- The need to rebuild 11kV lines at the end of life or to increase capacity requires consideration of alternative line routes.

- The existing 33kV system is adequate for the life of this plan, however continued load growth beyond this will eventually require an increase in this voltage, or construction of new lines. This is particularly true for longer 33kV lines such as to Rai Valley and Ward. Fortunately these areas are relatively lightly loaded at present. Where appropriate all future 33kV reconstruction overhead or new lines will be built to 110kV. Cabling in central areas will remain at 33kV.

- Further increases in embedded generation are likely to bring some assets to maximum loading, and may require increases in capacity or changes to system configuration.

5.6 Reliability assessments

MLL places great emphasis on reliability of supply and systematically investigates all recurring interruptions to identify the source of interruption. Currently we are experiencing a large number of long faults due to trees and in particular plantation forests. An increase in harvesting activities as forests mature has lead to loss of supply for two main reasons: trees, ropes etc contacting lines during harvesting and when trees fall over as harvest results in increased exposure to wind loadings. The latter typically can result in prolonged outages.

The current tree legislation only provides for minimal and sometimes impractical distances between lines and trees. In many situations the trees are close to and considerably higher than the lines.

MLL has filed declaratory judgment proceedings with the High Court in an endeavour to further clarify several matters pertaining to the Company's responsibilities relative to the interference of trees with lines. This case is scheduled to be heard during the year and it is anticipated the outcome will advance the Company's position relative to trees.

Table 19 in the previous section outlines MLL target number of faults for each class of line.

Figure 28 - 11kV Line through Plantation Forest

5.7 Constraints

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

- 100% 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 66% 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.

- For a zone substation, the load exceeds the n-1 capacity.

MLL considers an asset to be voltage-constrained when the delivered voltage at a consumer's 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. One issue with conductor upgrades is that it may require replacement of 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 it increases distribution line losses. In areas where further load increases can be expected, voltage boosters may only provide temporary relief.

For new load on a rural feeder, another critical issue relates to voltage flicker, which is caused when loads, in particular, 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.

MLL uses computer models of the 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. The table on the following page shows the identified constraints and possible solutions.

Location	*Type of Constraint*	*Notes*	*Solutions*
East Coast feeder	Voltage	Low load growth	Additional voltage regulators, rebuild old, small sections
Dashwood feeder	Voltage	Low load growth	Additional voltage regulators, rebuild old, small sections
Richmond-Brook feeder	Voltage	Low load growth	Additional voltage regulators, rebuild old, small sections
Waihopai Valley feeder	Voltage	Dairying and vineyard expansion	Additional voltage regulators, rebuild old, small sections
Wairau Valley feeder	Voltage	Dairying and vineyard expansion	Sections being rebuilt, additional voltage regulators have been installed.
Sounds feeder (Kenepuru)	Voltage	Holiday homes with peak loading in holiday periods	Increase voltage, additional voltage regulators, rebuild lines, install capacitors
French Pass feeder	Voltage	Holiday homes with peak loading in holiday periods	Increase voltage, additional voltage regulators, rebuild lines, install capacitors
Port Underwood west	SWER, capacity	Existing Regulations limit current to 8A, draft code alters this	Increase voltage to 22kV, increase current beyond 8A
Port Ligar	SWER, capacity	" "	" "
Waikakaho Valley	SWER, capacity	" "	" "

Table 23 - Existing Constraints

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

5.8 Options available to meet target levels

The guiding principle is "by what means will the target service levels be met at the lowest life-cycle cost". Accordingly MLL 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
- Non-network solutions

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 consistent with established company procedures. 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.

The best option is selected by considering the lowest NPV and other considerations in accordance with MLL's overall Mission and values, for example environment and acceptability of the solution to the stakeholders.

While at a policy level, distributed generation and non-network solutions may appear desirable, in practice it is difficult to use these types of technologies to replace lines and cables. For example if distributed generation is to provide capacity, then it must be as reliable as grid supply, otherwise overall reliability will decrease. Consumer surveys generally indicate that customers do not want this. To date, most distributed generation has been wind powered, meaning that it is of very variable output and has no storage or way to provide supply during calm days.

Non-network solutions such as demand-side management can be effective. However the existing vertically separated industry structure with distribution companies and retailers makes it difficult to co-ordinate and manage the implementation of this type of solution, particularly when Retailers do not reflect network cost elements in retail price schedules. With sustained growth, in some instances this type of solution can be effective at deferring capital expenditure, however it is costly to implement for small scale schemes.

6. System Development

6.1 Key assumptions

This section of the plan is based on the best information available at the time of writing and assumes:

- that consumers will continue to want and be willing to pay for a reliable power supply based on the MLL Network.
- the amount of capital expenditure is consistent with the objectives of maintaining a safe and reliable network which meets the needs of consumers and stakeholders.
- that the current regulatory framework will continue, albeit with some changes and refinements.
- that MLL will be able to earn an appropriate commercial return on all capital expended.
- that load will increase as indicated by other sections of this plan (in particular see section 5).
- that no major disasters or widespread systemic problems will occur and that load growth will be consistent with values elsewhere in this plan and spread across the region.
- that there not be widespread introduction of distributed generation
- that no major new loads or major generation will be installed during the period of this plan.
- that MDC will contribute to key overhead to underground conversion programmes

6.2 Future development

Future system development and enhancement will be dictated by a number of factors, many of which are outside MLL'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 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 and by its very nature subject to change.

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 final budget approval.

The need for further zone substation capacity is driven directly by the load. Should no further increases occur, then this expenditure will be able to be deferred. There are few easy alternatives to providing more capacity, however where practical these are taken (e.g. moving load from one substation to another, increasing cooling/capacity of existing transformers). Distributed generation is not sufficiently reliable, diverse or sufficiently cost effective to be able to substitute for zone substation transformer capacity. For example Ward substation has

more wind generation connected than load, however its maximum demand is relatively unchanged from prior to the connection of the wind generation and the further connection of wind may require increases in transformer capacity for the generation.

Most of the work detailed below is renewal of the existing 33kV lines, albeit with lines of higher capacity. In practice, there are few viable alternatives to replacing the line as the need for renewal is primarily a function of aging, rather than capacity. Consideration has been/is given to relocating the line, to deferring the cost where practical, and to changing the voltage. The further development of embedded/distributed generation, is not a viable alternative to renewing the lines as it is not sufficient diverse (i.e. mainly wind with very small percentage solar) to provide a reliable alternative to grid supply.

The predictions are based on the assumption that the regulatory regime will be such that MLL 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.

MLL expects to undertake the following developments as detailed in the following sections.

The overall budget is shown in Table 24 below.

Item	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016	2016/2017	2017/2018	2018/2019	2019/2020	2020/2021
33kV Subtransmission	6,215	3,545	3,725	3,460	4,700	5,260	5,420	4,770	2,525	3,600	3,700
11kV Overhead	2,950	3,995	3,140	5,570	5,220	5,470	4,220	3,970	4,770	4,220	4,370
11kV underground	2,830	1,755	1,055	915	640	515	565	615	715	665	715
Low Voltage	55	725	465	525	365	375	385	675	735	620	620
Zone Substation and Network Automation	1,675	2,670	4,925	1,075	625	425	425	1,925	775	425	500
Minor Plant and tools	-	150	50	50	50	50	50	50	50	50	50
Total	*13,725*	*12,840*	*13,360*	*11,595*	*11,600*	*12,095*	*11,065*	*12,005*	*9,570*	*9,580*	*9,575*
Customer Connection	277	555	288	286	283	258	278	288	288	288	288
System Growth	5,045	1,957	2,164	1,990	2,216	3,133	4,338	5,281	2,768	3,030	3,138
Renewal	4,075	4,667	3,529	5,429	4,496	4,307	3,026	2,677	3,173	3,031	3,113
Safety, Reliability, Envirnomental	4,033	5,117	2,143	3,030	3,558	3,457	3,144	3,465	3,130	2,912	3,098
Relocations	294	170	237	560	998	891	230	245	163	270	270

Table 24 - Capital Expenditure Budget – Assets

Table 24 above displays the expenditure data by category and in the format required by the Electricity Information Disclosure Requirements 2004. In practice many projects involve multiple categories such as replacing a line at the end of its life where load has elements of growth, renewal, and safety. Therefore the data is somewhat subjective.

The Network is aging and accordingly it can be seen that expenditure on renewal is essential to continue to maintain the viability of the Network. To date this work has been concentrated in areas of high customer numbers and/or where load growth has been occurring however increasingly renewal work will be required in the more remote and lower customer number areas. MLL has more than10,000 poles, which are either wooden or iron rails, and it is important to ensure that these are replaced at the end of their lives, i.e. before they cause problems with safety or reliability.

6.3 2011/2012 Year

Works planned for the current financial year include:

6.3.1 Zone Substations and Network Automation

In order to improve overall reliability, during this financial year, it is planned to install ten SCADA controlled reclosers, and increase Network automation. This should result in substantial improvement in Network performance and in reductions in SAIDI.

Key switching structures will also be upgraded to improve Network performance.

The existing outdoor switchgear at Rai Valley substation will be upgraded to second-hand indoor switchgear. This will allow SCADA operation of the switchgear and will reduce outage periods.

6.3.1.1Seddon

To provide for increased loading at Seddon, it is proposed to replace the existing 5MVA transformer with a new 10MVA transformer so that the substation has two 10MVA transformers. Procurement will occur in 2011/2012 with installation and commissioning as soon as practical, i.e. either 2011/12 or early in 2012/2103. This substation is too remote from other substations for any load transfer and hence the only real option to provide additional capacity and increase reliability is to install additional transformer capacity. It is noted that the East Coast region has seen development of wind powered distributed generation, however this is not sufficiently diverse/reliable to substitute for additional capacity at the substation.

A “do nothing” option of not increasing the capacity of this substation would compromise the integrity of supply to the town of Seddon, which has significant wineries and irrigation requirements.

6.3.2 33kV Transmission

The existing 33kV subtransmission system was largely designed and built more than 40 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. Sections of the 33kV supply to Havelock and 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 lives.

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.

6.3.2.1 Specific Projects

The Lansdowne to Riverlands line will be upgraded and rebuilt. This is necessary to provide additional capacity to Riverlands and the East Coast and to prevent the 33kV conductor sagging into the 11kV conductor.

The rebuilt section of the Cobb line will have its original 1944 copper conductor replaced with new iodine AAAC conductor in order to increase its capacity and to provide better voltage at Rai Valley. Further old hardwood poles will be replaced.

A section of 33kV line in Dashwood Pass will be relocated and rebuilt for NZTA.

33kV and 11kV lines will be rebuilt in Thomson Ford Road. This section of overhead was built in 1968 and has four 33kV circuits and one 11kV circuit plus some 400V on double pole structures. Replacement of this section of line would improve security of supply to Picton, Havelock, Rai Valley and Linkwater zone substations.

6.3.3 11kV Overhead and Underground

Key projects planned for this financial year include:

Havelock to Double Crossing 11kV upgrade: This section of line is a tie between Havelock Zone substation and Rai Valley substation. It is constructed on iron rails with small conductor. It is intended to upgrade this to modern construction with iodine AAAC conductor. This section of line is important in supplying connected customers and providing an inter-tie between zone substations.

Pelorus to Rai Valley: Similar to the Havelock to Double Crossing project above, This section of line is a tie between Havelock Zone substation and Rai Valley substation. It is constructed on iron rails with small conductor. It is intended to upgrade this to modern construction with iodine AAAC conductor.

Marchburn to Wairau Valley Township: This section of line is 1960 whiting. Wairau Valley is voltage constrained and currently has four sets of voltage boosters installed. It is intended to relocate the line and rebuild it with iodine AAAC conductor. This will assist with removing voltage constraints and provide capacity for further dairying/vineyard development.

Tirohanga to Kekerengu: This section of line is at the end of its useful life and currently has over 100 maintenance tasks listed against it. Rather than a piecemeal approach to the various problems, it has been decided to rebuild the entire section of line. This work is essential in maintaining a reliable supply to the East Coast region.

Waihopai River Crossing: To extend the 33kV further up the valley and alleviate voltage problems, it is planned to install a 22kV cable across the road bridge and to rebuild the existing river crossing using steel tubes and heavier conductor.

Murphys Road to Outer limits Development: In conjunction with MDC, it is proposed to underground the section of Middle Renwick Rd from Murphy's Road to the new Outer Limits development. In addition, as part of the development, the lines immediately in front of the development will be undergrounded.

6.4 2012 to 2016

6.4.1 Zone Substations

As identified in section 3.14.2, in the absence of further investment, three zone substations are either currently or will be operating beyond their n-1 capacity within the next ten years. These are Riverlands, Seddon, and Renwick. Seddon will have a new 10MVA transformer installed in 2012.

6.4.1.1Riverlands

To alleviate loading at Riverlands, a new zone substation is planned for the Cloudy Bay Industrial Estate in 2012/2013. This will improve the security of supply to major industrial areas, i.e. Riverlands and Cloudy Bay and restore (n-1) security to existing Riverlands load. Other options considered, include increasing capacity at the Riverlands substation, however this is difficult and more costly to do on the existing site while maintaining a reliable supply to the area. In addition, construction of a new substation would allow the Riverlands site to be developed later on. One further option is to "do nothing" and leave n level security at the substation. However it needs to be recognised the substation supplies a significant proportion of MLL's industrial load and prudence dictates that regardless of further load growth the new Cloudy Bay substation should proceed.

Such an approach is consistent with industry best practice and meets the expectations of customers who are dependent upon a reliable supply for a range of continuous processing applications.

To provide for increased loading at Seddon, it is proposed to replace the existing 5MVA transformer with a new 10MVA transformer in 2011/12. This substation is too remote from other substations for any load transfer and hence the only real option for additional capacity is to install additional transformer capacity. In addition to residential and farming customers, this substation also supplies significant wineries. It is noted that the east region has seen development of wind powered distributed generation, however this is not sufficiently diverse / reliable to substitute for additional capacity at the substation.

6.4.1.2Rai Valley

Installation of a 10MVA transformer at Seddon would allow the 5MVA unit to be relocated to Rai Valley. This would increase security of supply to n-1 for this substation. Rai Valley is remote from Blenheim and increasing the overall security and reliability of supply at this substation is important in improving the overall Network reliability. With a second transformer it is possible to undertake maintenance without having to shut down the entire substation.

6.4.2 Subtransmission 33kV

6.4.2.1 Cobb Line

From 2012 to 2014, sections of this line, i.e. Kaituna Valley to Hughes Creek will be renewed. This will complete replacement of hardwood poles in the 33kV Network. This work is important as a number of the hardwood poles are in very poor condition, and some have failed during moderate weather conditions. The conductor will also be upgraded to help reduce load constraints. This will improve reliability of supply to Rai Valley, Havelock and Linkwater.

If this work is not undertaken, then the section of line will ultimately need disconnection and the reliability of supply at Rai Valley, Havelock and Linkwater would reduce substantially.

6.4.2.2 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 number of poles alongside the road and would complete the reconstruction of 33kV line from Blenheim GXP to Riverlands.

This work is scheduled to be undertaken in 2013/2014.

6.4.2.3 Alabama Road

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

This is scheduled to be undertaken in 2013/2014.

6.4.2.4 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 armour 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 lives. As a consequence, the section of line from Blenheim GXP to Renwick was renewed.

In total, 27 km of line 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 2012 to 2018. The section of line beyond Leefield will be subject to agreement with Trustpower, the owners of the Waihopai Generation.

6.4.2.5Thomson Fords to Hammerichs

The section of line uses 1944 conductor (7/0.1093 copper) on 1960's concrete poles. This is scheduled for 2013/2014. It will improve voltage and capacity for Rai Valley, Linkwater and Havelock as well as renewing an existing asset.

6.4.2.6 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 precise timing and scope may vary depending on large scale wind farm development on the East Coast.

6.4.3 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. In contrast, work on the 11kV Reticulation 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 requirements.

Specific 11kV projects planned for the period 2012 to 2016 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. Changing the voltage is the most effective way of increasing capacity in this area. The construction of new lines on alternative routes is a theoretical alternative but it is more costly and much more difficult to implement.

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. This is planned for 2012/2013.

Sounds Feeder from Linkwater – Conversion to 22kV: This feeder is constrained for new loads and it is proposed to upgrade it to 22kV. This is planned for 2015 to 2018. Maximum demand tends to occur at holiday periods and further study will be undertaken to ascertain whether it would be more economic to install generators to provide supply or convert to 22kV.

Additional mobile generators: The 900kVA and 550kVA units MLL currently owns have been very successful in reducing planned outages and maintaining supply. A further 550kVA unit will be purchased in 2011 and further mobile generation will be purchased as appropriate.

Figure 29 - 900kVA Generator in Kaiapoi (Sept 2010)

6.5 2016 to 2021

The projects below are those currently being reviewed and considered for 2016 to 2021. It is likely that this list will be altered as further work is done in developing these projects and depending on customer requirements, actual aging, load growth and changes in land use. These projects are all at pre-design stage and further development of alternatives/options is required.

6.5.1 Zone Substations

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.

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 may not be necessary within the next ten years, however the land was purchased when the opportunity arose based on anticipated customer requirements at that time, and the substations can be developed quickly if required.

6.5.2 33kV Subtransmission

A number of the 33kV renewal projects will carry onto the 2016-2021 period, specifically Redwood Pass Line and the Waihopai line.

6.5.2.1 Taylor Pass 33kV

This project involves building a new 33kV line to Seddon, thereby freeing up one of the existing lines for upgrading to 110kV and use with large or medium scale wind generation. This is planned for 2015 to 2020. This work is contingent on the further development of wind generation on the East Coast.

6.5.2.2Murphys Road

This section of line, built on 1967 concrete poles, carries two 33kV circuits, an 11kV circuit and a 400V circuit down Murphys Road. It is a key section of line, close to the GXP which is difficult to maintain and impacts greatly on the security of supply for a large number of customers. It also runs past Springlands School and Kindergarten and is built on concrete poles. The road carries high traffic volumes.

It is proposed to reconstruct this and install most of the circuits underground. This is planned for 2015/2016.

6.5.2.3 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. This is scheduled for 2016 to 2017.

6.5.2.4 Jacksons Road to Renwick

If required for the Wairau River Hydro scheme, this section of line can be upgraded to 66kV or 110kV. This is scheduled for 2017 to 2018.

6.5.2.5 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.

Figure 30 - Live Line work assist in reducing outages

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 (e.g. transformers)
- Environment (such as salt laden air)
- Age (typically embodying number of operations, exposure to environment and weathering)
- Lack of prudent maintenance

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 Key assumptions

This plan assumes:

- that consumers will continue to want and be willing to pay for a reliable power supply based on the MLL Network. The amount of maintenance is consistent with the objectives of maintaining a safe and reliable network which meets the needs of consumers and stakeholders.
- that the current regulatory framework will continue, albeit with some changes and refinements.
- that no major disasters or widespread systemic problems will occur and that load growth will be consistent with values elsewhere in this plan and spread across the region.
- that there will not be widespread introduction of distributed generation
- that no major new loads or major generation will be installed.

7.2 Maintenance Strategy

MLL 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

MLL endeavours to achieve these aims, while 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.

MLL also endeavours to buy quality new equipment with minimal maintenance requirements to assist with future reliability.

Typical maintenance tasks include the following classes of activities:

- Checking and replenishment of consumables such as oil, SF6, vacuum and grease.
- Checking, minor repairs or replacement of semi-consumable components eg. brushes, contacts, gaskets, seals etc.
- Checking and minor repairs to breakable components eg. sight glasses.
- Calibration of components such as thermo-couples, relays etc.

The key criteria for these tasks is that they restore the original service capacity, they do not increase that capacity.

7.3 Maintenance Planning

Preventative 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.

Regime	Frequency
Zone Substation and Booster Site Inspections	Monthly
33kV Lines	Annually
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 25 - Key Preventative Maintenance Regimes

Most of the preventative 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. 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 asset criticality (ACR) and task criticality (TCR).

The ACR for a particular asset encompasses the weighted average of five factors: number 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.

MLL has 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.

7.4 Systemic failure identification

MLL records component failures and investigates possible systemic or type faults if recurring patterns are identified. To assist in this, regular meetings are held to review and debrief faults and equipment failures.

7.5 Testing and Inspection Regimes

7.5.1 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 report 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 contractors to investigate and repair.

7.5.2 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 oil leaks which ultimately if left could have had significant consequences. 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.

7.5.3 Oil Switch Inspections

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

7.5.4 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. MLL 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.

MLL 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 lives, and, in some instances, are becoming quite unreliable. They are being replaced with newer model circuit breakers with remote operation and monitoring.

7.5.5 Earth Testing

In general earth testing is performed on a six yearly basis. Zone substations, and assets in/near public areas such as shopping centres and schools are tested every year. SWER substations will be tested every three years. 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 and changes in regulations. This work will result in a new MLL Network Standard for earthing, as well as determining the corrective action required on earths 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, which do not meet the new requirements.

7.5.6 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 be built 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.

Field trials have determined the success and cost effectiveness of helicopter video assessment. As part of this process the video is linked to GPS data so that any remedial work can be readily effected.

MLL has purchased GPS equipment which enables data capture and in-field photo attachment. This equipment has also eliminated the need for paper inspection forms in the field and will eliminate the data entry that has previously been required.

7.5.7 MDI Readings

Maximum Demand Indicator (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 MLL 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.

7.5.8 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 carried out annually prior to the summer boating season.

Similarly inspections of lines and network equipment near schools are undertaken at least annually.

7.5.9 Public Places inspections

Recently MLL has 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 the public are eliminated or mitigated.

7.5.10 Road and Rail Crossings

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

7.5.11 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.

7.5.12 DGA Testing

Dissolved Gas Analysis (DGA) testing is used to monitor condition of Zone Substation Transformers and Tap changers. It is one of the tools 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. However, recent DGA testing picked up three transformers which 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.

7.5.13 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, liaison and advertising.

In practice, this legislation is not leading to good outcomes. The growth limit zones are barely adequate for ensuring safety of the public in relation to trees, however in many cases they do not protect the lines from trees and or inhibit the risk of fire. In addition the complex formulas require detailed and costly survey work to be undertaken if landowners require strict adherence to the legislation.

The inadequacy of the Tree Regulations in rural and forestry areas is of real concern to MLL to the extent that MLL has filed proceedings seeking a Declaratory Judgment in relation to various aspects of the Regulations and protecting the network from interference from trees to maximise reliability and prevent fires.
From 2011 MLL will inspect all lines annually for tree interference, typically utilising a video / GPS system within a helicopter but together with ground inspections.

7.6 Feedback of Results

All inspections involve the completion of an inspection form. The data is entered into WASP. 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 to users via either the WASP interface or reporting services reports. Some of the reports are automatically emailed to asset management staff showing the latest inspection results. Asset Managers are able to look through these results and add any corrective maintenance required to the task pool.

7.7 Renewal and Refurbishment

While renewal and refurbishment can be treated as an operational/maintenance activity under the Electricity Distribution (Information Disclosure) Requirements 2008, in practice most of this activity is handled as capital works/development by MLL.

The policies for this are covered elsewhere in this plan.

7.8 Maintenance Expenditure

Maintenance expenditure is planned consistent with prudent and timely maintenance of all elements of the network. It is MLL's firm view that deferral of prudent maintenance will ultimately incur much greater costs.

-Our maintenance programme is determined in conjunction with best industry practice, regulatory requirements, manufacturer's recommendations, and continuous surveillance of the network. Overall we anticipate to incur similar maintenance levels each year but because the magnitude and frequency of unforeseen events cannot be predicted, estimation of such expenditure is determined relative to previous history and can be subject to significant variation from one year to the next.

The estimated maintenance expenditure for the next ten years is shown in the table on the following page, and is based on current estimates. These estimates factor in previous history, growth expectations and known condition of assets.

The values given in Table 26 are in today's NZ 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.

Item	2010/2011 ($000)	2011/2012 ($000)	2012/2013 ($000)	2013/2014 ($000)	2014/2015 ($000)	2015/2016 ($000)	2016/2017 ($000)	2017/2018 ($000)	2018/2019 ($000)	2019/2020 ($000)	2020/2021 ($000)
load control operation	40	35	35	35	35	35	35	35	35	35	35
Design System Expansion	250	250	250	250	250	250	250	250	250	250	250
Engineering Salaries	850	850	850	850	850	850	850	850	850	850	850
Truck & Depot Stock	25	25	25	25	25	25	25	25	25	25	25
Safety inspections & Disconnections	8	8	8	8	8	8	8	8	8	8	8
Operation	*1,173*	*1,168*	*1,168*	*1,168*	*1,168*	*1,168*	*1,168*	*1,168*	*1,168*	*1,168*	*1,168*
Asset Condition Assessment	140	180	180	180	180	180	180	180	180	180	180
earth testing	60	95	95	95	95	95	95	95	95	95	95
Monitoring & Inspections	135	150	150	150	150	150	150	150	150	150	150
33 kv System - preventative maintenance	150	150	151	152	153	154	155	156	157	158	159
scada preventative maintenance	105	105	106	107	108	109	110	111	112	113	114
zone substation preventative maintenance	210	200	202	204	206	208	210	212	214	216	218
11 kv System - Preventative Maintenance	700	850	858	866	874	882	890	898	906	915	924
distribution transformer in depot maintenance	110	110	111	112	113	114	115	116	117	118	119
distribution sub station preventive maintenance	160	200	202	204	206	208	210	212	214	216	218
possum guards	100	100	100	100	100	100	100	100	100	100	100
LV System - preventative maintenance	300	300	300	300	300	300	300	300	300	300	300
Tree cutting and vegetation control	1,700	1,100	1,155	1,328	1,527	1,603	1,603	1,603	1,603	1,603	1,603
Routine and Preventative maintenance subtotal	*3,870*	*3,540*	*3,610*	*3,798*	*4,012*	*4,103*	*4,118*	*4,133*	*4,148*	*4,164*	*4,180*
Communications Equipmernt Maintenance	60	50	50	50	50	50	50	50	50	50	50
33 kv System - Renewals	50	40	40	40	40	40	40	40	40	40	40
scada Renewals	5	5	5	5	5	5	5	5	5	5	5
11 kv System - Renewals	500	500	505	510	515	520	525	530	535	540	545
distribution sub station renewals	250	120	121	122	123	124	125	126	127	128	129
LV System - Renewals	325	300	303	306	309	312	315	318	321	324	327
Refurbishment and Renewal maintenance subtotal	*1,190*	*1,015*	*1,024*	*1,033*	*1,042*	*1,051*	*1,060*	*1,069*	*1,078*	*1,087*	*1,096*
11 kv System - Corrective Maintenance	889	1,100	1,111	1,122	1,133	1,144	1,155	1,166	1,177	1,188	1,199
LV System - corrective maintenance	1	1	1	1	1	1	1	1	1	1	1
fault and Emergency Maintenance subtotal	*890*	*1,101*	*1,112*	*1,123*	*1,134*	*1,145*	*1,156*	*1,167*	*1,178*	*1,189*	*1,200*
Total	7,123	6,824	6,914	7,122	7,356	7,467	7,502	7,537	7,572	7,608	7,644

Table 26 - Operational Expenditure 2010 to 2020

8. Risk Management

MLL's 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, MLL has adopted the systemic approach to risk identification and control outlined in the Australia/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*, MLL will review the work undertaken and will adopt an integrated approach to Risk Management.

Figure 32 below shows the risk management process suggested by this standard:

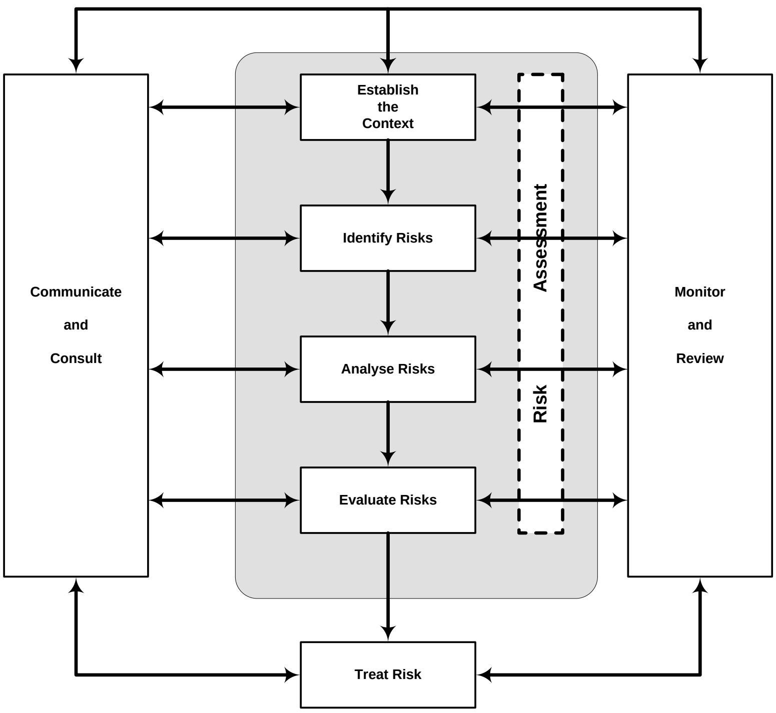


Figure 32 – Risk Management Process Overview

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.

8.1 Risk context

Management of network-related risks is ultimately the responsibility of the Directorate who ensure that the necessary policies are in place to ensure that these risks are properly addressed. It is then MLL's Managing Director who ensures that the necessary policies and appropriate procedures are implemented through the assistance of designated staff including the Engineering Manager and Network Operations Manager.

This process considers all credible electricity conveyance risks associated with the MLL 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 27 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 MLL's distribution Network and its impact on the environment.
Electricity business risks	Network-related risks, including financial, that impact on MLL 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 27 – Risk Category Types

The range of credible risks that place the MLL electricity network at risk is very broad: including vermin damage, minor vandalism, vehicle accidents, major natural disasters (such as severe storm events, earthquake or flood). Similarly the impact of these possible events can vary significantly . 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 MLL's asset base means that individual assets can be less susceptible to any one event - unless that event is region wide. However, as the assets are dispersed over a greater number of sites, under extreme events the risks can be widespread.

MLL has carefully evaluated the impact of various categories of risk and is confident that other than extreme events such as a widespread severe earthquake it has the capacity to deal with the impacts of such risks from engineering, operational, financial and environmental perspectives. The company has developed an Emergency Preparedness Plan and this is

regarded as a dynamic document which is reviewed by senior staff at least annually. Of course the key factor is dealing with any risk is to seek avoidance of the potential risk through proper identification and mitigation procedures. It is also necessary to undertake at least an annual review and following such major events as the Christchurch earthquake to ensure that any appropriate modifications are addressed.

8.2 Risk management tools

During the 2010/2011 planning year a major revision of the MLL risks was completed. This involved key staff at MLL discussing the 06/07 risk register to determine any modifications required. Although few risk additions or deletions were made, many risk ratings increased or decreased as a result of thorough discussions during the exercise. A number of clarifications to risk descriptions were also made. It is now intended that this risk register be reviewed annually and after any major relevant events.

8.2.1 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 has meant that MLL's multiple risk memos and hazard registers have been superseded.

ASNZS 4360 suggests five levels of likelihood and consequence for risk analysis, however MLL 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.

8.2.2 Risk categories

The risk categories from the 06-07 planning year were retained in the new risk register. They are presented in Table 28 below.

Risk Category	Risk Category Type	Description
Threshold-breach	Business	A Commerce Commission threshold regime breach, leading to investigation and possible targeted control of ML (price setting)
Data-mgmt	Business	Issues relating to the availability and accuracy of ML network data (assets and asset performance / condition).
Disruptive -tech	Business	The impact disruptive technologies on the ML asset base and business value (i.e. technical obsolescence and network bypass).
Fire-damage	Business	Damage to ML buildings and equipment caused by fire (network and support infrastructure).
Knowledge-mgmt	Business	Knowledge management issues (e.g. skill gaps) relating to the ML asset base.
Vandalism	Business	Disruption to the operation of ML electricity distribution network through acts of vandalism and public nuisance.
Access & Control	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
Dist-fail	Electricity	The inability of the ML distribution network assets to safely convey electricity within the supply regulations.

Risk Category	Risk Category Type	Description
Generation-fail	Electricity	Major generation failure causing the unavailability of electricity within the supply regulations to the Marlborough region.
Transpower-fail	Electricity	The inability of the Transpower transmission network assets to safely convey electricity within the supply regulations.
Vegetation-cont	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 Marlborough Sounds.
ML-impact-Environ	Environment	Major natural environment impact caused by ML distribution assets i.e. fallen lines cause a fire, or an oil spill pollutes a waterway.
Environ-impact-ML	Environment	Major natural environment impact on ML distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.
Complaints	Regulatory	Complaints resulting in reputational damage to ML
H&S-issue	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	Regulatory	ML is unable to access land to site its equipment or get access across to service / upgrade existing assets
RMA-issues	Regulatory	ML is unable to progress network expansion / maintenance or upgrade project due to RMA issues.

Table 28 - Risk Categories

8.2.3 Risk register

At the date of this report a total of 86 network-related risks are documented in the MLL 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 86 risks across the four risk category types is presented in Table 29 below. Predictably, the majority of the identified risks relate to the distribution of electricity across the MLL Network.

Risk Category Type	Number of Risks
Electricity network risks	57
Environmental risks	8
Electricity business risks	15
Regulatory compliance risks	6

Table 29 - Risk Division Across Types

A list showing the risk register is included in section 8.4.

8.2.4 Risk treatments

The approach taken to risk treatments in the 2011 review was to assume all of the previous treatments were currently in effect and determine areas of improvement for new treatments for all of the critical to moderate risks. These treatments are in a variety of stages ranging from investigating to implemented. Table 30 on the next page shows the new 2011 risk treatments.

Control Name	Description
Vehicle Training	Vehicle training for staff in four-wheel-drive terrain
Pole Ground Line	Marking the appropriate ground line on new poles that are to be installed in the Network
MLL Auditing	Random audit visits at Marlborough Lines construction sites to investigate site safety and the level of workmanship
Contractor Auditing	Random audit visits at external contractor construction sites to investigate site safety and the level of workmanship
Electrical Contractor Courses	Courses for external contractors working on electrical assets to help them understand the hazards involved and the MLL priorities regarding site safety and work practices
Other Contractor Courses	Courses for external contractors working around electrical assets (civil works etc.) to help them understand the hazards involved and the MLL priorities regarding site safety and work practices
Re-design Network	Investigate the current network in high risk areas to determine if re-design is possible to reduce the risk to public safety
Underground Conversion	Convert overhead construction to underground in high-risk areas, where practicable, to reduce the risk to public safety
Surveillance	Increase surveillance at key locations
Maintenance	Increase the level of maintenance regime in critical areas
Forestry Industry Communication	Develop a pro-active system to communicate with the forestry industry where new trees are being planted around power lines
Increased Easement Size	Obtain wider easements where new forestry is being planted
Access Track Easements	Obtain more easements for access tracks to MLL assets
Faultman Training	Additional training for faultmen with regard to identifying material defects
Fault Reporting	Improve fault reporting system to describe material defects
Pro-active Maintenance	Develop an improved pro-active maintenance system
Maintenance Standards	Create maintenance standards that detail specific maintenance procedures and routines with applicable time frames
Indoor/Underground conversion	Convert overhead buswork to indoor switchgear and underground cables to reduce the risk of vandalism at the Transpower GXP
New Transpower Transformer	New transformer at the Transpower GXP which increases the security of supply
New Transpower Bus	New switchgear bus at the Transpower GXP which increases the security of supply
Marlborough Roads Communication	Improve communication channels with Marlborough Roads for road closures
Road Access Database	Create a database for contact numbers to investigate if roads are closed
Worksmanship Faults Responsibility	Clearer definition of responsibilities regarding quality
Critical equipment inspections	Inspections of critical switches during planned shutdowns for other work
Maintenance Standards	Create maintenance standards that detail specific maintenance procedures and routines with applicable time frames
Move high-risk equipment	Identify and move equipment where necessary/possible
High Risk Area Database	Create a database for assets in high risk areas
Armco Barriers	Install armco barriers around assets high risk areas
Twin 33kV emergency spare pole	Design an emergency spare pole that can support two 33kV circuits
Feeder Separation	Move feeders to separate structures for critical lines
Fuse Replacement	Identify old fuses and replace during planned shutdowns
Maintenance Standards	Create maintenance standards that detail specific maintenance procedures and routines with applicable time frames

Table 30 - Risk Treatments

8.2.5 Treated risk matrix

Once the identified risks were entered into the register they were grouped into a risk matrix to allow an overall assessment of MLL's risk exposure.

From this analysis, one risk was identified as critical and one was identified as very high. These risks were "MLL staff injury / incident" and "Contractor injury / incident" respectively. The risk of "Public Injury/Property Damage" and "Network Asset Site Security" were rated as high.

These risks rate highly, as MLL treats the consequences seriously. There are a number of treatments in place to reduce these risks and new treatments are being investigated and developed to reduce these risks further.

Where possible, it is attempted to design identified network risks out of the system, 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), MLL 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 MLL's operations but is a risk beyond its direct control.

8.2.6 Highest rated risks

The ten highest risks are presented in Table 31 below.

Risk Name	Description	Rank	Rating	Pre-treatment Rating
MLL Staff Injury / Incident	A network incident or personnel injury, due to the breakdown of the MLL network access and control systems.	1	Critical	MLL Staff Injury / Incident
Contractor Injury / Incident	A contractor incident or personnel injury, due to the breakdown of the MLL network access and control systems.	2	Very High	Contractor Injury / Incident
Public Injury/Property Damage / Incident	A member of the public has an incident, personnel injury or property damage, due to the breakdown of the MLL network access and control systems.	3	High	Public Injury / Incident
Network Asset (or related) Site Security	Disruption to the operation of MLL electricity distribution network through acts of vandalism and public nuisance.	4	High	Network Asset (or related) Site Security
Vegetation Clearance from MLL Overhead Distribution Assets	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.	5	Considerable	Vegetation Clearance from MLL Overhead Distribution Assets
Land Access Difficulties	MLL is unable to access land to site its equipment or get access across to construct existing assets	6	Considerable	Land Access Difficulties

Risk Name	Description	Rank	Rating	Pre-treatment Rating
Latent Material Defects	Material defects resulting in the inability of the MLL distribution network to safely convey electricity within the supply regulations.	7	Considerable	Latent Material Defects
Lack of Maintenance Related Network Failure	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations.	8	Considerable	Lack of Maintenance Related Network Failure
Vandalism at the Blenheim GXP	Disruption to the operation of MLL electricity distribution network through acts of vandalism at the Blenheim GXP.	9	Moderate	Vandalism at the Blenheim GXP
Availability of Roading Network	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.	10	Moderate	Availability of Roading Network

Table 31 - Highest Risks

8.2.7 General risk commentary

From the risk study analysis presented in Table 31 the following conclusions are drawn:

1. The overall post treatment risk profile of MLL is presently constrained to acceptable levels.

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

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

4. The most significant risks, while in the critical and very high categories, are inherent to the industry. There are many treatments already in place for these risks and from the 2011 risk review there are more treatments being investigated and implemented.

5. MLL's 33kV lines and zone substations carry some operational risk, but these are minimised by the diversity of the loads and the security offered by the existing configuration. At the time of this report all but one zone substation (in rural areas) have 'n-1' transformer security. As the 11kV Network is rebuilt and upgraded, the configurations available for interconnecting other substations to liven part of a failed substation 11kV network, is increased.

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 MLL's 33kV and 11kV Networks would allow supply to be restored to all other consumers by manual

switching to alternative feeds. A design is also being developed for a single emergency pole to be placed at the damaged site to replace the damaged structure quickly.

7. Earthquake: All network assets have been constructed in accord with the relevant codes and following the 2010 Canterbury earthquake an independent engineering assessment of all assets was commissioned. This work was almost completed at the time of the 2011 Christchurch earthquake and will be finalised in the first quarter of 2011. Where appropriate changes will be made as necessary.

8. As a result of the 2011 risk review many new treatments are being developed. An area for improvement identified was maintenance, so new standards and regimes are being investigated to reduce maintenance related risks to MLL.

9. Generally, the MLL 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.

8.3 Emergency preparedness and Civil Defence

MLL's 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.

MLL operates a full time fault service with sufficient staff levels to ensure appropriate responses to any foreseeable event on the Network.

MLL 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 MLL's capability to respond. For instance a large festival may place a high peak load on local infrastructure for a short duration.

Following on from the Christchurch earthquakes in September and February, MLL is reviewing the Emergency preparedness plan and also giving consideration to the location of the control room. This is intended to ensure that the control room have ready access to key resources during major events.

MLL is part of a group of South Island lines companies which have agreed to a Mutual Aid cooperative in the event of major disruption to individual or multiple networks. MLL has recently sent staff and diesel generators to Kaipoi and Christchurch following the September 2010 and February 2011 Canterbury earthquakes.

8.4 Risk Register

Risk Name	Risk Category	Type	Risk Description	Risk
MLL Staff Injury / Incident	MLL Distribution Network Access and Control Breakdown	Bus	A network incident or personnel injury, due to the breakdown of the MLL network access and control systems.	Critical
Contractor Injury / Incident	MLL Distribution Network Access and Control Breakdown	Bus	A contractor incident or personnel injury, due to the breakdown of the MLL network access and control systems.	Very High
Public Injury / Incident	MLL Distribution Network Access and Control Breakdown	Bus	A member of the public has an incident or personnel injury, due to the breakdown of the MLL network access and control systems.	High
Network Asset (or related) Site Security	Vandalism and Public Nuisance	Bus	Disruption to the operation of MLL electricity distribution network through acts of vandalism and public nuisance.	High
Vegetation Clearance from MLL Overhead Distribution Assets	Vegetation Control	Elect	Failure to maintain clearance reduces network reliability, would breach a statutory requirement, incurs significant 'catch up' costs and may present a serious safety risk to staff and the general public.	Considerable
Land Access Difficulties	Land Access Difficulties	Reg	MLL is unable to access land to site its equipment or get access across to construct new assets or maintain existing assets.	Considerable
Latent Material Defects	MLL Distribution Network Failure	Elect	Material defects resulting in the inability of the MLL distribution network to safely convey electricity within the supply regulations.	Considerable
Lack of Maintenance Related Network Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations.	Considerable
Vandalism at the Blenheim GXP	Vandalism and Public Nuisance	Bus	Disruption to the operation of MLL electricity distribution network through acts of vandalism at the Blenheim GXP.	Moderate
Availability of Roading Network	MLL 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.	Moderate
Poor Workmanship Faults	MLL Distribution Network Failure	Elect	Poor workmanship faults resulting in the inability of the MLL distribution network assets to safely convey electricity within the supply regulations.	Moderate
Open point failure	MLL Distribution Network Failure	Elect	Failure of a switch at an open point between two feeders	Moderate
Car versus Pole or Equipment	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - high traffic density, access constricted areas and poor network design.	Moderate
Multiple 33kV circuits on single structure	MLL Distribution Network Failure	Elect	Picton 1 and 2 Feeders between O'Dwyers Road and Tuamarina, especially a pole on SH1 north of Wairau River bridge	Moderate

Risk Name	Risk Category	Type	Risk Description	Risk
ABS & HV Fuse Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - lightning or high wind speed activity.	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.	Some
Access Track Clearance	Vegetation Control	Elect	Constant effort is required to keep tracks clear so that assets can be accessed in the Marlborough Sounds. Failure to do so makes the Network less reliable and increases network fault repair/response times.	Some
Land Access Difficulties	Land Access Difficulties	Reg	MLL is unable to access land to site its equipment or get access across to service / inspect / upgrade existing assets or vegetation.	Some
Construction Site Security	Vandalism and Public Nuisance	Bus	Disruption to the operation of MLL electricity distribution network through acts of vandalism and public nuisance at network construction sites.	Some
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.	Some
Skill Gaps	Knowledge Management	Bus	Skill gaps relating to the MLL asset base i.e. either equipment becomes technically obsolescent (no one can maintain it) or MLL cannot attract the skills it needs.	Some
Ring Main Unit Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake or flood activity.	Some
Multiple 33kV circuits on single structure	MLL Distribution Network Failure	Elect	Rai Valley and Picton 2 feeders along Thomsons Ford Road	Some
Multiple 33kV circuits on single structure	MLL Distribution Network Failure	Elect	Waihopai and Redwoodtown feeders along Murphys Road	Some
Communications failure	Communications	Elect	Unavailability of MLL voice data (radio) network	Some
Micro Generation Interconnection	Disruptive Technologies	Bus	The impact of disruptive technologies on the MLL network supply quality, voltage regulation, etc.	Some
Unlawful or Unsafe Network Connection	MLL Distribution Network Access and Control Breakdown	Elect	The inability of the MLL distribution network to safely convey electricity within the supply regulations, due to the breakdown of the MLL network access and control systems i.e. unlawful or unsafe network connection	Some
Multiple 33kV circuits on single structure	MLL Distribution Network Failure	Elect	Redwood Pass and Dashwood Pass lines south of Riverlands and again north of Seddon	Some

Risk Name	Risk Category	Type	Risk Description	Risk
Multiple 33kV circuits on single structure	MLL Distribution Network Failure	Elect	Two branches of Rai Valley feeder along floor of Kaituna Valley	Some
Maintenance Security Constraint at Picton Zone Sub	MLL Distribution Network Failure	Elect	When one transformer is out of service there is only one 33kV line supplying the substation due to the lack of a 33kV bus coupler	Some
High Winds Causing Damage to MLL Distribution Assets	Natural Environment Impact on MLL Distribution Assets	Env	Natural environment impact on MLL distribution assets causing the unavailability of electricity supply to part, or all, of the Marlborough region.	Some
Resource Management Act Issues	Resource Management Act Issues	Reg	MLL is unable to progress a network expansion project due to RMA issues.	Some
Data Record Unavailability	Data Management and Record Access	Bus	Issues relating to the availability and accuracy of MLL network data (assets and asset performance / condition).	Some
33kV Overhead Line Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - high wind speed activity or snow loading.	Some
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).	Some
Site Access Control	Health & Safety Issues (staff and general public)	Reg	Situations or events in relation to the MLL electricity distribution network construction program which lead to health and safety issues for MLL staff and the general public	Some
11kV UG Cable Failure Due to 3rd Party (excavation) Damage	MLL Distribution Network Failure	Elect	11kV UG cable failure causes the loss of supply to MLL distribution network assets and therefore the loss of an 11kV circuit or a feeder.	Some
Adequate Fuel Supply	MLL 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.	Some
Multiple 11kV circuits on single structure	MLL Distribution Network Failure	Elect	Talleys and Renwick Feeders along Old Renwick Road	Some
Lightning Storm Damage to MLL Distribution Assets	Natural Environment Impact on MLL Distribution Assets	Env	A lightning storm resulting in damage to MLL distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.	Some
Flooding Causing Damage to MLL Distribution Assets	Natural Environment Impact on MLL Distribution Assets	Env	Natural environment impact on MLL distribution assets causing the unavailability of electricity supply to part, or all, of the Marlborough region.	Some
Indoor Switchgear Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.	Low

Risk Name	Risk Category	Type	Risk Description	Risk
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.	Low
Switching structures	MLL Distribution Network Failure	Elect	An entire switching structure is compromised and all switching structure switches are inoperable	Low
Major Earthquake Damage to MLL Distribution Assets	Natural Environment Impact on MLL Distribution Assets	Env	Major natural environment impact on MLL distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.	Low
Fire Damage to Buildings and Equipment	Fire Damage to Buildings and Equipment	Bus	Damage to MLL buildings and equipment (network and support infrastructure) caused by fire.	Low
Fault Security Constraint at Havelock Zone Sub	MLL 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
11kV Cable Failure	MLL Distribution Network Failure	Elect	11kV cable failure causing the inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.	Low
11kV Overhead Line Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - high wind speed activity or snow loading.	Low
Pole Mounted TX Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - lightning or earthquake activity.	Low
Multiple 11kV circuits on single structure	MLL Distribution Network Failure	Elect	Dashwood and Seaview feeders north of Seddon, Grassmere and Richmond Brook feeders south of Seddon	Low
Multiple 11kV circuits on single structure	MLL Distribution Network Failure	Elect	Renwick and Kaituna feeders along Anglesea St	Low
Multiple 11kV circuits on single structure	MLL Distribution Network Failure	Elect	Waikawa and Buller Street feeders along Canterbury Street	Low
Multiple 11kV circuits on single structure	MLL Distribution Network Failure	Elect	Vernon and Cloudy Bay feeders around Montana	Low
Inadequate emergency stock	Stores	Elect	MLL does not have adequate stock on hand to repair faults in the Network	Low
Ripple signal failure	MLL Distribution Network Failure	Elect	A problem at system control that causes one or more injection cells to fail to send a ripple signal	Low
Chemical Spray (use and storage)	MLL 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).	Low
Resource Management Act Issues	Resource Management Act Issues	Reg	MLL is unable to progress network maintenance or upgrade work due to RMA issues.	Low

Risk Name	Risk Category	Type	Risk Description	Risk
Asset or Equipment Obsolescence	MLL Asset or Equipment Obsolescence	Bus	Assets or equipment owned by MLL becomes obsolete due to business requirements	Very Low
33kV UG Cable Failure Due to 3rd Party (excavation) Damage	MLL Distribution Network Failure	Elect	33kV UG cable failure causes the loss of supply to MLL distribution network assets and therefore the loss of a subtransmission circuit or a zone substation.	Very Low
Power TX Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.	Very Low
400V Box Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - vehicle damage or flood.	Very Low
Ground Mounted TX Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity or flood.	Very Low
Communications failure	Communications	Elect	Unavailability of cell phone network	Very Low
Transformer Oil Spill (In-Situ or in Transit)	MLL Distribution Assets Impact on Natural Environment	Env	Major natural environment impact caused by transformer oil contaminating soil, waterways or stormwater drains, etc.	Very Low
Fault Security Constraint at Rai Valley Zone Sub	MLL 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.	Very Low
400V UG Cable Failure Due to 3rd Party (excavation) Damage	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations.	Very Low
400V Overhead Line Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - high wind speed activity or snow loading.	Very Low
Single 33kV Supply to Linkwater Zone Sub	MLL 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.	Very Low
Landslide Damage to MLL Distribution Assets	Natural Environment Impact on MLL Distribution Assets	Env	Natural environment impact on MLL distribution assets causing the unavailability of electricity supply to part or all of the Marlborough region.	Very Low
Distributed Generation - Fuel Cells	Disruptive Technologies	Bus	Disruptive technologies have the potential to lower MLL revenues and hence asset value (i.e. island networks that only need back up supply therefore line charge but no delivery charge)	Very Low
Fault Security Constraint at Riverlands Zone Sub	MLL 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

Risk Name	Risk Category	Type	Risk Description	Risk
400V Cable Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.	Very Low
High Load Damage to Lines and Equipment	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - unescorted loads.	Very Low
Single 33kV Supply to Rai Valley Zone Sub	MLL 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.	Very Low
Single 33kV Supply to Ward Zone Sub	MLL 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.	Very Low
MLL Asset Design	MLL Distribution Assets Impact on Natural Environment	Env	Poor design leading to a negative impact on the environment surrounding MLL substation assets i.e. control of SF6 gas, assets not blending into the environment, poor noise control.	Very Low
Electricity Complaints	Electricity Complaints	Reg	Complaints resulting in reputational damage to MLL	Very Low
Extended Recovery From Network Outage	MLL Distribution Network Access and Control Breakdown	Elect	Longer than necessary outage, due to the breakdown of the MLL network access and control systems	Very Low
33kV Cable Failure	MLL Distribution Network Failure	Elect	The inability of the MLL distribution network assets to safely convey electricity within the supply regulations. Highest risk - earthquake activity.	Very Low
Loss of Tacit Institutional Knowledge	Knowledge Management	Bus	The loss of detailed background data (often uncodified) relating to the MLL asset base i.e. how to access equipment, likely fault locations, etc.	Very Low
Single 33kV Supply to Leefield Zone Sub	MLL 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.	Very Low
Price Path Threshold Regime Breach	Commerce Commission Threshold Regime Breach	Bus	Price Path threshold regime breach, leading to investigation and possible targeted control of MLL (price setting)	Very Low
Quality Threshold Regime Breach	Commerce Commission Threshold Regime Breach	Bus	Quality threshold regime breach, leading to investigation and possible targeted control of MLL (price setting)	Very Low
Fault Security Constraint at Seddon Zone Sub	MLL 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
Maintenance Security Constraint at Havelock Zone Sub	MLL 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.	Insignificant

9. Performance Evaluation

9.1 Asset Management Performance

The asset management process is based on constant review and incremental improvement. Throughout the year, the plan is reviewed and, where appropriate, changes are made. At the end of the year an extensive review is made and a new plan produced, incorporating changes and improvements.

During the year, if any significant changes occur to the company or the environment it operates in, then the plan will be reviewed and adjustments made.

9.1.1 Customer consultation

MLL regularly undertakes consultation with its customers both as part of its everyday business practices and its requirements under legislation.

9.1.2 Introduction

MLL 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.

9.1.3 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
- Interest Groups (such as Federated Farmers, Chamber of Commerce, Sounds Residents Groups)
- Mass Market Consumers (approx. 21,000)

MLL 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 MLL website. Phone survey undertaken on approximately 200 random customers.

Table 32 - Stakeholder Consultation

In addition to this, MLL undertakes ad-hoc consultation as required. In 2011, it is intended that the Managing Director will speak to a range of Sounds groups and focus on issues such as reliability, trees and costs of supply.

9.1.4 Consultation

An independent telephone survey of randomly selected Marlborough electricity consumers was conducted in March 2010 to measure satisfaction with a range of performance measures, current attitudes towards MLL, and consumer preferences regarding company ownership and electricity industry regulation. The margin of error was deemed to be +/- 3.5%.

As well as direct consumer communication methods, MLL 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.

9.1.5 Results

Over 91% of the sample was satisfied with reliability and quality while 88% were satisfied with the fault service. Overall, 94% of the sample was satisfied with MLL's performance. This high level of satisfaction indicates general acceptance of the asset management practices of MLL. The margin of error is ±3.5% at the 95% confidence level.

9.1.6 Discussion

As can be seen from the survey results and the high levels of satisfaction, generally, network performance and consumer expectations are well aligned.

Consumer feedback is utilised at many levels in MLL's Asset Management Planning processes, for example at a higher level, the consumer's desire for improved reliability helps to set MLL's overall service level targets for system and consumer supply interruption frequency and duration (SAIDI, and SAIFI). 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 MLL 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).

9.2 Network Performance

The key indicators for system performance are shown in the following table. The Marlborough Sounds is one of the unique features of the MLL 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, MLL's 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 MLL not being restricted relative to its revenue requirements by inappropriate regulatory requirements.

9.2.1 Targets and actual performance

The performance targets and actual outcomes for the 2010 calendar year (12 months ending 31 December 2010) were:

Description	Target	2009	2010
Urban Blenheim < 0.5 hours	75%	29%	40%
Urban Other < 1.5 hours	75%	45%	61%
Rural < 4 hours	75%	87%	86%
Remote Rural < 8 hours	75%	81%	72%
Faults not restored after 3 hours	<20%	26%	28%
Faults not restored after 24 hours	0%	3%	2.6%
Number of planned Interruptions	<260	284	234
Number of unplanned interruptions	<300	357	327
Total Number of faults/100km - 33kV	<2.5	0.65	3.3
Total Number of faults/100km - 11kV	<10	14.2	14.3
SAIDI - Class B minutes/consumer (planned outages)	<90	109	88
SAIDI - Class C minutes/consumer (faults)	<120	165	215
SAIFI - Class B outages/consumer (planned outages)	<0.35	0.36	0.55
SAIFI - Class C outages/consumer (faults)	<1.44	1.64	1.5

Table 33 – Key Performance Indicators

Our target for power restoration in the Blenheim urban area is to have 75% of faults restored within 30 minutes. In 2009 we achieved 29% and in 2010 it was 40%. A considerable portion of the Blenheim urban area is overhead, and where the fault is persistent, it is necessary to patrol the lines before relivening. The existing target is optimistic, however it is considered better to try and fail, than to accept a lower level of performance.

Our target for faults longer than 24 hours is zero, however some faults require considerable work and effort to repair or it may be that access cannot be obtained. For example, where trees fall over a line in a remote area, it can take some time to organise access for repairs. In a recent fault, logging operations had left the access tracks blocked with trees and these had

to be removed before the repairs to the damaged line could be attempted. In other instances flooded rivers have precluded access.

Our planned work is within target, this is mainly due to the increased use of the generators and better planning.

The fault performance of the Network in 2010 was poor, 215 minutes compared to a target of <120 minutes. In addition the severe storm late in December resulted in an additional 239 SAIDI minutes, which have been excluded as they are categorised as extreme events using Commerce Commission guidelines.

One of the factors driving the poor performance is an increase in logging activity in the vicinity of MLL's lines. Logging activity tends to be very localised and can result in damage to lines and reliability either directly (felling trees onto lines or equipment contacting lines) or indirectly (by altering wind flows or removing forest behind weakened trees close to lines).

Measures considered to counter this include:

- lowering the lines to the ground during key periods
- replacing lines with cable on ground
- installing a generator beyond the forestry work site
- Improved liaison with logging contractors

9.2.2 Efficiency Measures

Measure	Target	2008/2009	2009/2010
Load factor	65%	61%	62%
System losses	7%	5.1%	6%
Capacity utilisation	21%	23%	23%

Table 34 - Efficiency Measures Results

The load factor is heavily influenced by the manner of load control. Historically the load control plant was used to limit the maximum demand on MLL's Network. In the last two years it is only used to limit the maximum demand when the Upper South Island (USI) demand is also high. This has lead to an apparent reduction in load factor as effectively when the USI load is low, the MLL load is allowed to rise.

The capacity of utilisation is largely determined by customer requirements and patterns of use but can be influenced to a limited extent by design and operation of the network. Every effort is made to limit the unnecessary installation of transformers and keep this as high as possible.

System losses are monitored and considered when designs are undertaken and all transformers are purchased.

9.2.3 System reliability

For the 2010 calendar year, there were 215 minutes per consumer lost due to faults and 88 minutes lost due to planned outages. This equates to an overall reliability of 99.942%. NB, this excludes the extreme weather event of 27 December.

The 340 faults can be broken down into 317 faults on the 11kV system and 10 faults on the 33kV system. The graph below shows the customer minutes lost for each month.

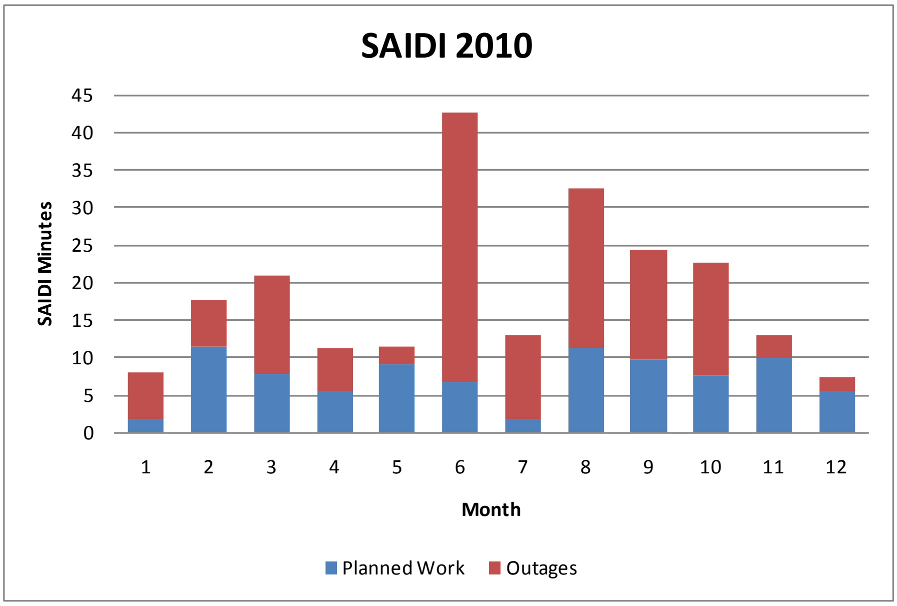


Figure 33 - Monthly Breakdown of System Outages

In June, a single fault caused by trees falling over the French Pass feeder from Rai Valley substation's line caused 18 SAIDI minutes. In total for the year, this feeder and tree related faults contributed 35 SAIDI minutes to the total. Note if the extreme weather events of 27 December are included, this feeder contributed a total of over 91 minutes of SAIDI.

Overall the reliability performance may be assessed as poor but this statistic needs to be properly considered relative to the terrain over which the lines are installed, the uneconomic nature of the lines, and the limitations of the tree regulations which inhibit maximisation of reliability of supply. Against the background of difficulties the performance although not ideal can be considered the best under the circumstances. Indeed consistent with the company's programme of continuous improvement, it serves to ensure that various measures have been reviewed with a view to improving performance. These include:

- deployment of SCADA into more remote areas to reduce outage times
- Additional reclosers with SCADA control to improve isolation of faults and reduce outage areas
- Greater maintenance focus on poorly performing feeders and sections of line which influence reliability
- Consideration of further use of generators to maintain supply past areas where logging is occurring

9.2.4 System faults

There were a total of 340 faults on the Network in 2010, compared to 357 faults on the Network in 2009. 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
2010	130	0	28	18	98	6	47	327

Table 35 - Causes of Faults

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.

During 2010 there were eleven major faults (defined as faults where greater than five SAIDI minutes were lost). This compares with five major faults in the previous year.

Date	Ref	Location	Reason	SAIDI Minutes
28/12	107259	Havelock	Extreme Weather	110.2
28/12	107267	Rai Valley	Extreme Weather	39.9
28/12	107265	Picton	Extreme Weather	21.6
20/6	106547	French Pass feeder	Trees	18.1
21/12	107178	French Pass feeder	Trees	12.2
1/8	106727	French Pass feeder	Trees	10.0
8/6	106517	Picton	Switchgear failure	9.5

Date	Ref	Location	Reason	SAIDI Minutes
1/8	106726	Kaituna	Trees	6.3
22/3	106215	Kenepuru	Weather	5.6
28/12	107264	Picton	Extreme Weather	5.3
22/12	107236	French Pass feeder	Trees	5.2

Table 36 - Major Faults

9.2.5 Planned outages

During 2010 there were no major planned outages greater than five SAIDI minutes in the Network. There were four outages of between 2.5 and five SAIDI minutes which are listed in the table below. Line maintenance is essential to maintain the safety and performance of the Network. Live line techniques and the use of our 900kVA and 550kVA generators have reduced the need and/or the duration of many planned shutdowns.

Date	Ref	Location	Reason	SAIDI Minutes
6/12	107008	Blenheim	Upgrade lines/water substation	3.6
29/6	106470	French Pass Feeder	Repairs to lines damaged by trees	3.4
19/4	106147	Kenepuru	Upgrade Transformers and cut trees	3.0
2/8	106571	French Pass Feeder	Repairs to lines damaged by trees	2.6

Table 37 – Major Planned Shutdowns

With a large capital programme, and in particular line renewals, it is often necessary to shutdown large sections of the Network 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, MLL has a 900kVA mobile generator as well as a 550kVA unit.

In the 2010 calendar year generators were used on 45 occasions saving 235 SAIDI minutes. The total output was 122,644 kWh at a direct cost of 31c/kWh. This compares with the typical values of non-supply in the range $1.50 to $5.00.

Date	Location	Mode	Customers	SAIDI
21/01/2010	Rai Valley	Support	679	3.8
22/01/2010	Rai Valley	Support	679	15.4
28/01/2010	Rai Valley	Island	809	16.9
1/02/2010	Rai Valley	Island	809	19.9
11/02/2010	Paynters Road	Island	62	1.3
16/02/2010	Rarangi	Island	226	4.6
18/02/2010	Rarangi	Island	226	4.0
23/02/2010	Rarangi	Island	226	4.6
25/02/2010	Rarangi	Island	188	4.2
3/03/2010	Rai Valley	Support	679	11.7
8/03/2010	Rai Valley	Support	679	11.9
12/03/2010	Rai Valley	Support	679	8.4
16/03/2010	Rarangi	Island	114	2.3
18/03/2010	Rarangi	Island	144	3.0
23/03/2010	Rai Valley	Island	809	17.0
23/04/2010	Wairau Valley Township	Island	209	3.9
29/04/2010	Wairau Valley Township	Island	209	3.8
14/05/2010	Ward Sub	Island	309	3.2
27/06/2010	Acquatic Centre	Island	1	0.0
29/06/2010	Maclaren Bay	Island	372	7.1
22/07/2010	Middle Renwick Road	Support/Fault	26	0.4
2/08/2010	Northbank	Island/Fault	75	1.6
3/08/2010	Northbank	Island/Fault	75	3.3
6/08/2010	Shakespeare Bay	Island	37	0.7
24/08/2010	Waihopai Valley	Island	39	0.7
1/09/2010	Narrows	Island	332	5.6
3/09/2010	Narrows	Island	332	5.0
22/09/2010	Narrows	Island	336	5.8
23/09/2010	Lewis Street	Island	134	2.5
24/09/2010	Narrows	Island	348	5.7
27/09/2010	Narrows	Island	348	5.2
7/10/2010	Narrows	Island	348	4.9
13/10/2010	Narrows	Island	348	5.9
19/10/2010	Narrows	Island	332	5.6
21/10/2010	Narrows	Island	330	5.0
28/10/2010	Havelock	Support		0.0
29/10/2010	Havelock	Support		0.0
4/11/2010	Narrows	Island	332	5.6
23/11/2010	Narrows	Island	329	5.2
25/11/2010	Narrows	Island	329	5.9
30/11/2010	Havelock	Support		0.0
8/12/2010	Narrows	Island	329	5.8
10/12/2010	Lewis Street	Island	132	2.4
22/12/2010	Maclaren Bay	Island/Fault	371	4.9
2010	total			234.6

Table 38 - Generator Use in 2010

9.2.6 Targets for 2011 on

The performance targets for the 2011 year and beyond 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

Table 39 - 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, in general, customers expect that service levels will increase over time.

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

9.3 Works Performance

9.3.1 Review of Capital Expenditure

The actual capital expenditure against budgets for the 2009-2010 financial year is given in the table below:

Description	Estimate	Actual	variance
33kV Transmission	4,720,000	5,678,777	20%
11kV OH	2,970,000	2,926,518	-1%
11kV U/G	65,000	662,387	919%
LV	65,000	47,229	-27%
Zone substations and Network Automation	5,835,000	4,519,089	-23%
Total	13,655,000	13,834,000	1%
Customer Connection	250	142	-43%
System Growth	6,365	4,869	-24%
Reliability, Safety and Envirnoment	4,422	3,532	-20%
Asset Replacement and Renewal	2,569	5,099	98%
Asset Relocations	50	192	284%

Table 40 – Budget and Actual Capital Expenditure 2009/10

Overall, the total expenditure was close to budget. The original budget included completion of the new Waters zone substation, however this was held up due to resource consent delays and the unexpected need for a resource consent hearing. The effect of the delay was to require other projects, originally planned for 2010/2011, to be brought forward. This included additional work on the Cobb 33kV line and some 11kV undergrounding.

Some of the variances in the disclosed breakdown (customer connection, system growth, reliability etc) also relate to the delays in the Waters Substation and the bringing forward of other work, however in general this variation is due to changes in classification of work. Many projects involve multiple voltage levels (e.g. rebuilding an overhead line with 33kV/11kV and LV lines) as well as varying elements of customer connection, system growth, reliability and renewal. Splitting the project into these categories is often very subjective, for example where an old line is replaced with a new higher capacity line because the line is at the end of its life, the load has increased and a new major customer is planning connection, it is difficult to split the costs into the appropriate classification.

The process of assigning the disclosure categories to capital work is relatively new and it is expected that the variances will decrease in time.

9.3.2 Review of Operational Expenditure

The actual operational expenditure against budgets for the 2009-2010 financial year is given in the table below:

Item	09/10 Budget	actual 09/10	Variance
load control operation	40,000	40,615	1.5%
Design System Expansion	200,000	144,047	-28.0%
Engineering Salaries	850,000	905,928	6.6%
Truck & Depot Stock	25,000	54,365	117.5%
Safety inspections & Disconnections	5,000	1,174	-76.5%
Operation	*1,120,000*	*1,146,129*	2.3%
Asset Condition Assessment	140,000	178,855	27.8%
earth testing	60,000	16,494	-72.5%
Monitoring & Inspections	100,000	96,524	-3.5%
33 kv System - preventative maintenance	150,000	238,668	59.1%
scada preventative maintenance	105,000	108,402	3.2%
zone substation preventative maintenance	175,000	152,559	-12.8%
11 kv System - Preventative Maintenance	700,000	672,775	-3.9%
distribution transformer in depot maintenance	110,000	120,017	9.1%
distribution sub station preventive maintenance	180,000	197,317	9.6%
possum guards	100,000	119,473	19.5%
LV System - preventative maintenance	200,000	200,748	0.4%
Tree cutting and vegetation control	1,600,000	1,690,639	5.7%
Communications Equipment Maintenance	60,000	69,301	15.5%
Routine and Preventative maintenance subtotal	*3,620,000*	*3,861,773*	6.7%
33 kv System - Renewals	50,000	34,645	-30.7%
scada Renewals	5,000	1,300	-74.0%
11 kv System - Renewals	500,000	556,207	11.2%
distribution sub station renewals	200,000	155,199	-22.4%
LV System - Renewals	350,000	360,550	3.0%
Refurbishment and Renewal maintenance subtotal	*1,105,000*	*1,107,901*	0.3%
11 kv System - Corrective Maintenance	890,000	844,667	-5.1%
LV System - corrective maintenance		1,636	-
fault and Emergency Maintenance subtotal	*890,000*	*846,303*	-4.9%
Total	6,735,000	6,962,106	3.4%

Table 41 – Budget and Actual Operational Expenditure 09/10

The classification of the budget values into the disclosure categories above differs from the values disclosed in 2010. Historically, expenditure has not been classified in the manner required by the Disclosure Regulations and while systems have been altered to allow for the changes, it will take some time for estimates and budgets to be classified accurately into the new categories.

Overall the expenditure is 3.4% above budget and the expenditure in each area is close to budget. In general the larger variances are associated with smaller budget items. While budgets are closely monitored, some aspects of operational expenditure are dictated by outside factors, such as weather, vandalism, component aging and reported faults.

For example, preventative expenditure on the 33kV system was 60% above estimate. This reflects identified problems with the 33kV and in particular the need to change some 33kV insulators. Once the fault was identified, it was important that it was corrected and the faulty

insulators were replaced, with the knowledge that this was beyond the allocated budget. Had this not been undertaken further multiple failures would have occurred.

9.4 Improvement Initiatives

9.4.1 Asset Management

The Asset Management Plan and process are reviewed continuously and, in particular, updated annually. Where appropriate, changes are made and implemented.

In line with the AMP objectives in Section 1, MLL 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 MLL is exposed to, particularly physical risks to the Network.
- Maintaining efficient work processes through network surveillance integration of WASP with existing asset data.
- Improving staff knowledge and skills through training and professional development.

9.4.2 System Performance

MLL is committed to reducing causes of outages on its Network. In recent years a number of fault prevention ideas have been initiated by MLL's 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 fitted to steel cross-arms to prevent magpies and other large birds contacting both the conductor and the cross-arm.
- Extra wide possum guards have been installed on more than 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 MLL's staff.

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

In addition to these general activities, in 2011/2012 MLL has a focus on reliability and improving this by installing additional automation:

- Installation of automation and remote controllable equipment to allow better fault isolation and faster restoration of supply following a fault. MLL has allocated a budget of $1.5 million to this in the 2011/2012 year.

- Greater maintenance focus on poorly performing feeders and sections of line which influence reliability

- Consideration of further use of generators to maintain supply past areas where logging is occurring

- Following on from the Christchurch earthquake, consideration is being given to the location of the control room, with a view to ensuring that key resources are readily available to assist during major events on the Network.

9.4.3 Works Management

In addition to the work associated with increasing system and asset management performance, MLL will look at ways to improve its works management. In 2011/2012 focus will be given to three areas:

- **Project management training**. This will ensure that all relevant staff use similar approaches and tools for project management. It will incorporate consideration of best practice and up-to-date project management techniques. All planning staff will undergo training within the 2011/2012 year

- **Increased forward planning.** By increasing resources, it is intended to refine forward plans and increase the amount of design and estimation undertaken prior to incorporating projects into budgets. This will allow greater time to consider alternatives and non-system options as well as increasing the accuracy of estimates.

- **Vegetation control.** The utilisation of the latest helicopter recording GPS technology will enable identification of hazards and the required remedial work to be implemented more quickly and cost effectively. Proceedings have also been filed with the High Court seeking a Declaratory Judgment relative to the Tree Regulations. Should the Court decide in MLL's favour, costs will be reduced and expenditure will be more effective.

Appendices

A 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

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
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
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

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
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*
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*

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
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, 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*
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*

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
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*
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*

Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
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*

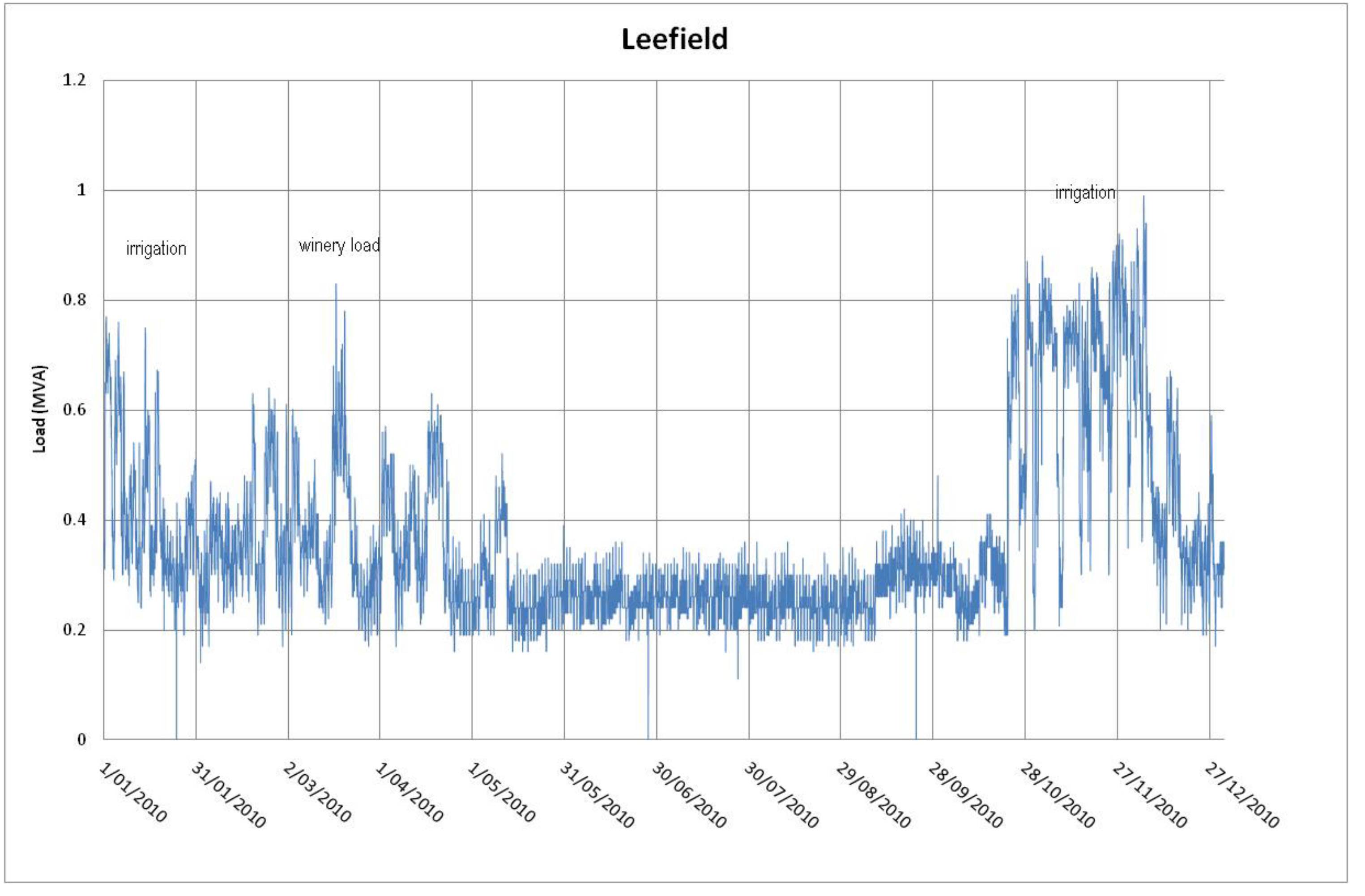
Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
Micro Generation Interconnection	*Disruptive Technologies*	*Bus*	*The impact of disruptive technologies on the ML network supply quality, voltage regulation, etc.*	*Insignificant*	*Moderate*
Land Access Difficulties	*Land Access Difficulties*	*Reg*	*ML is unable to access land to site its equipment or 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*

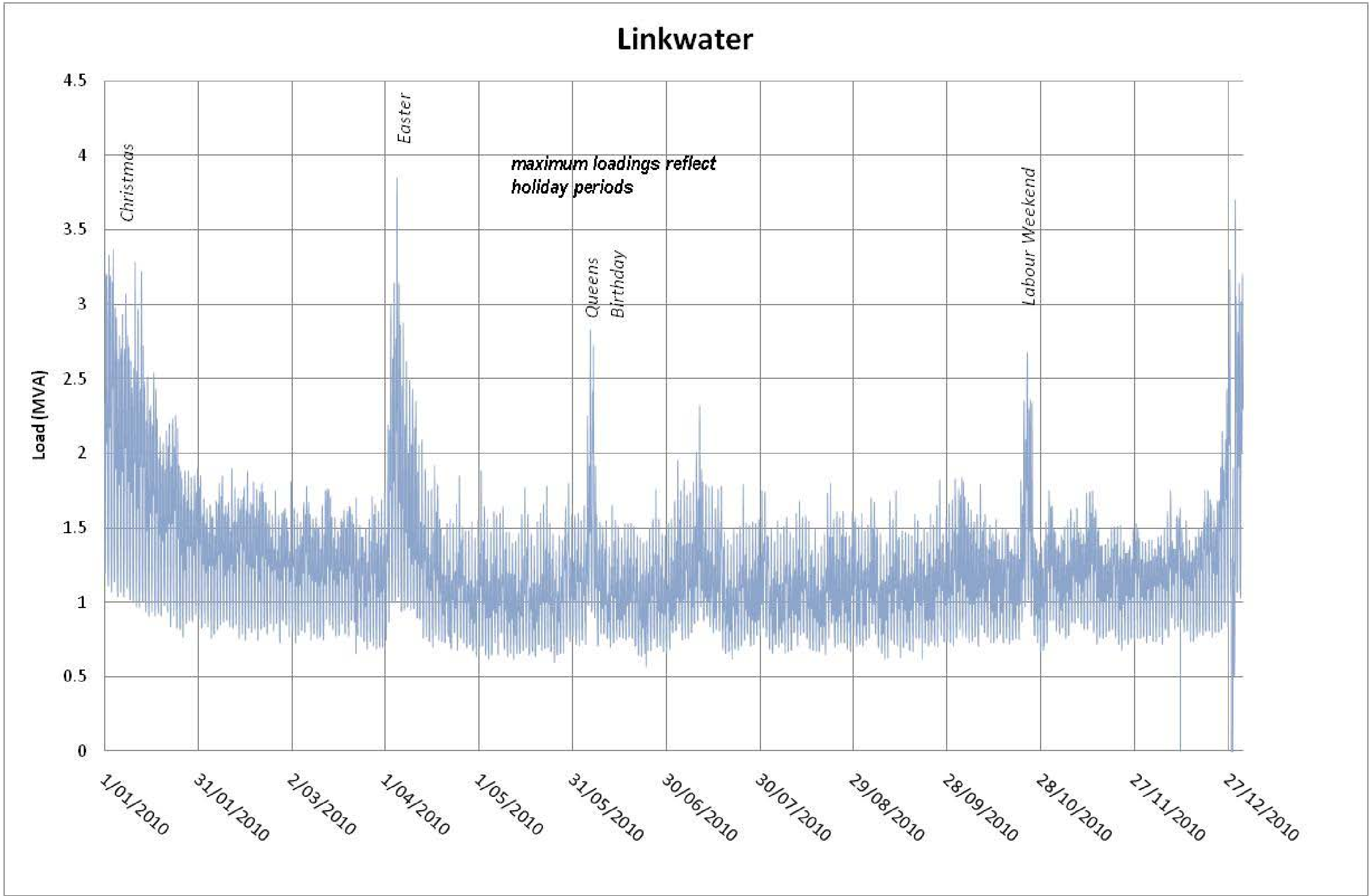
Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
Flooding Causing Damage to ML Distribution Assets	*Natural Environment Impact on ML Distribution Assets*	*Env*	*Natural environment impact on ML distribution assets causing the unavailability of electricity supply to part or all 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*
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*

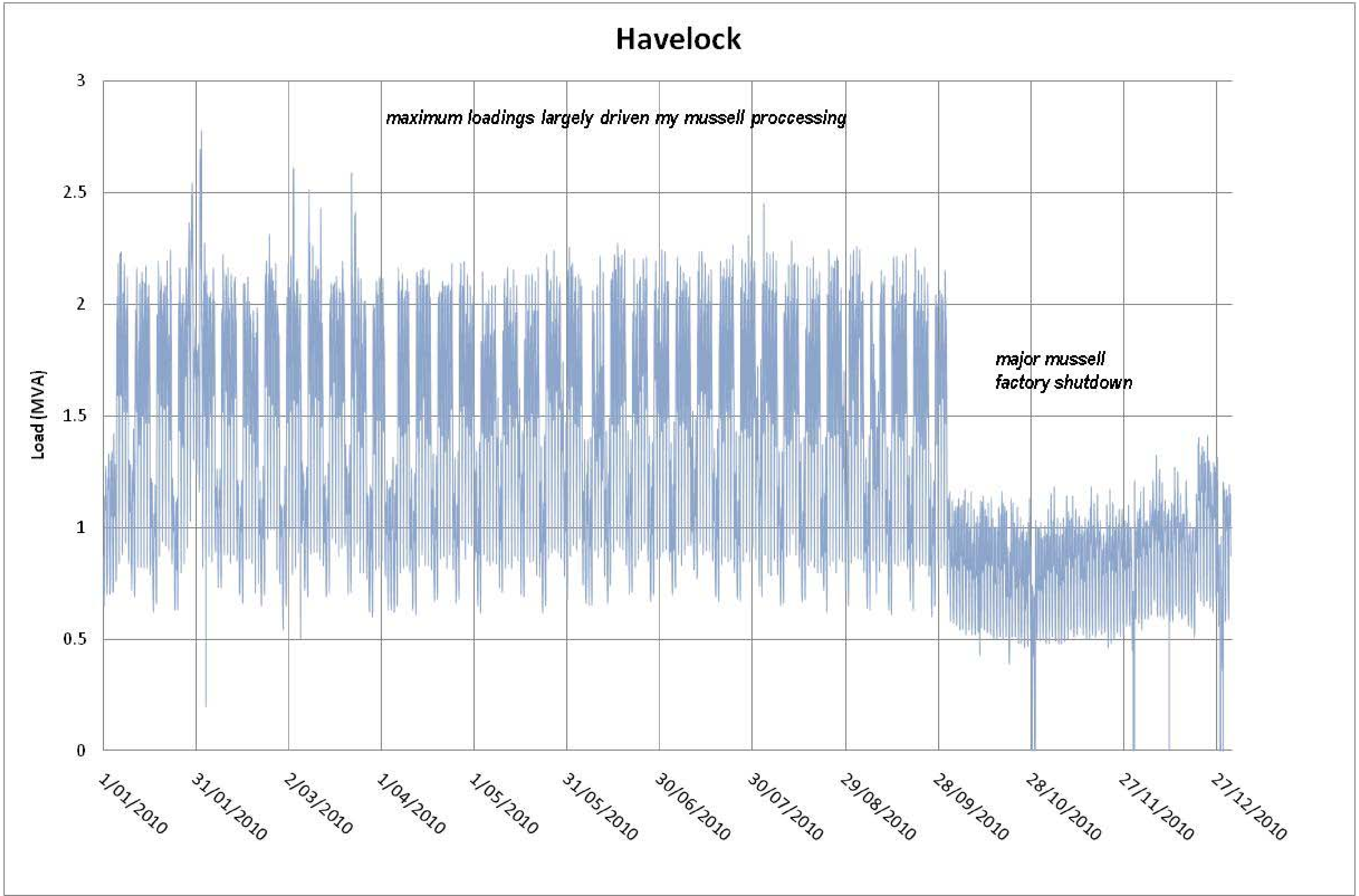
Risk Name	Risk Category	Type	Risk Description	Rating	Pre-treatment Rating
Resource Management Act Issues	*Resource Management Act Issues*	*Reg*	*ML is unable to progress network maintenance work due to RMA issues.*	*Insignificant*	*Very low*
Loss of Tacit Institutional Knowledge	*Knowledge Management*	*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*
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*

B Zone Substation loadings

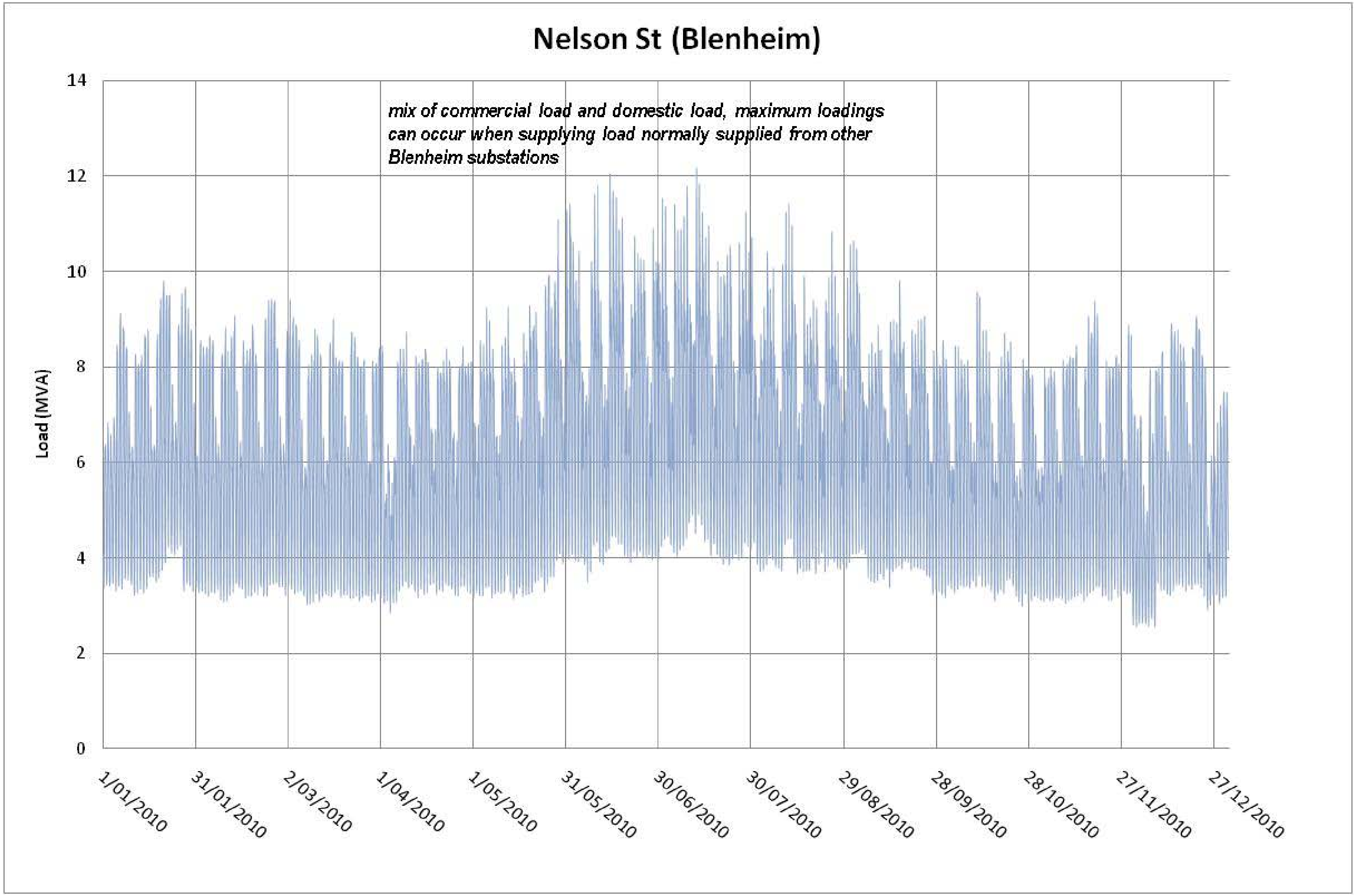
The following graphs show the actual zone substation loadings for the 2010 calendar year.

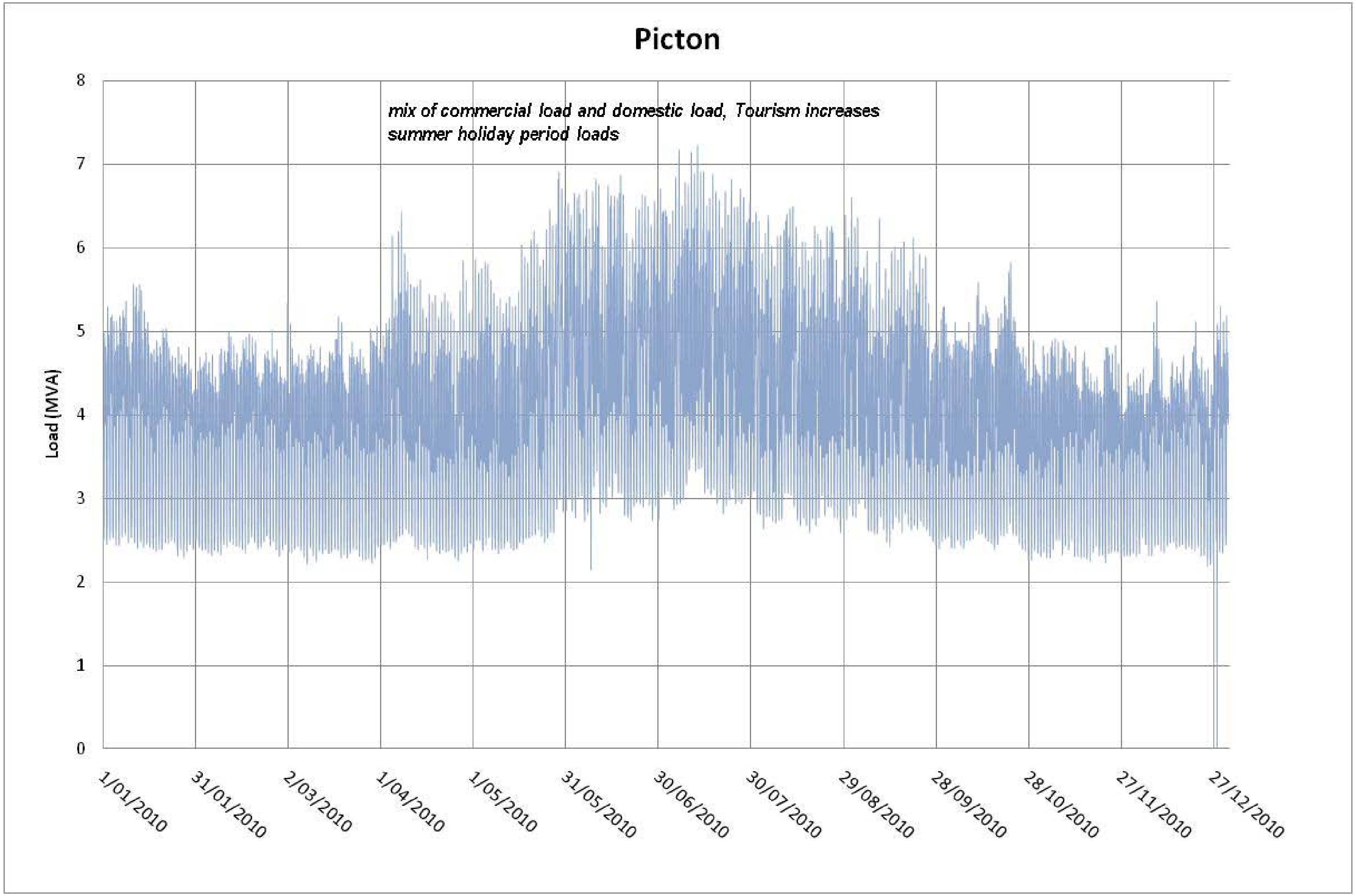


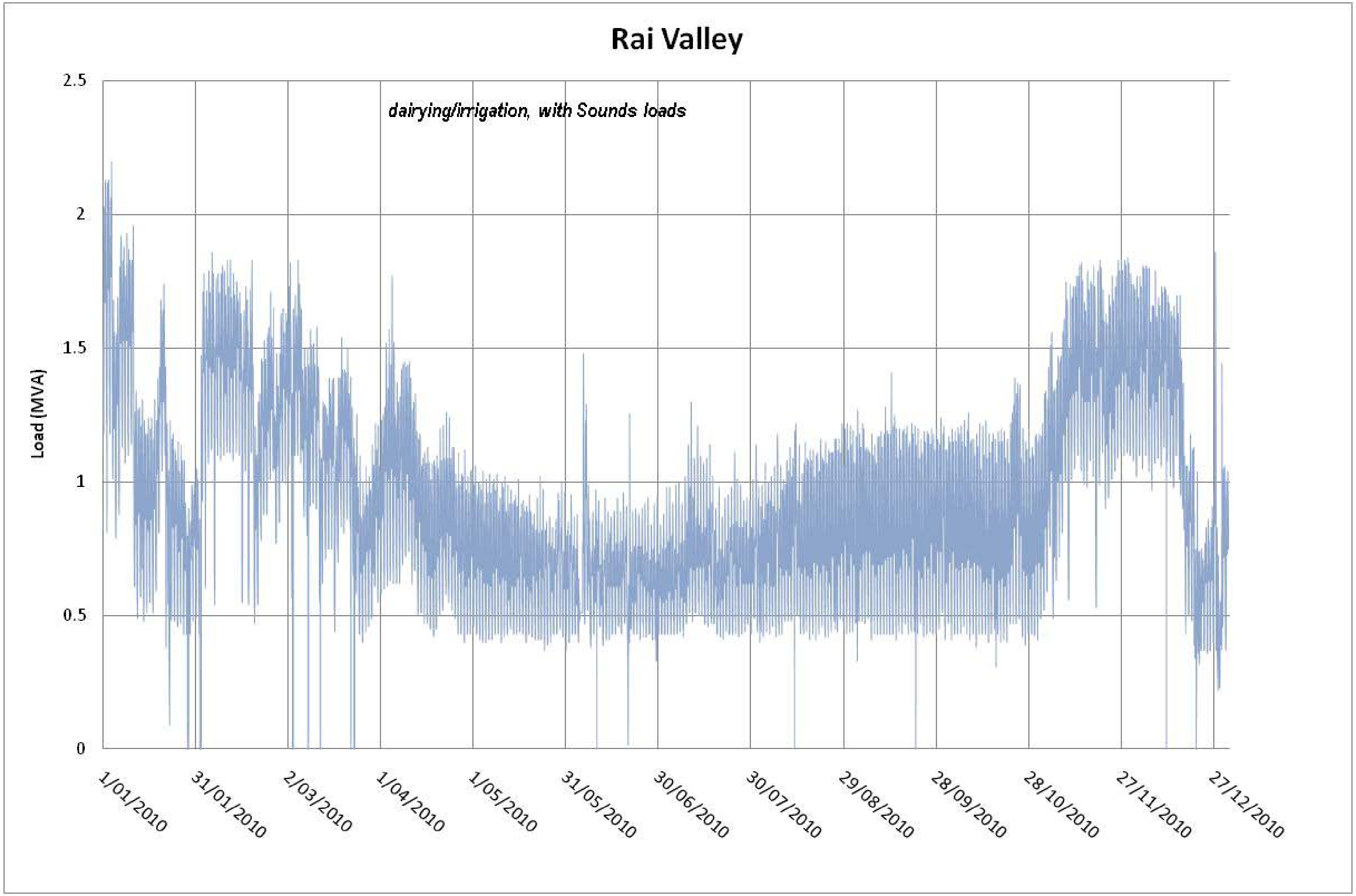

Linkwater
Load (MVA)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Christmas
Easter
maximum loadings reflect
holiday periods
Queens
Birthday
Labour Weekend
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010

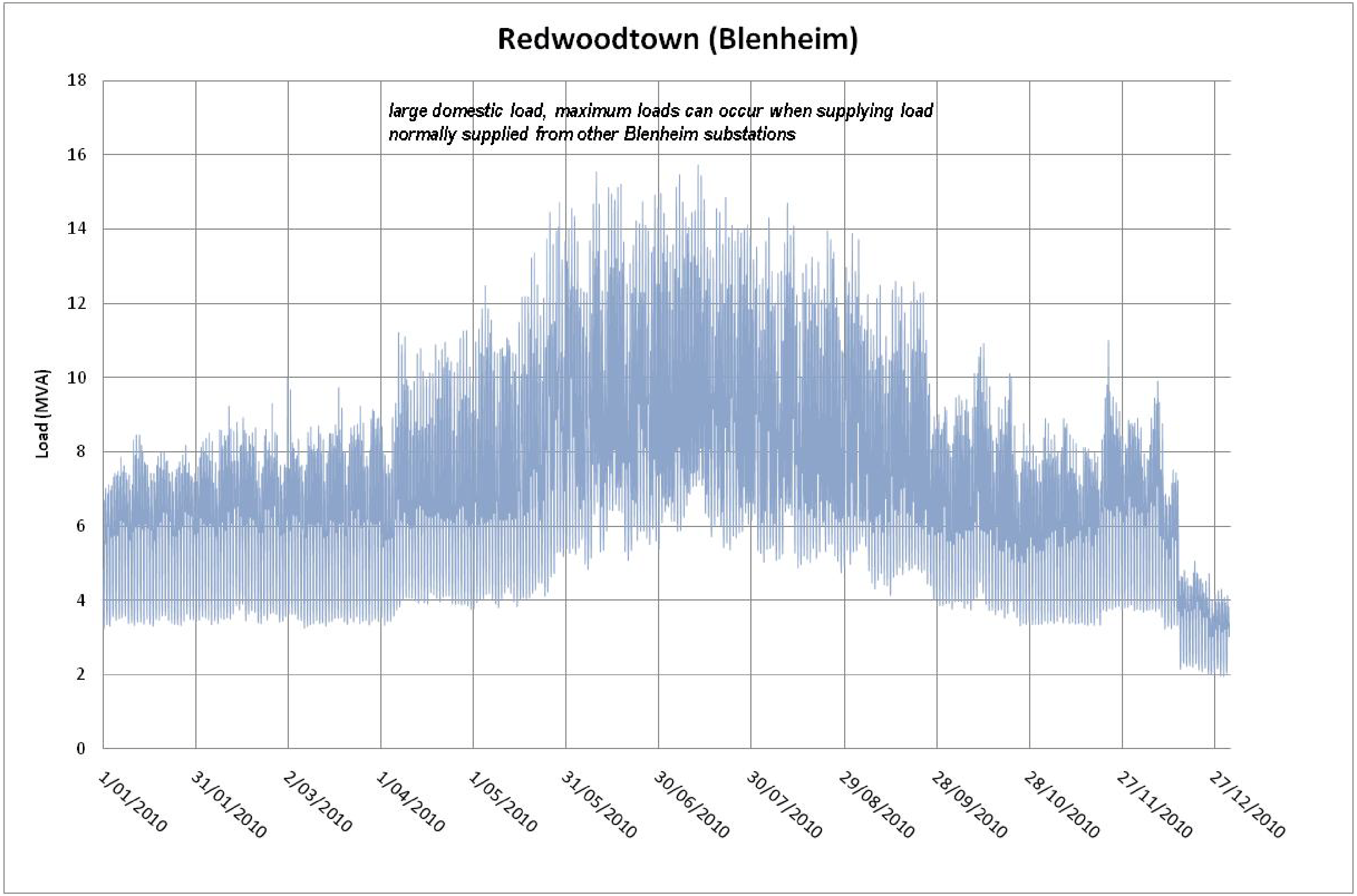


Havelock
Load (MVA)
3
2.5
2
1.5
1
0.5
0
maximum loadings largely driven my mussell proccessing
major mussell
factory shutdown
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010

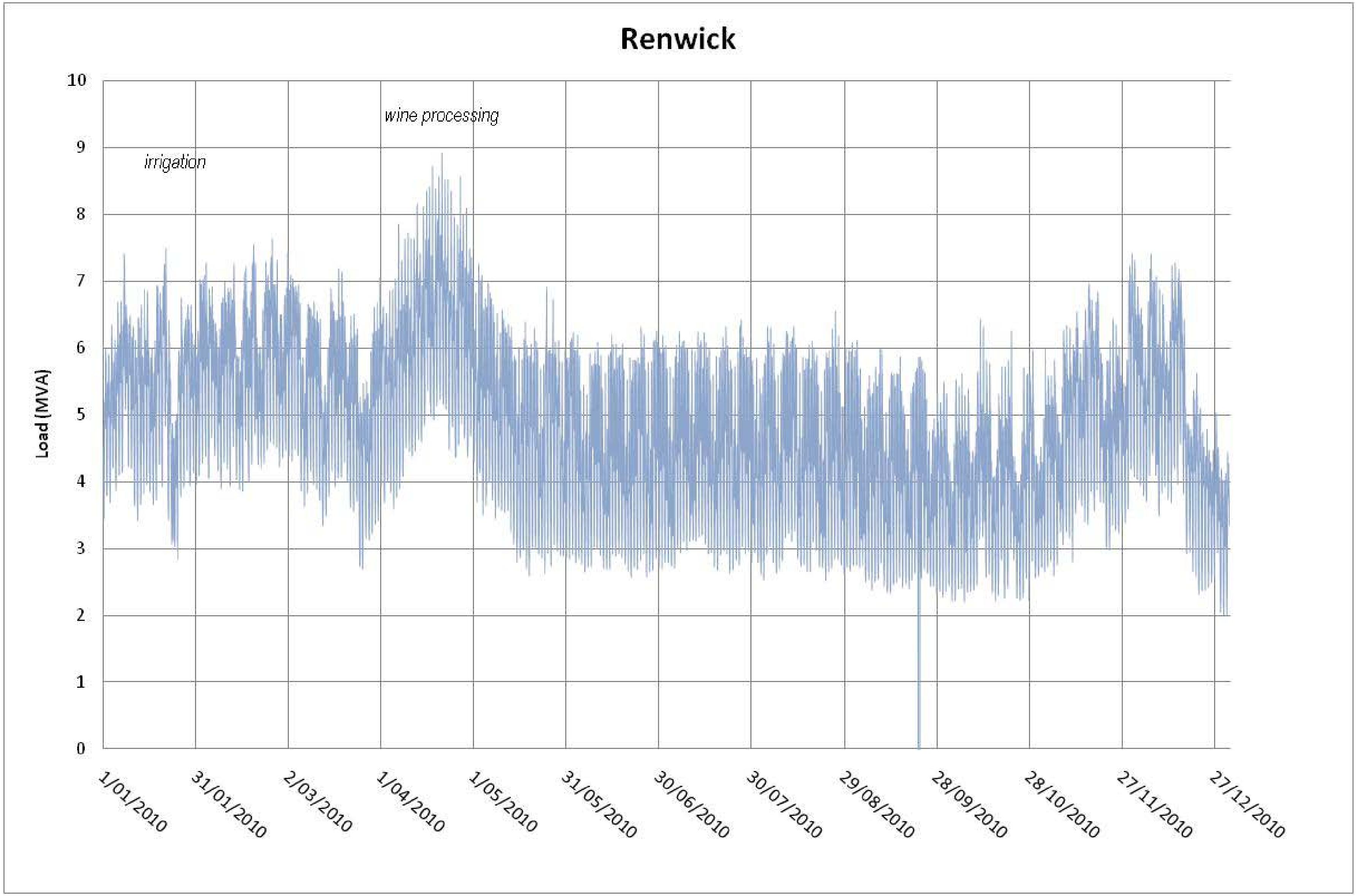

Nelson St (Blenheim)
mix of commercial load and domestic load, maximum loadings can occur when supplying load normally supplied from other Blenheim substations
Load (MVA)
14
12
10
8
6
4
2
0
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010


Picton
mix of commercial load and domestic load, Tourism increases summer holiday period loads
Load (MVA)
8
7
6
5
4
3
2
1
0
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010

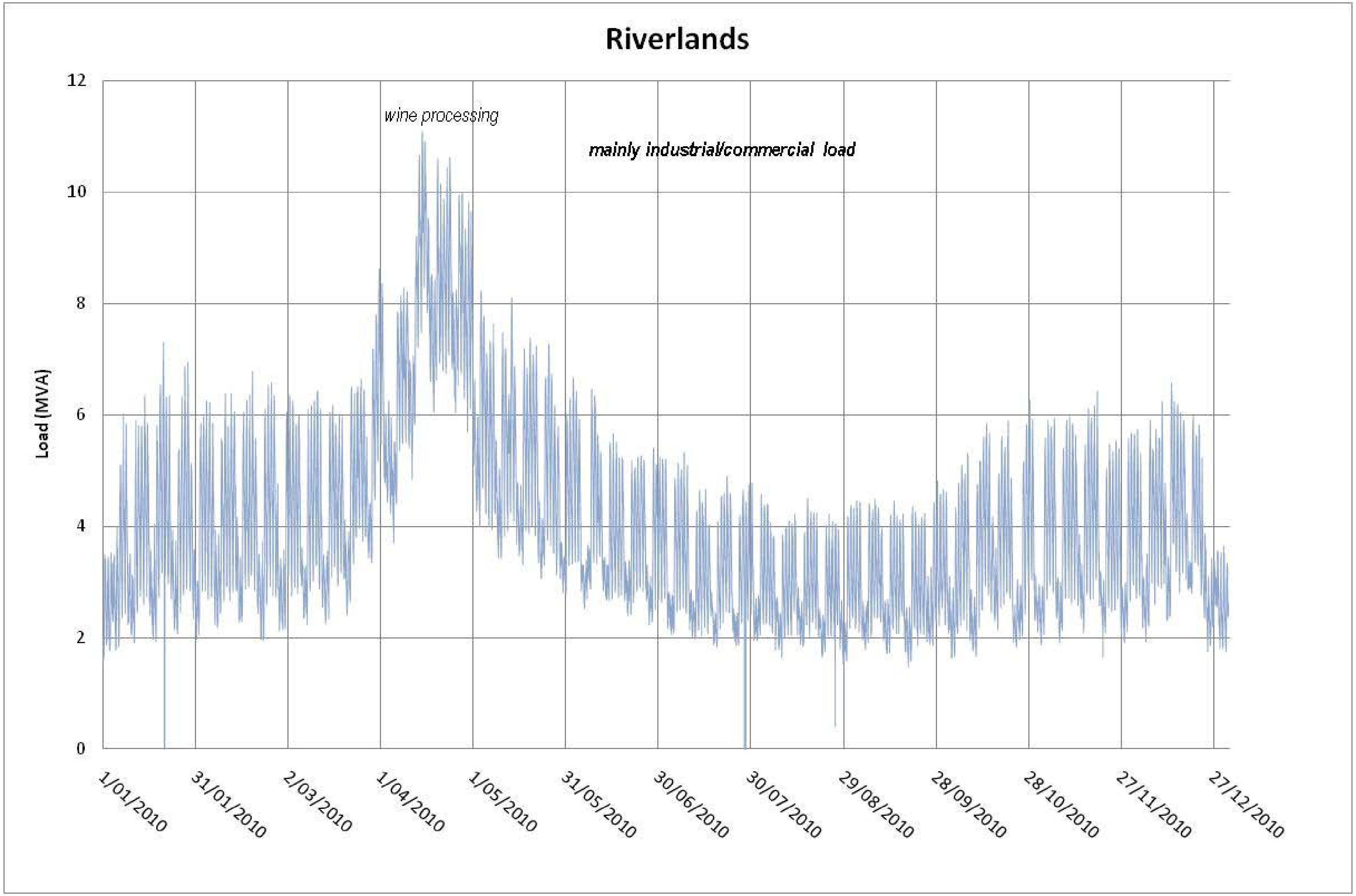

Rai Valley
dairying/irrigation, with Sounds loads
Load (MVA)
2.5
2
1.5
1
0.5
0
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010



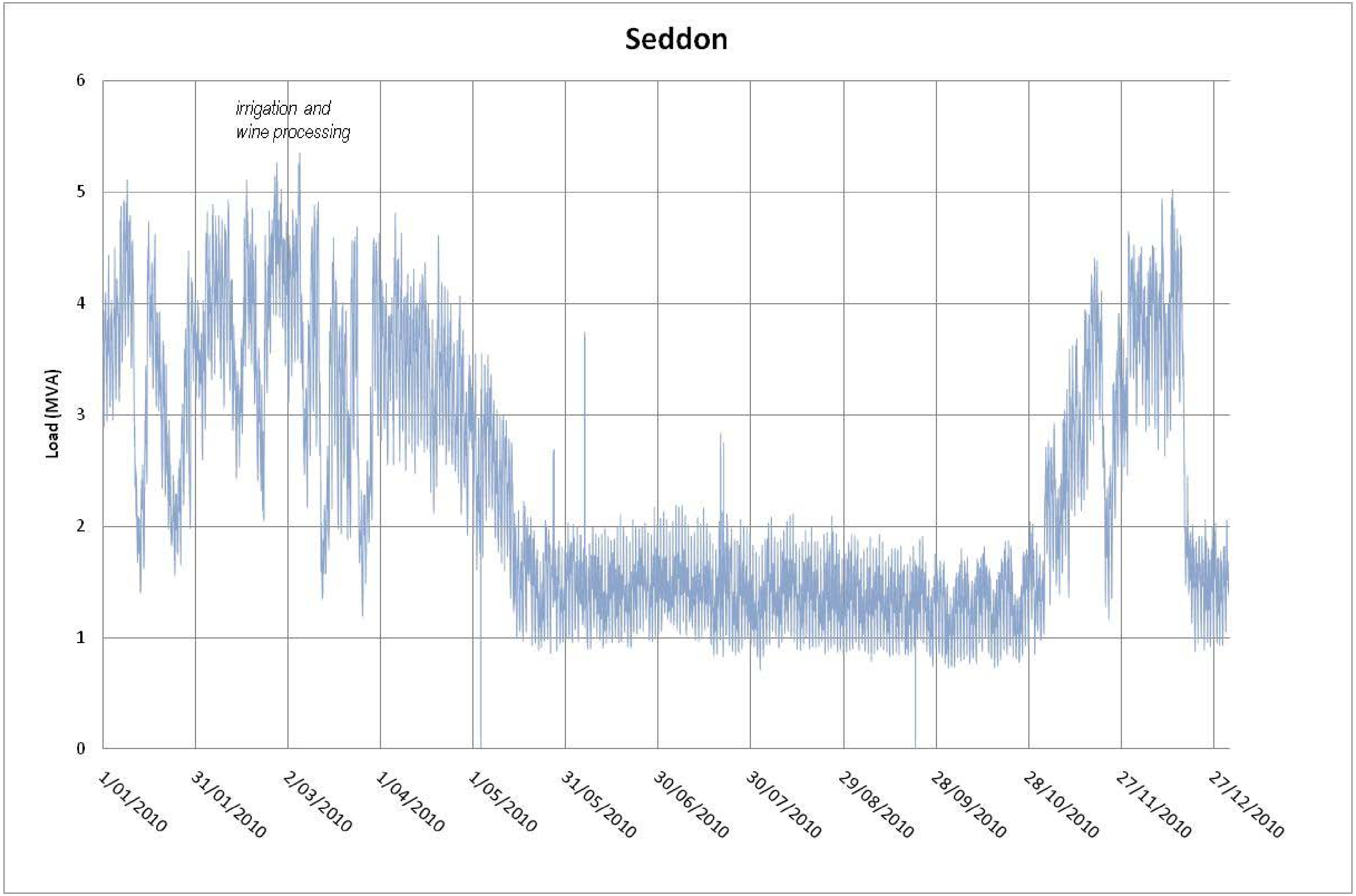
Redwoodtown (Blenheim)
large domestic load, maximum loads can occur when supplying load normally supplied from other Blenheim substations
Load (MVA)
18
16
14
12
10
8
6
4
2
0
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010

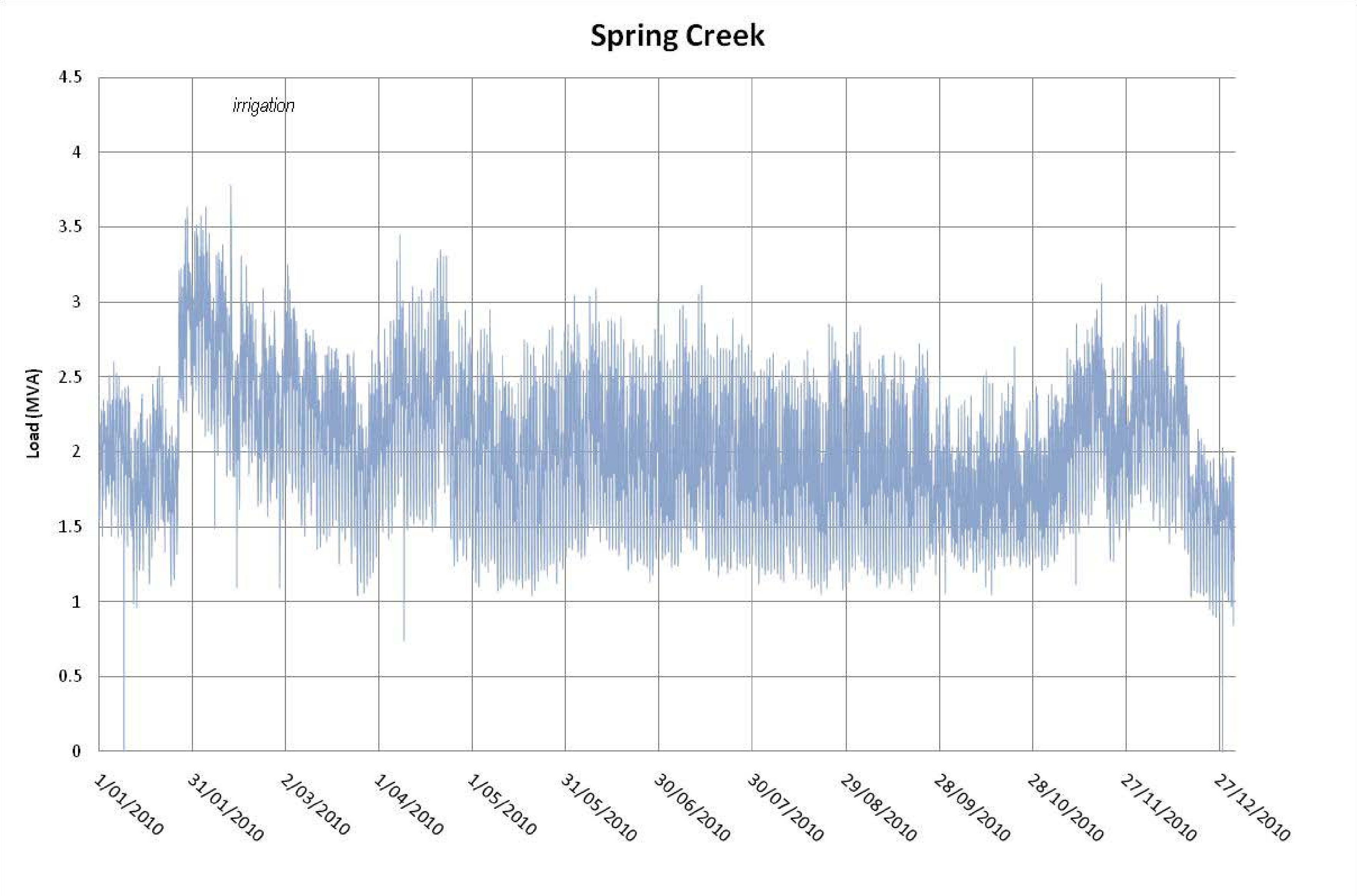


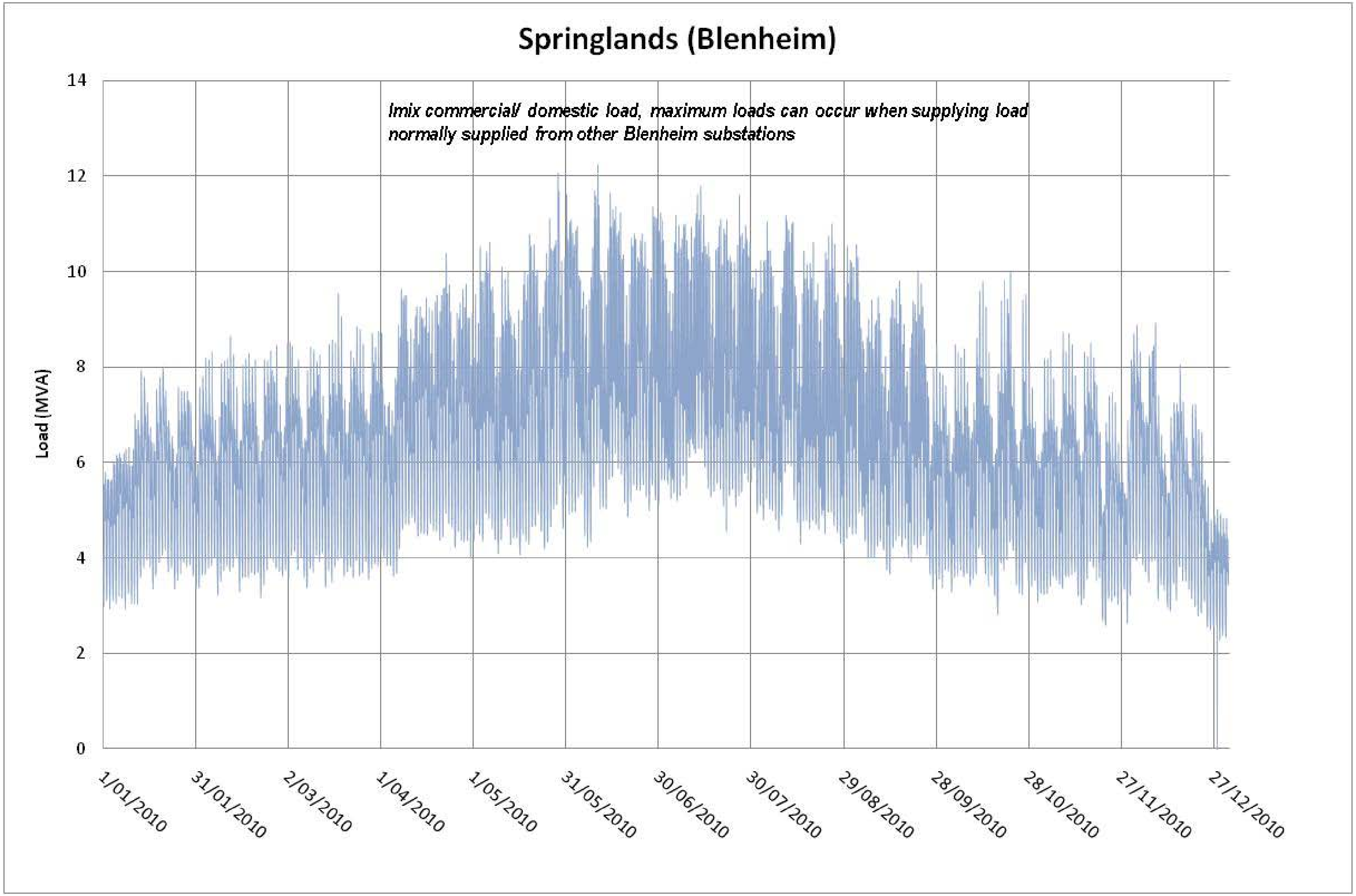
Renwick
Load (MVA)
10
9
8
7
6
5
4
3
2
1
0
irrigation
wine processing
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010



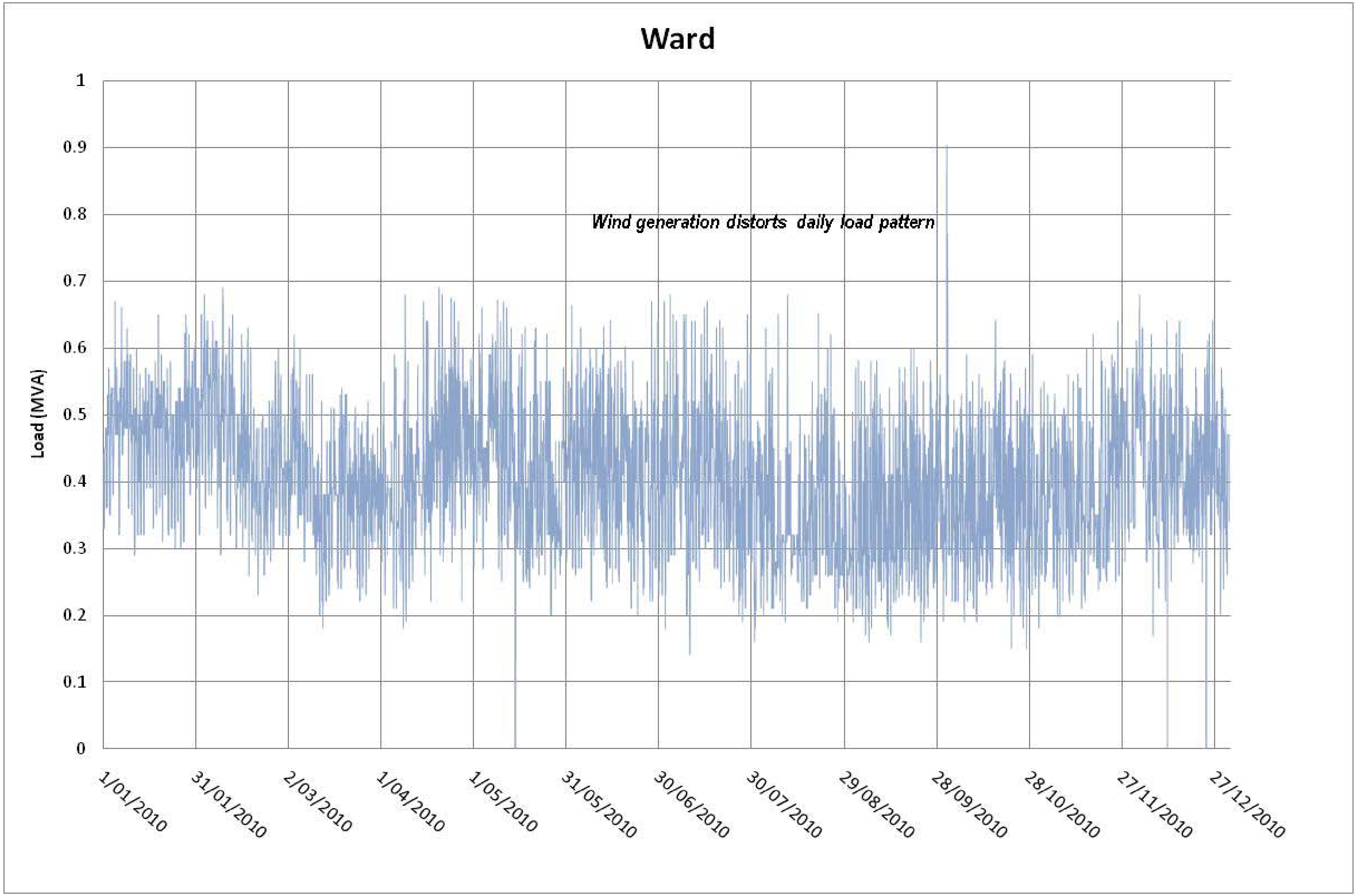
Riverlands
wine processing
mainly industrial/commercial load
Load (MVA)
12
10
8
6
4
2
0
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010


Seddon
irrigation and
wine processing
Load (MVA)
6
5
4
3
2
1
0
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010

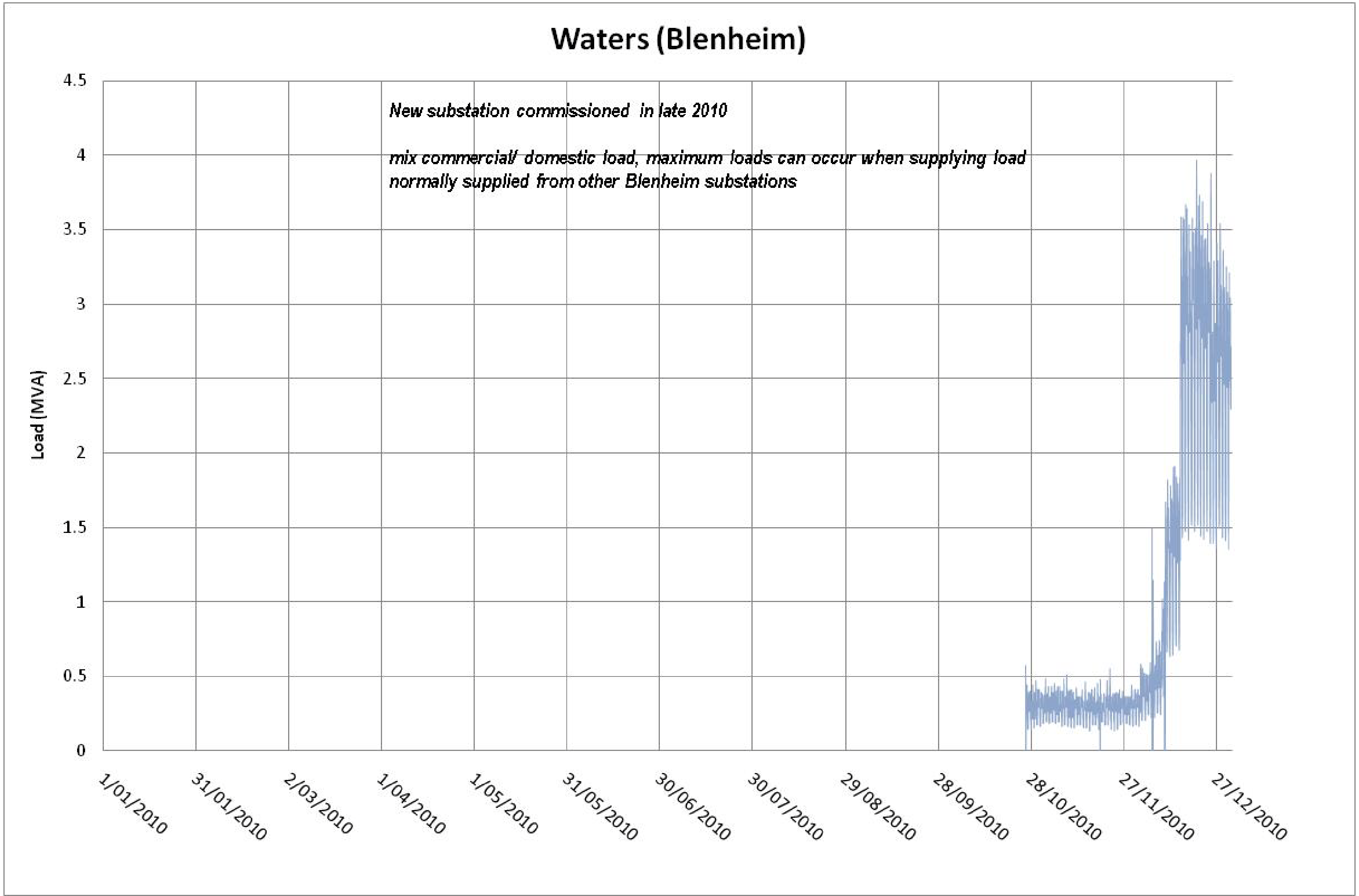

Spring Creek
irrigation
Load (MVA)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010

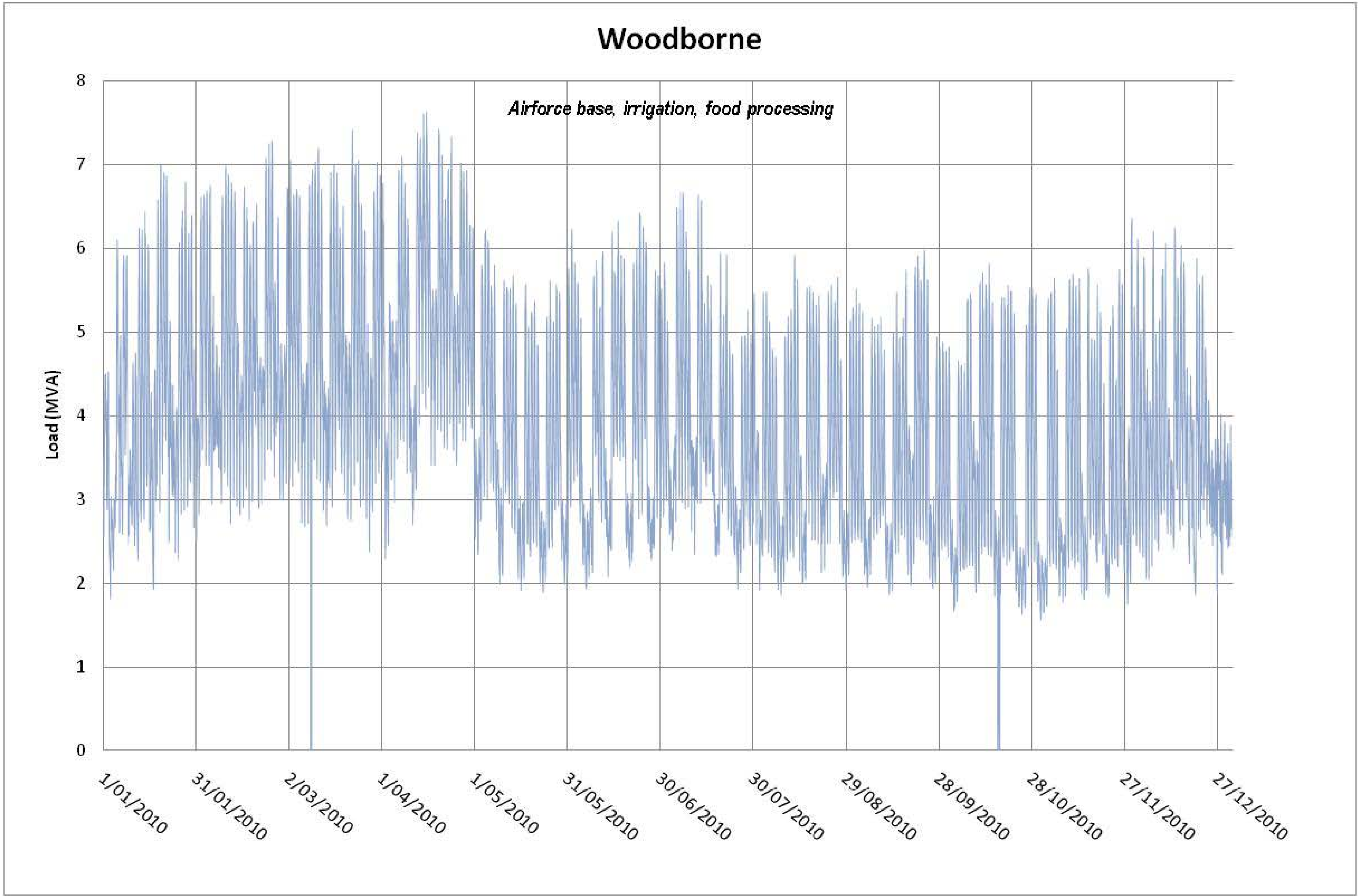


Springlands (Blenheim)
Imix commercial/ domestic load, maximum loads can occur when supplying load normally supplied from other Blenheim substations
Load (MVA)
14
12
10
8
6
4
2
0
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010



Ward
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Load (MVA)
Wind generation distorts daily load pattern
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010


Waters (Blenheim)
New substation commissioned in late 2010
mix commercial/ domestic load, maximum loads can occur when supplying load normally supplied from other Blenheim substations
Load (MVA)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010


Woodborne
Airforce base, irrigation, food processing
Load (MVA)
8
7
6
5
4
3
2
1
0
1/01/2010
31/01/2010
2/03/2010
1/04/2010
1/05/2010
31/05/2010
30/06/2010
30/07/2010
29/08/2010
28/09/2010
28/10/2010
27/11/2010
27/12/2010

C Network Policies

C.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:

C.1.1True 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's 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. MLL has a consumer advisory service which advises consumers on energy efficiency e.g. house insulation, hot water temperature settings etc.

C.1.2Partial 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.

C.2 Distributed generation

MLL 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 MLL 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 part of an asset's 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.

MLL 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

C.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. MLL 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 MLL' 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.

C.4 Upgrade of existing assets

MLL 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.

C.5 Installation of new assets

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

Where a new extension to the MLL' 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.

MLL may contribute to that investment subject to the following conditions:

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

C.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.

MLL 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 MLL or its stakeholders, they will be thoroughly investigated and, if appropriate, adopted.

C.7 Disposal of existing assets

MLL 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.

C.8 Safety

MLL 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 and ladder testing.

MLL 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, MLL has now achieved Tertiary level status for the ACC Work Place Safety Management Practices program. MLL 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.

C.9 Tangata Whenua

MLL is committed to Te Tiriti 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 MLL recognises the need for consultation on Wahi Tapu sites or areas.

MLL has an ongoing relationship with Marlborough Iwi.

C.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 MLL that supplies other customers or crosses other owners property is moved, an easement, of acceptable form to and in favour of MLL is required prior to relocation of the line.

***New Assets where ownership is to be transferred to MLL*:** Where ownership of new assets is to be transferred to MLL, an easement of acceptable form to, and in favour of, MLL is required.

Easements are recommended, but not mandatory where the assets are:
of the voltage at which the consumer takes supply (generally 230/400V); and
supply a single installation only; and
are entirely located on a single title; and
the landowner is the person responsible for their construction.

Easements must be provided before any future installation can be connected.

MLL 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.

C.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.

C.12 Sounds Contribution

As a result of past Government polices and legislation, MLL 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 MLL with a small return on the capital put into this area, all new connections must pay a connection fee to MLL. In addition to this fee, some new connections require capital repayments to the customers who originally contributed to the cost of installing the works.

C.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.

C.14 Live Line Work

Live Line work 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. MLL 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.

C.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. MLL recognises the legislative requirement to maintain all existing supplies, and appropriate levels of maintenance are provided.

C.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.

For consumers with a supply capacity of up to 140kVA, line charges comprise 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.

C.17 Access on to Private Property

MLL's Network has many kilometres of line located on private property. Where the lines were constructed before 1993, MLL 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 MLL 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, MLL is aware of the need to take care when entering private property, to protect the landowner's rights to use and enjoy their properties.

C.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 MLL 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.

C.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.

C.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 MLL.

C.21 Vegetation Control

One of the major issues facing the MLL Network is vegetation control. Significant areas of the reticulation pass through forestry areas, native bush or have trees/bush located nearby. MLL's 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.

C.22 Ownership of Assets

For the ownership and therefore maintenance responsibilities for any new assets to be transferred to MLL, 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.

C.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.

C.24 Stores

The items held in stock in the MLL 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 MLL's 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.

C.25 Fault Service

MLL 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.

D Glossary of Terms

AAAC – All aluminium conductor
ABS – Air Break Switch – used in the 33kV and 11kV Networks.
ACR – Asset Critically, a measure of important of asset for providing service
AMP – Asset Management Plan
GAAP – Generally Accepted Accounting Principles
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 is 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

CDMA – data system provided by Telecom, uses Cell Network, MLL uses this for some SCADA communications
DOC – Department of Conservation
EPV – Elevating Platform Vehicle – Used in Live Line work and for ease of maintenance on various assets.
GFC – Global Financial Crisis
GXP – Grid Exit Point, connection between Distribution Network and National Grid.
Hiab – Trade Name for truck mounted hydraulic crane.
kVA – 10^3 VA. Measure of apparent power.
kWh – 10^3 Wh 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 MLL
MDC – Marlborough District Council.
MLL – Marlborough Lines Limited
MVA – 10^6 VA. Measure of apparent power.
N level security, any one failure causes loss of supply
N-1 level security, two failures required before loss of supply
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 similar line business, would suggest more effective line maintenance, though a very low figure could indicate over investment.
NZTA – New Zealand Transport Agency
ODV – Optimised Deprival Value, a method of valuing assets laid down in regulations
PSTN – Public Switched Telephone Network, i.e. standard telephone system.
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

SCADA – Supervisory Control and Data Acquisition**,** computer and communications system to monitor and control equipment in the Network, e.g. circuit breakers
SCI – Statement of Corporate Intent
Standard NZ Voltages, 230V/400V. Transformers output 240V/415V to allow for voltage reduction along lines/cables.
SWER – Single Wire Earth Return. A system which uses a single wire (compared with two for convectional single phase or three for three phase) to transmit power. MLL uses this system at 11 kV.
TCR - Task Critically, a measure how urgently maintenance or repair is required
Thermovision - using infra-red technologies to locate hot spots/faults in Network Assets.
VHF – Very High Frequency, radio frequency used by MLL primarily for voice communications
WASP – Asset management and works management software from EMS Solutions Ltd

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:

Name	
Company (if applicable)	
Address	
Phone	
Fax	
Email	

Suggestions for improving the report

Suggestions for improving our asset management practices
