ASSET MANAGEMENT PLAN 2019-2029

mainpower

mainpower

Asset Management Plan 2019 – 2029

Section 1 – Summary

Summary

MainPower New Zealand Limited (MainPower) is a consumer trust owned Electricity Distribution Business (EDB) that builds, owns, operates and maintains the electricity distribution network in the North Canterbury region - providing distribution services to over 40,000 residential and business connections and delivering electricity to a population base of around 65,000 people.

MainPower is committed to contributing towards a bright future for our region by delivering an electricity distribution network that is ready for the future. Our vision is to provide safe, secure and sustainable services for current and future generations.

MainPower has undertaken a strategic review of its business within the 2018-2019 reporting period. A key outcome of this review included the development of a mission statement that reflects our corporate intent and demonstrates a clear link between our corporate goals, the direction our business is taking and asset management. It is our mission to partner in our customers' energy future and we have two key pillars of strategic intent, namely;

- Strengthening our core business for the future; and
- Creating new opportunities.

'Strengthening our core business for the future' means that asset management, our core business, is fully aligned with our corporate goals. It also means that our business objectives and network performance is delivering what our customers are telling us they want, while ensuring that the network is ready for a 'new energy future', including operational readiness and effectiveness.

'Creating new opportunities' recognises that, in a new energy future, services beyond that of a typical electricity distribution network will present other opportunities that are possibly non-regulated, leveraging off our core business. Strategically, it is expected that such services will be that of a Distribution Energy Resource Management system (DERMs).

The intention of the Asset Management Plan is to deliver a document that is clear and easy to read by a wide audience. It provides the context to our approach to asset management. This plan ensures network performance improves on our customer experience and works towards creating a network for the future, whilst balancing the needs of our customers, our community and other stakeholders.

Our strategic focus for the past year has been to embed a customer-centric approach within our business, having completed the implementation of an integrated Customer Relationship Management (CRM) solution. Our CRM solution has allowed us to create a better understanding of who our customers are and better manage interactions with our customers, thereby supporting the evolving needs of our customers and the business.

MainPower's customer-centric approach reflects the changing New Zealand electricity sector that is experiencing significant transformation, driven by new energy technologies, the movement to a low carbon footprint and changing customer behaviour. The challenge for MainPower is determining prudent investment in core infrastructure to achieve acceptable levels of service for the communities we serve, while providing fair pricing of our services. This is widely referred to as balancing the "energy trilemma" – delivering an energy supply that is secure and equitable (affordable and accessible) while remaining sustainable.

MainPower continues to invest to ensure that we achieve our strategic vision. This year MainPower embarked on two key business improvement initiatives:

- Updating our Enterprise Resource Planning (ERP) tool (TechnologyOne OneEnergy solution) that we use for financial, supply chain, asset and people management. The core objective is to improve the implementation of our asset fleet strategies ensuring that we do what we say we do to every asset, and, when performing maintenance activities, that we collect data that will inform our approach to Strategic Asset Management in order to further enhance our ability to address performance, cost and risk in the future.
- MainPower's Board has approved the implementation of an Advanced Distribution Management System (ADMS) that will integrate into our Network Operations. The ADMS comprises an Outage Management System (OMS), a new Supervisory Control and Data Acquisition (SCADA) system and a Distribution Management System (DMS). This is a transformational project that signals MainPower's intention to ensure that its network will be able to meet the demands of a new energy future, influenced by the decarbonisation of the economy.

Furthermore, and in response to this changing landscape, MainPower continues to review its approach to business. This year we have once again taken a fresh look at our asset management systems, processes and practices, not only assessing

our asset management maturity using the Commerce Commission's Asset Management Maturity Assessment Tool (AMMAT), but also assessing the maturity of the organisation against the international ISO55001 standard via independent evaluation.

While evaluating our business against ISO55001 we concluded that, as a business, we had to enhance our approach to asset management not simply from the network perspective, but also as an organisation with a focus on our assets and our people. The fact that MainPower is already accredited to the internationally accepted ISO9001 standard makes the journey to ISO55001 less complex and arduous than might otherwise have been expected.

MainPower recognises that that the way in which the distribution network will be used in the future, and the services customers will require from the network, will be influenced by changing customer behaviours, new technologies and a national transition to a low carbon economy. Network development policies and procedures take account of this new trajectory and recognise the need to move from the traditional distribution network approach of demand-based planning to a scenario-based planning approach. This work remains a key focus of MainPower's work for the planning period ahead.

Asset Management Plan 2019 – 2029

Section 2 – Background and Objectives

This section outlines the scope, purpose and strategic alignment of this Asset Management Plan which covers MainPower's distribution network and associated systems that deliver energy to our customers in the Waimakariri, Hurunui and Kaikoura districts.

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2. Background and Objective

This Asset Management Plan (AMP) covers a ten-year planning period, from 1 April 2019 to 31 March 2029 and was approved by the Board of Directors at the 21 March 2019 meeting.

The AMP provides our customers and stakeholders with insight and explanation as to how we provide electricity distribution services to our customers in a safe, reliable, economically efficient and sustainable manner that meets the expectations of both customers and stakeholders over the next ten years.

2.1 Purpose and Alignment to Corporate Objectives

2.1.1 Purpose of the AMP

The AMP is a planning document that provides information on asset management systems, processes and practices with a specific focus on the development, maintenance and replacement plans for our electricity distribution network assets that enables MainPower to understand cost, risk and network performance in accordance with stakeholders' requirements.

In addition, the information within the AMP informs our annual business and financial planning, ensuring that sufficient resources are directed to deliver the identified asset management needs consistent with our overall corporate objectives.

The AMP also demonstrates our alignment with best practice asset management processes. The content and structure serve to achieve compliance with the Commerce Act information disclosure requirements for electricity lines services.

2.1.2 Strategic Alignment

MainPower's vision is to provide safe, secure and sustainable services for current and future generations. It is our mission to partner in our customers' energy future and we have two key pillars of strategic intent, namely;

- Strengthening our core business for the future; and
- Creating new opportunities.

2.1.3 Strengthening our Core Business

'Strengthening our core business for the future' means that asset management, our core business, is fully aligned with our corporate goals. It also means that our business objectives and the performance of the network is delivering what our customers are telling us they want, while ensuring that the network is ready for a 'new energy future' including operational readiness and effectiveness

- Strategic Asset Management and Operational Excellence

  Develop and improve our asset management and operational practices ensuring MainPower is an effective and efficient asset management organisation that delivers value to the business, our customers and shareholders achieving ISO55001 compliance.

Figure 1 Strengthening Our Core Business

- Evolution to the network of the future
  - Continue to maintain and build on the value in our assets and services including the implementation of an Advanced Distribution Management System;
  - Collaboration with other Electricity Distribution Businesses (EDBs), delivering common architecture, access and competency – minimising risk across regions and developing regional resilience;
  - Transition from a Distribution Network Provider (DNP) to a Distribution System Integrator (DSI) offering an open architecture framework so that customers can engage with other market participants enabling them to extract full value from their Distributed Energy Resources (DER); and
  - Ensure that our operating systems and process can offer Distribution System Operator (DSO) services in the future.

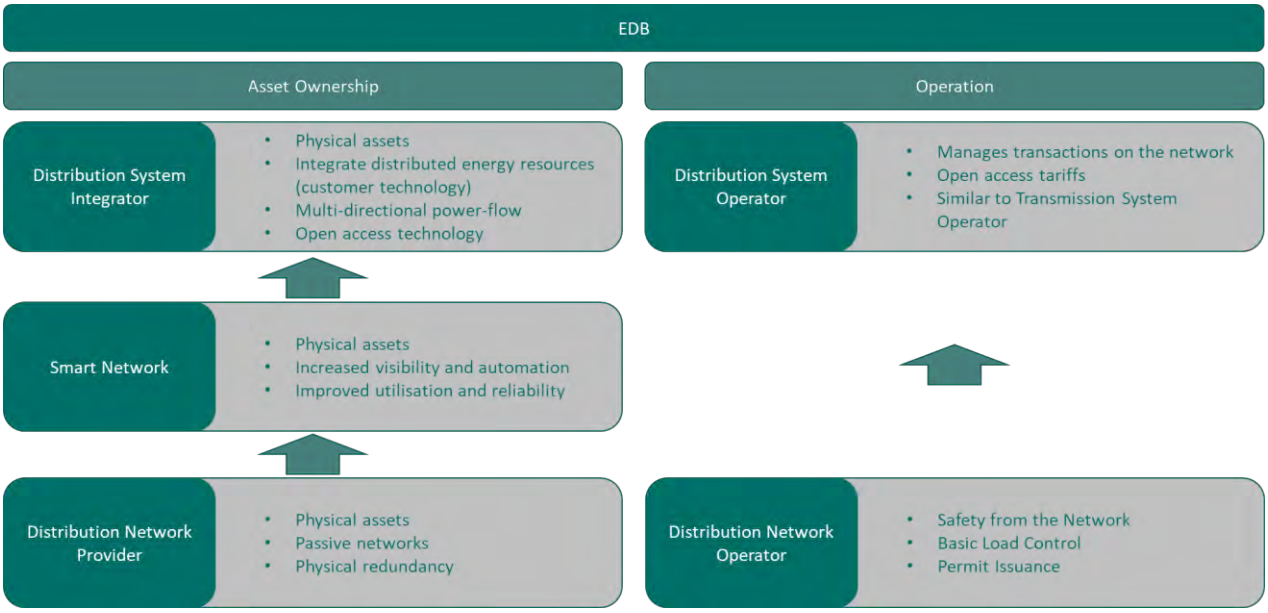


Figure 2 New Energy Future

2.1.4 Creating New Opportunities

'Creating new opportunities' - recognises that in a 'new energy future', services beyond that of a typical Electricity Distribution Business (EDB) will present other opportunities. Currently it is anticipated that such services will be aligned with that of a Distribution Energy Resource Management system (DERMs).

Distribution Energy Resource Management system

- Enable internal expertise and systems that provide a platform of Asset Management and Operational Excellence delivering solutions that allow MainPower to 'partner in our customer's energy future';
- Outage management and first response; and
- Deliver a complete 'Plan Build Operate' approach to our customer energy systems.

Figure 3 Creating New Opportunities

2.1.5 Business Planning

A key focus of MainPower's approach to asset management is how we link our everyday asset management decisions and activities to our corporate objectives. This provides line-of-sight from our corporate objectives (informed by our Asset Management Plan) through our lifecycle strategies for individual asset classes to our everyday maintenance activities. Our approach to aligning lifecycle planning to corporate objectives is outlined in the figure below.

Figure 4 Aligning Lifecycle Planning to Strategy

2.1.6 Relationship of Management Plans

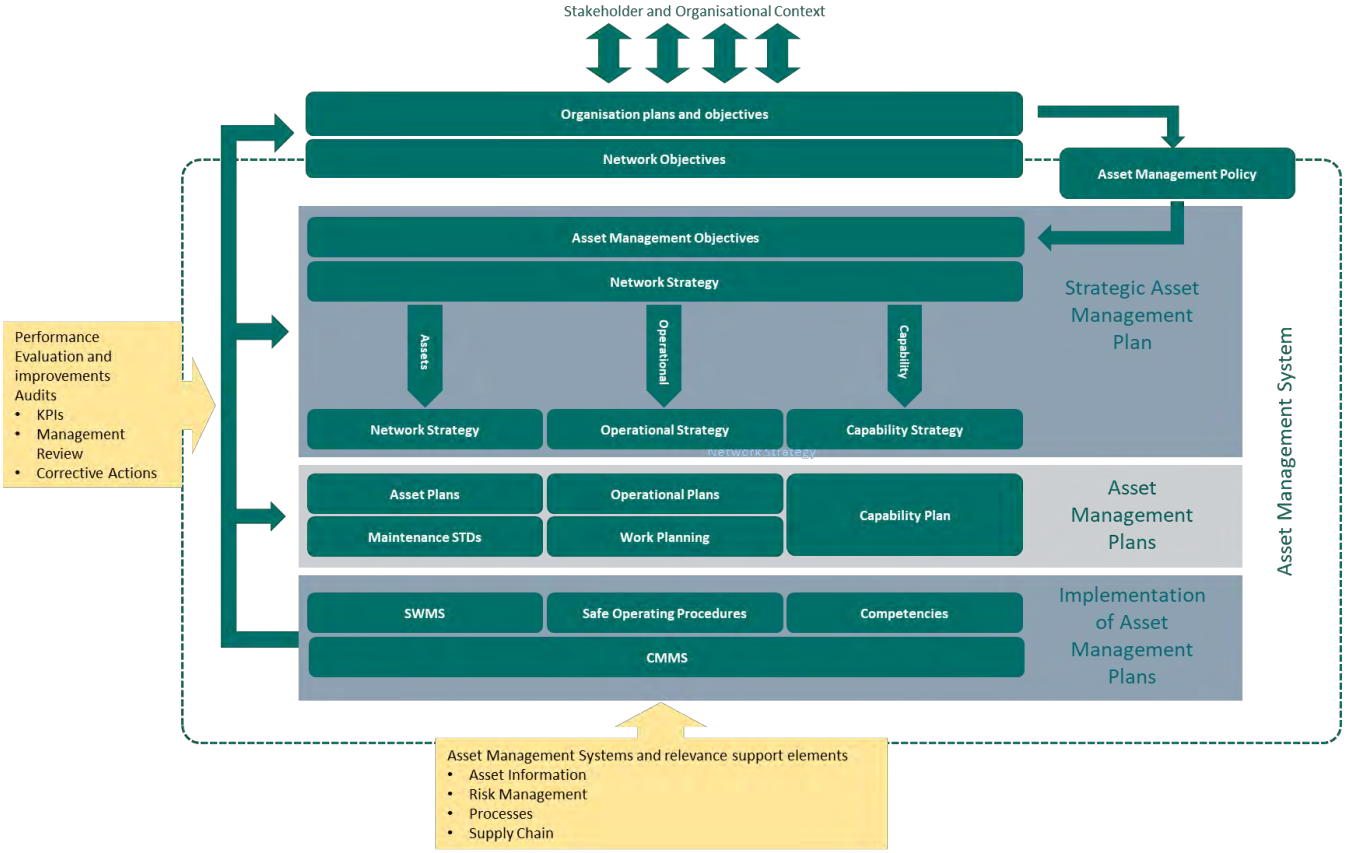


Figure 5 Asset Management Planning Documents

2.1.7 Business Objectives

Strategic Themes			
1.0 Customer Focus Objective 1.1: **Act to Invest and Support our Customers:** • Customer survey results demonstrates alignment • Greater knowledge of our customers • Increasing direct interface with our customers. Objective 1.2: **Deliver Value to our Customers** • High measured customer satisfaction • Low levels of off-griding Objective 1.3: **Evaluate** • Assess network performance against customer requirements	**2.0 Operational Excellence** Objective 2.1: **Invest to Ensure Safe, Secure and Resilient Network** • Stable fault rate and performance trends • Stable defect stocks and risk trends Objective 2.2: **Asset Management Drives Investment Efficiency** • Achieving ISO55001 accreditation • Benchmark against similar EDBs for Price Profits Expenditure and Reliability • Understand Cost, Performance and Risk Objective 2.3: **Continually Improve Organisational Performance** • Delivery against plan • Higher productivity	**3.0 New Energy Future** Objective 3.1: **Enable Customer Energy Choices** • System architecture for Distribution System Integrator • DSI tariff structures provide platform for customers • Deliver a smart network • Enhance service offering from EDB to DSO. Objective 3.2: **Efficient Current and Future Asset Utilisation** • Efficient network asset growth – stranding risk assessed and minimised • Measurable business value from non-network solutions • Maintained or improved asset utilisation	**4.0 Growth** Objective 4.1: **MainPower Value** • Integrate and manage Distributed Energy Resources into our systems and processes • Advance Network Management beyond electrical distribution • Asset Management beyond MainPower Electrical Network Objective 4.2: **Community Partnering** • OMS and First Response with others • Develop DERMs opportunities with others

Initiatives – Network Business Goals and Objectives								
1. Customer Experience • Digital Communications and Information • Customer Relationship Management • Customer Surveys • Community Sponsorship • System Performance	**2. Future Energy Networks** • Cost-Reflective • Technology Roadmap • Technology Trials • Industry Collaboration • Network Architecture Standards • Advanced Distribution Management System	**3. Excellence in Asset Management** • ISO55001 • CBRM Models • Asset Health Indicators • Enhanced Asset Data Reliability • Data Analytics • Asset Fleet Strategies	**4. Safe, Secure, Resilient Networks** • Asset Renewals Programme • Security and Growth Programme • Optimised Service Delivery Model • Advanced Distribution Management System	**5. Enhanced Safety Performance** • Safety in Design • Enhanced Contractor Management • Generative Safety Performance • Quality Lifecycle	**6. High Performance Organisation** • Talent Development • Change Leadership Development	**7. New Foundations** • Data Governance • Process Optimisation • Works Management	**8. Regulatory Alignment** • Pricing Strategy • Regulatory Performance Comparison Assessment • AMMAT Assessment	**9. Value Optimisation** • Value-Focused Decision Making • Risk Assessment and Tolerance

Table 1 Business Objectives

2.2 Stakeholder Interests

Defining and understanding the needs and desires of our stakeholder groups allows us to structure our strategic objectives and define service levels in a way that is meaningful and relevant. We have the following groups.

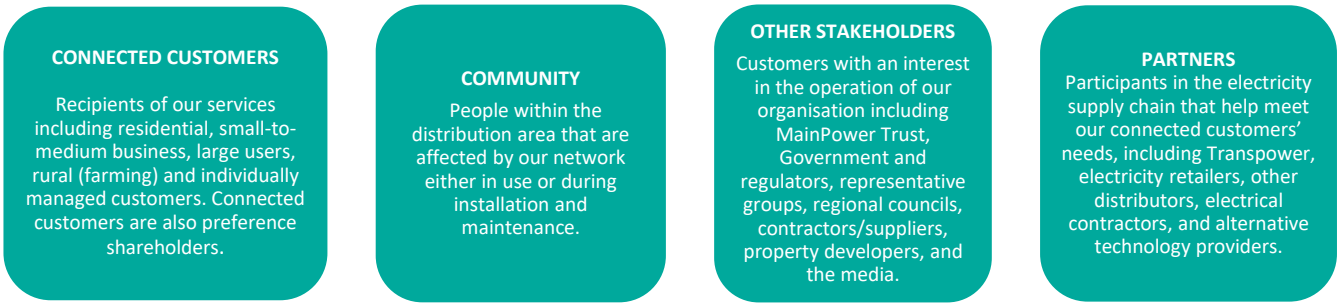


Figure 6 Our Stakeholder Groups

2.2.1 Stakeholder Engagement

We identify the expectations and requirements of our stakeholders through a wide range of engagement activities, including consultation, correspondence and online feedback via our website. Our other methods of identification are summarised in the table below.

STAKEHOLDER	HOW WE IDENTIFY THE EXPECTATIONS AND REQUIREMENTS OF STAKEHOLDERS
All Stakeholders	Consultation and correspondence
Connected Customers	Customer account managers Customer discussion groups Customer research (quantitative and qualitative methods) Direct current feedback/interactions Events (including Annual Meeting) Informal contact/discussions Open days Public meetings and information sessions Submissions on discussion papers
Community, Representative Groups	Direct current feedback/interactions

STAKEHOLDER	HOW WE IDENTIFY THE EXPECTATIONS AND REQUIREMENTS OF STAKEHOLDERS
	Forums and working groups One-on-one meetings Open days Submissions on discussion papers
MainPower Trust (Ordinary Shareholder)	Direct current feedback/interactions Events (including Annual Meeting) Operational interface Other engagement activities
Government	Disclosure requirements Submissions on discussion papers
Regulators	Adherence to corporate policies Disclosure requirements Operational interface
Regional Government	Disclosure requirements
Contractors and Suppliers	Direct current feedback/interactions One-on-one meetings
Media	Briefing sessions Forums and working groups Media monitoring and editorial opportunities Open days Public meetings and information sessions Sponsorship involvement
Transpower	Operational interface Submissions on discussion papers
Electricity Retailers	Direct current feedback/interactions Industry collaboration Informal contact/discussions One-on-one meetings Open days Public meetings and information sessions
Electricity Industry	Forums and working groups Informal contact/discussions One-on-one meetings Open days Participation in industry (including membership) Public meetings and information sessions Submissions on discussion papers

Table 2 How we identify the expectations of our stakeholders

2.2.2 Summarising the Interests of Our Stakeholders

The expectations of our stakeholders are summarised in the table below.

STAKEHOLDER	EXPECTATIONS
Connected Customers	Accessibility – easy to contact my provider, if needed Consistency of service delivery (including response time) Continuity of supply – keeping the power on Future innovation Health, safety and environment Price – keeping costs down Quality – keeping flickering or dimming lights to a minimum Restoration of supply – reducing length of time when power is off Transparent communication (including outage information)
Community, Representative Groups	Community focus Corporate social responsibility Engagement and consultation Public safety around electricity
Other Stakeholders	
MainPower Trust (Ordinary Shareholder)	Delivery of a secure and reliable power supply Effective and efficient incident response Future innovation Health, safety and environment

STAKEHOLDER	EXPECTATIONS
	Maintaining shareholder value Prudent risk management Statutory/regulatory compliance
Government	Appropriate investment in infrastructure Delivery of a secure and reliable power supply Future innovation Health, safety and environment Industry collaboration
Regulators	Contribution via industry consultations/submissions Cost-reflective pricing methodology Delivery of a secure and reliable power supply Health, safety and environment Future innovation Statutory/regulatory compliance
Regional Government	Appropriate investment in infrastructure Collaboration on shared service upgrades Contribute towards a vibrant and prosperous region Contribution to planning via consultations/submissions Delivery of a secure and reliable power supply Engagement and consultation Health, safety and environment Future innovation
Contractors and Suppliers	Effective contractor management Health, safety and environment
Media	Effective relationship management Timely access to information
Partners	
Transpower	Appropriate investment in infrastructure Collaboration and effective relationship management Engagement and consultation Health, safety and environment Transparent communication (including outage information)
Electricity Retailers	Continuity and security of supply Effective systems and processes Health, safety and environment Transparent communication (including outage information)
Electricity Industry	Collaboration Future innovation Health, safety and environment Industry participation Information and knowledge sharing
Bankers and Insurers	Accurate and timely performance information Confidence in Board and leadership Good governance Prudent risk management Sufficient revenue to maintain asset efficiency and reliability

Table 3 What our stakeholders expect from us

2.2.3 Translating Stakeholder Interests into Asset Management

We meet the expectations of our stakeholders through our approach to asset management. The statements below describe how we meet those expectations. The first set of statements is focused mainly on customers and the public.

- We ensure that staff, contractors and the public are able to move around and work on our electricity distribution network in total safety.
- We meet customer expectations regarding service levels, and, importantly, meet our customers' needs for fair pricing commensurate with our service levels.
- We understand that continuity and restoration of supply is essential to minimise interruptions to customers.
- We ensure customers have positive experiences with their interactions with MainPower.
- We comply with many statutory requirements ranging from safety to required regulatory disclosures.

The statements below describe other ways we meet those expectations.

- We actively identify key risks and seek to mitigate them where economically and practically possible.
- We use effective contingency planning.
- We maintain our security of supply standards across the network.
- We are efficient and effective in our network operations and planning.
- We provide timely and accurate information.
- We ensure sufficient revenue to maintain asset efficiency and reliability.
- We are innovative and drive continual improvements in our operations.
- We assess the performance of our network against what our customers are telling us they want.

2.2.4 Managing Stakeholder Interests when they Conflict

Where stakeholder conflicts arise, the priorities for managing the conflicts are ranked in the following order:

1. Safety
2. Compliance
3. Service quality
4. Risk management
5. Efficiency and effectiveness

2.3 Accountabilities and Responsibilities for Asset Management

2.3.1 Ownership

We are a closely held shareholder structure with all the shares held by the MainPower Trust. The MainPower Trust holds shares in the Company on behalf of connected electricity customers, who are both the income and capital beneficiaries of the Trust.

The Trust appoints the MainPower Board of Directors and agrees the Statement of Corporate Intent. The Trust also provides input on behalf of their beneficiaries on matters of relevance to asset management planning such as price, quality and performance.

The trust also requires MainPower to trend its performance against a selected sample of other EDBs in terms of profits, price, expenditure and network reliability.

2.3.2 Governance

MainPower currently has 6 non-executive Directors who collectively comprise the Board of Directors. The Board is accountable to the Trust.

The Board of Directors is responsible for the corporate governance of MainPower. The Board delegates the day-to-day responsibility for the operation and administration of MainPower to the Chief Executive (CE). Directors also approve the AMP, business plan and budget. Financial approvals that exceed the delegated authority of the CE require Board approval i.e. large investment proposals.

The MainPower Senior Leadership Team structure is provided below.

Figure 7 Senior Leadership Team Structure

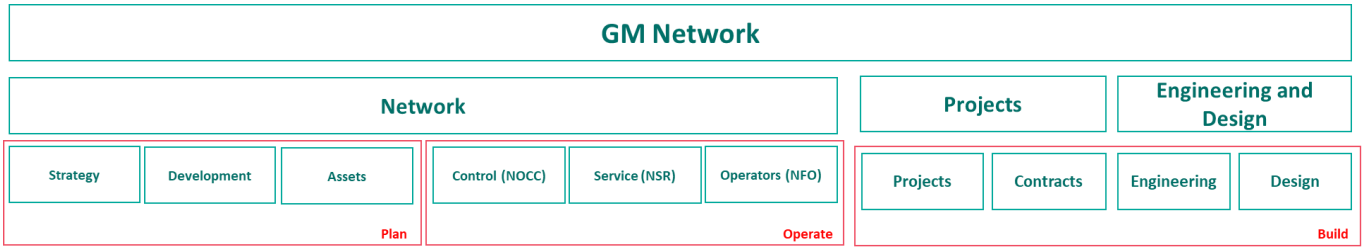
The Chief Executive of MainPower is accountable to the Board through an employment agreement, which includes performance criteria.

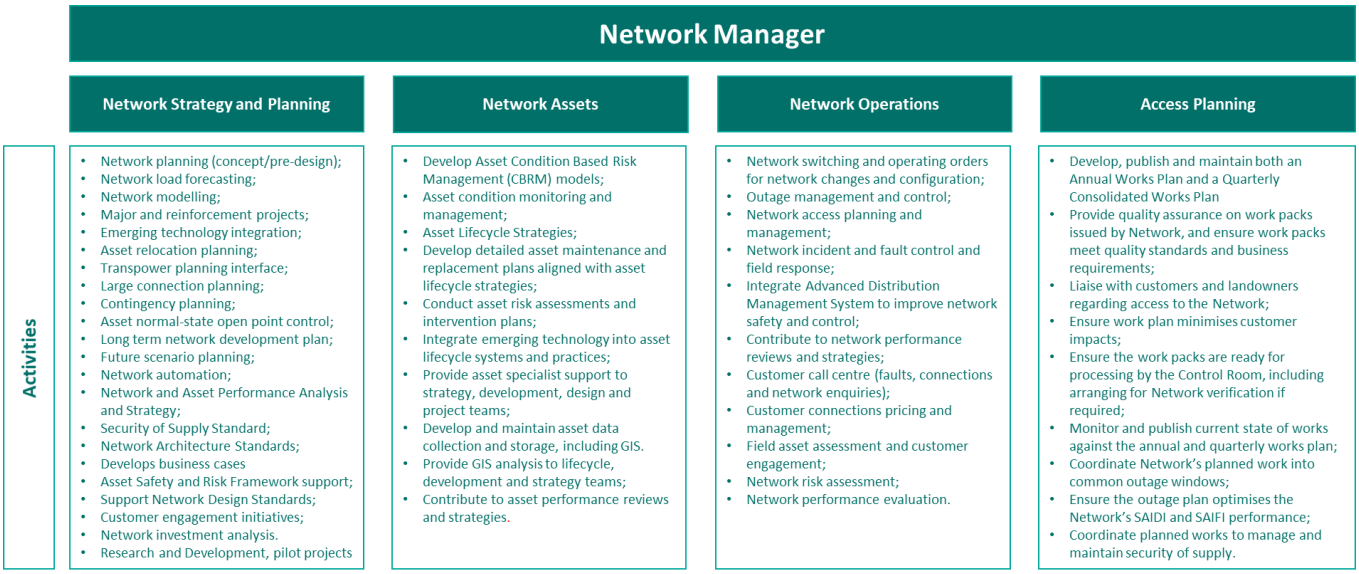
The Asset Management Plan serves to communicate to the Board the business's approach to asset management. Corporate objectives, expenditure, network and asset management performance is reported to the Board monthly.

As MainPower transforms its network for a new energy future, it has also set up a Strategic Asset Management steering group. The group includes a Board Director, the CE and the General Manager Network. The purpose of the steering group is to oversee the enhancement of asset management at MainPower in accordance with our corporate objectives, taking into consideration a changing energy sector. The group has met as required to date but intends to meet quarterly in this reporting cycle.

2.3.3 Management

The Network team has accountability for asset management and overall network performance. The Network team is structured on a 'Plan, Build, Operate' basis.





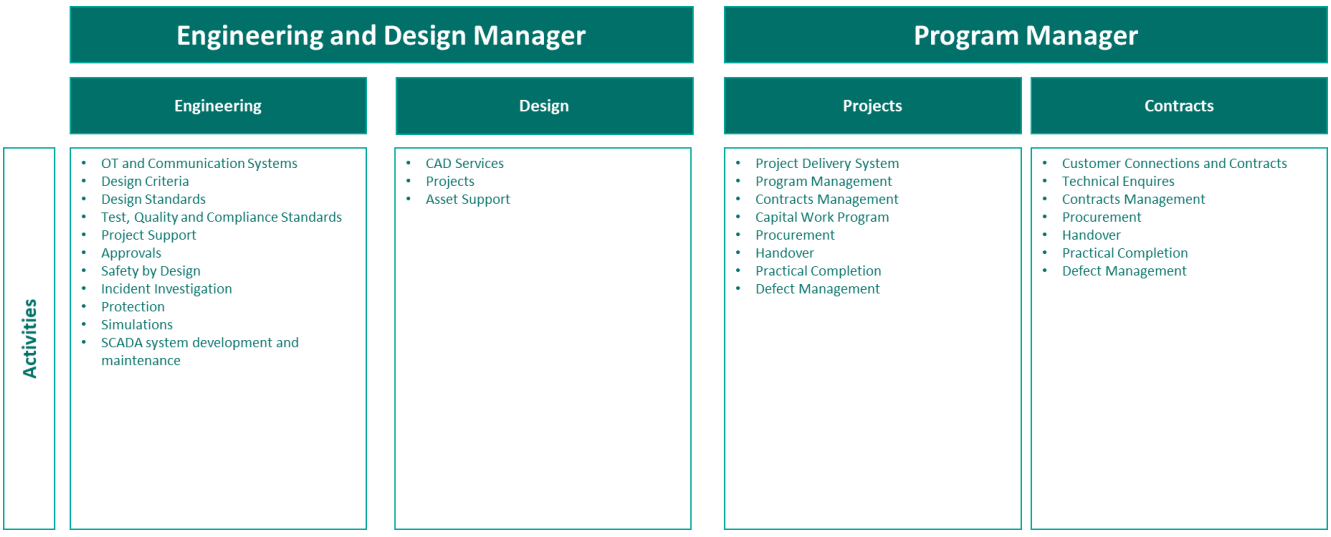


Figure 8 Asset Management Team (Network) Structure

2.3.4 Field Services

MainPower has implemented a Field Services Agreement (FSA) that describes how maintenance and construction activities are to be issued by the Network team and completed by the Operations team. In most instances it is the responsibility of the General Manager Operations to deliver the maintenance and construction activities. Where the Operations team has the capability but not the capacity to complete the maintenance and construction activities, the Operations team will contract out the works to a third party.

All field works are governed by rate cards. The rate cards detail the services required and the standard to which the services will be delivered including market costs to deliver the works.

The works streams described in the Field Services Agreement are:

- Project services; and
- Routine services.

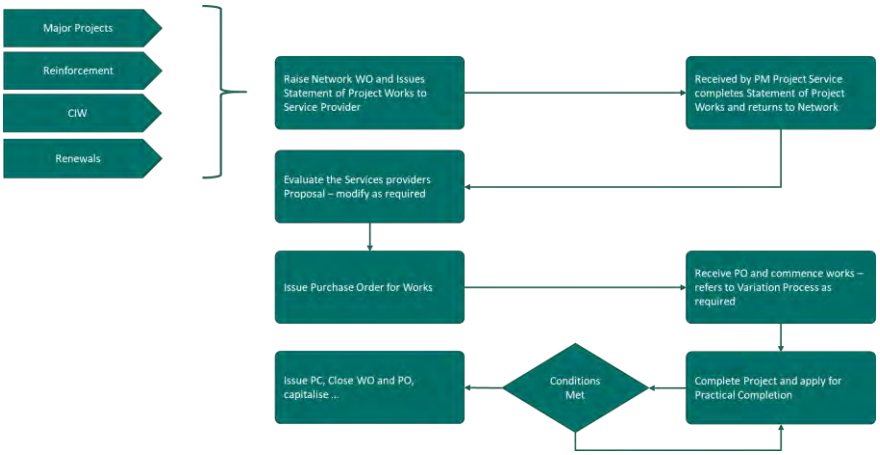


Figure 9 Project Services Workflow

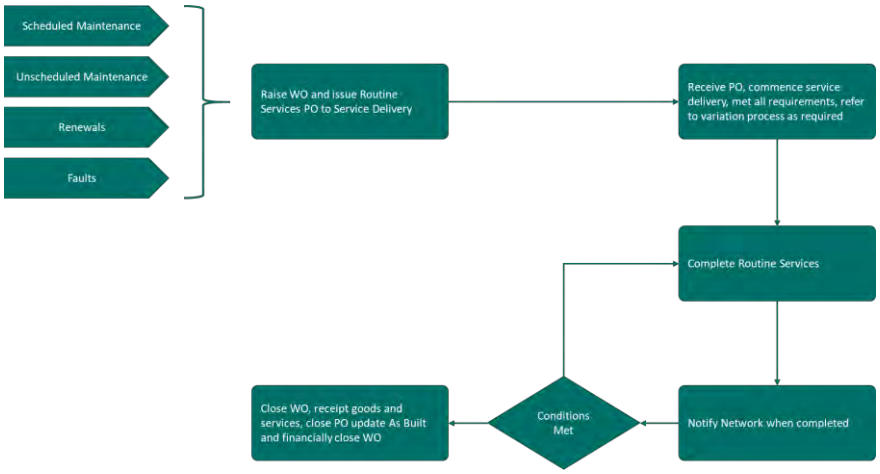


Figure 10 Routine Services Workflow

2.4 Assumptions Made

2.4.1 Significant Assumptions Made

The following assumptions have been made in the preparation of the AMP.

- Residential subdivision activity will continue or plateau and possibly reduce, over the planning period.
- Major industrial plants will maintain similar kW and kWh demand for the next five years.

- It is possible that a significant renewable energy project (Mt Cass) may obtain approval to proceed within the next reporting cycle. The requirements to connect Mt Cass to the grid is not documented in this AMP.
- Small grid connected Distributed Generation (DG) will increase throughout the planning period, impacting financial growth but not causing significant network constraints.
- Existing external regulatory and legislative requirements are assumed to remain unchanged throughout the planning period.
- All projections of expenditure are presented in constant terms (as at 01 April 2019, without inflation).
- Transpower continues to provide sufficient capacity to meet MainPower's requirements at the existing GXPs and undertakes additional investment required to meet future demand, as specified in the development plan.
- MainPower's existing corporate vision and strategic objectives continue for the planning period.
- Neither MainPower's network nor the local transmission grid is exposed to a major natural disaster during the planning period.
- Our network is exposed to climatic (temperature, wind, snow and rain) variation over the planning period, consistent with our experience since 2000.
- Seasonal load profiles remain consistent with recent historical trends.
- Zoning for land use purposes remains unchanged during the planning period.
- Electric vehicle charging loads are not likely to significantly impact network constraints within the planning period.

2.4.2 Sources of Information

The principal sources of information relevant to this AMP are listed below.

- MainPower's strategic planning documents including the Statement of Corporate Intent and the Annual Business Plan and Budget
- MainPower's Asset Management Policy
- MainPower's Business Continuity Plan
- Ongoing customer surveys
- Maximum electricity demand at each GXP
- Regional population data and forecasts sourced from Statistics New Zealand and the Waimakariri, Hurunui and Kaikoura District Councils
- Interaction with customers and the community in relation to possible future developments within the network region

2.4.3 Forecasting Certainty

We have assessed the level of certainty of forecasts relevant to different customer groups within our AMP planning period as follows:

Timeframe	Location	Constraint	Proposed Remedy
Year 1	Reasonable certainty	Reasonable certainty	Reasonable certainty
Year 2 - 3	Some certainty	Reasonable certainty	Reasonable certainty
Year 4 - 6	Some certainty	Little if any certainty	Some certainty
Year 7 -10	Some certainty	Little if any certainty	None

Table 4 Planning Certainty

2.4.4 Escalation Index

Our input prices are subject to a range of cost pressures including those which apply to skilled and unskilled labour, material components (such as copper, aluminum, steel), the NZD exchange rates, and other inputs such as fuel. We have applied the Westpac Economics Forecast Summary Spreadsheet values for the purpose of converting our constant price forecasts to nominal terms as given in the table below.

Year	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Index	1	1	1.015	1.018	1.016	1.017	1.019	1.019	1.019	1.019

Table 5 Escalation Index based on Westpac Inflation Index

2.4.5 Sources of Uncertainty

MainPower considers that the following factors could lead to material differences in actual versus planned. However, as this plan is updated annually, it is expected that any differences would exhibit as a linear (i.e. not a step) change and would be anticipated in advance.

Changes in demand factors most significantly impact future development plans. Higher than forecast growth brings forward the need for investments in additional capacity, security or reliability or increased load management, while lower than expected growth allows them to be deferred (in some cases). Uncertainties within our demand assumptions include:

- The rate of growth in demand could significantly accelerate or decelerate within the planning period.
- Dry/wet years that impact irrigation demand.
- Significant land zoning changes may be implemented within the region.
- Significant new loads may require supply.
- Large existing loads may reduce or cease demand.
- Customers could change their requirements for reliability and/or their willingness to pay for higher/lower levels of service.

Changes in operational factors may require us to reprioritise or reallocate our planned OPEX in the short term and increase or decrease OPEX or renewals allowances in the medium term. Changes may include:

- The network could experience major natural disasters such as an earthquake, flood, tsunami or extreme storms.
- Significant storm events that divert resources from scheduled maintenance.
- Regulatory requirements may change, requiring MainPower to achieve different service standards, health and safety standards, or design or security standards.

2.5 Asset Management Strategy and Delivery

Due to the long-lived nature of our assets, the 'new energy future' and the dependency that our customers, the community and economy has on our assets, MainPower's approach to lifecycle management of our assets is based on risk, cost and overall performance of the assets. MainPower's asset management policy describes MainPower's commitment to asset management.

2.5.1 Asset Management Policy

Corporate	1. Asset Management Policy supports the Corporate Vision, Values and Strategic Objectives by providing a framework for delivering the design, construction, operation, maintenance and renewal of network assets in an efficient manner. 2. Provides resources to ensure Asset Management objectives can be delivered. 3. Monitor measure and report on Asset Management performance.
Wellbeing	4. Ensure that the network provides a safe environment for our people, the public and contractors through Safety in Design, enhanced contractor management, generative safety performance and quality lifecycle. 5. Ensure that our assets and the management of our assets do not impact adversely on the environment.
Customers	6. Provide and receive information from our consumers that is clear, accurate, relevant, and timely. 7. Ensure we recognise the different communication needs and wants of consumers. 8. Understand what our customer tell us is important. 9. Invest in assets and maintenance activities in accordance with our customer's needs.
Excellence	10. Develop and maintain effective Asset Management Systems with commitment, accountability and involvement across the organisation. 11. Understand and respond to our customers' requirements. 12. Use our risk management framework to systematically identify hazards, assess and control risks associated with those hazards. 13. Assess organisation performance through benchmarking against similar EDBs.
People	14. Our people are at the core of everything we do. 15. We need to ensure that we invest in our people by developing capability that means we can achieve asset management strategy, goals and objectives. 16. Foster a collaborative culture within MainPower that motivates our people and drives successful outcomes.

Figure 11 Asset Management Policy

2.5.2 Asset Lifecycle Framework

MainPower needs to ensure that its network is ready for the future as New Zealand prepares for a zero-carbon economy, the onset of new technologies and multiway energy flow while fully we continue to understand and balance cost, risk and performance.

Within the last reporting period MainPower has taken a fresh look at our asset management systems, processes and practices both through internal and external audit. Both audits identified gaps between current state and where we want to be in terms of asset management maturity in the future.

In the last AMP it was noted that MainPower embarked on the critical review of our asset management system, processes and practices. A key part of assessing our level of maturity was the use of the Commerce Commission's Asset Management Maturity Tool (AMMAT).

This year MainPower completed a review and assessed the whole organisation against ISO55001. One of MainPower's strategic themes is 'strategic asset management and operational excellence' with a business objective of achieving ISO55001 compliance, taking into consideration:

- 'New energy future' and delivering a 'network for the future';
- Providing a strategic approach to asset management balancing cost, risk and performance; and
- MainPower's accreditation to ISO9001.

MainPower has decided to achieve compliance with ISO55001.

2.5.3 Strategic Asset management

Asset Management at MainPower causes MainPower to understand risk, cost and performance across its asset fleet over the lifetime of the assets.

The system also needs to be able take into consideration differing resourcing constraints that occur from time to time and to be able to clearly articulate to the business the risks impact the constraints will have across the asset fleet.

To fully achieve this across the life of the asset requires MainPower to implement Strategic Asset Management within its ERP system (OneEnergy).

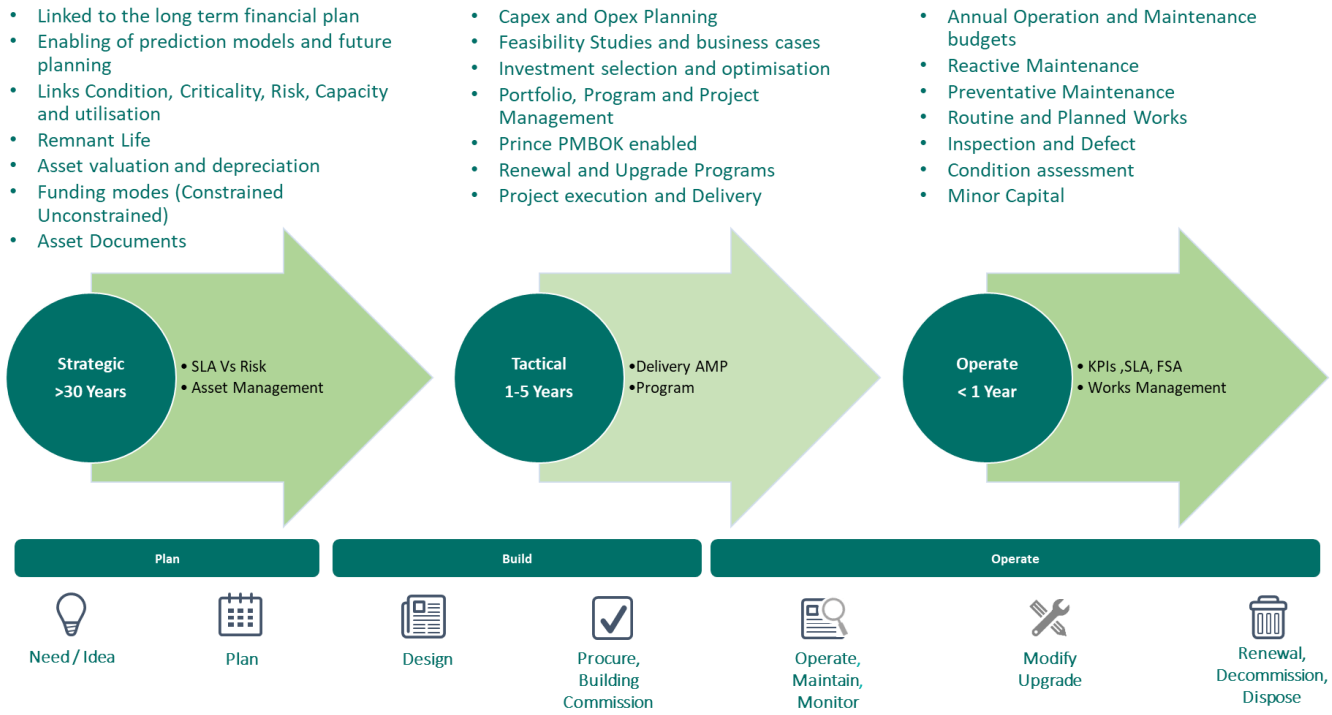


Figure 12 Strategic Asset Management

2.5.4 Asset Management Structure

The structure of MainPower's asset management system is based on the IIMM (International Infrastructure Management Manual) which defines 18 processes of asset management, grouped into three main categories. The relationship between these categories is shown in the flowchart below, it includes a summary of the associated documents that support the framework. The process is based on a continuous improvement cycle.

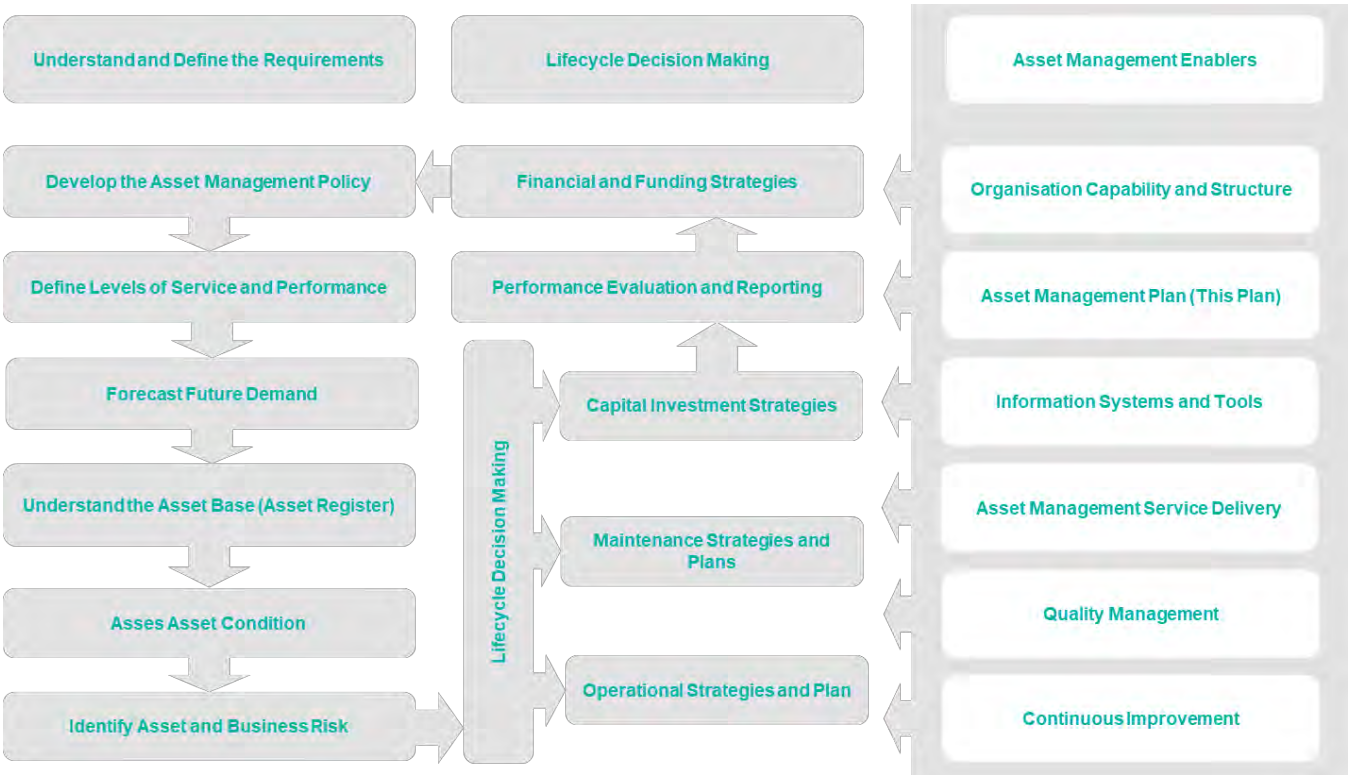


Figure 13 Asset Management Structure

ASSET MANAGEMENT Policies	
Develop the Asset Management Policy	MainPower has an Asset Management Policy
Define Levels of Service and Performance	Defined in this Asset Management Plan (Section 2)
Forecast Future Demand	Regional Master Plans are being developed as described in Section 5 of this Asset Management Plan
Understand the Asset Base (Asset Register)	Entered and maintained within MainPower's Enterprise Resource Planning (ERP) tool (TechnologyOne)
Assess Asset Condition	Completed and updated through general maintenance. Maintenance requirements are documented in Asset Class Maintenance Plans that are implemented in the ERP as schedules against assets.
Identify Asset and Business Risk	Detailed in Section 7 of the Asset Management Plan, risk assessment as completed by Business Function, Activity, Plant and Equipment including network operability risk when assessed against adverse events
Financial and Funding Strategies	Ongoing and form part of the pricing review project currently in progress
Capital Investment Strategies	Part of the Maintenance Strategies, Asset Condition and Criticality assesses renewals and forecasts budgets. The Capital Sanctioning process as part of the Project Delivery System (PDS) ensures funding is allocated in accordance with strategy, service delivery and business planning.
Maintenance Strategies and Plans	Maintenance strategies exist for all assets, detailing maintenance requirements to achieve customer service levels and business outcomes. Maintenance strategies are implemented in the Computerised Maintenance Management System (CMMS).
Operational Strategies and Plan	All Operational Activities are risk assessed and, where the risk appetite of MainPower is exceeded, 'Safe Operating' procedures are developed. Other operational planning takes into consideration Incident Reponses and emergency preparedness.

Table 6 Asset Management Policies

2.5.5 Asset Lifecycle

MainPower has adopted a lifecycle asset management process structured on a total lifecycle cost of asset ownership. The framework has its foundation in the activities that occur over the lifetime of the physical asset. These activities are outlined in the figure below.

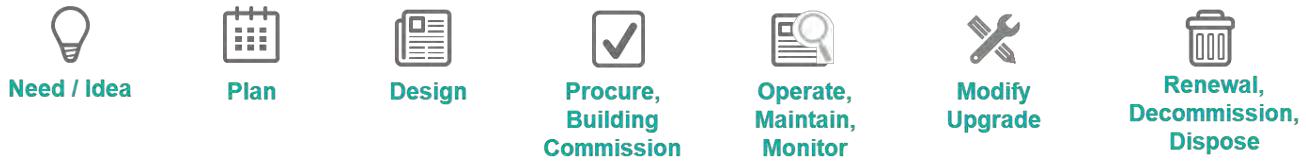


Figure 14 Asset Lifecycle Planning

Develop a Need or Idea

The need or idea can come from anywhere within the business. It typically details a high-level view of the intent or requirement of a given project. Each idea is formulated by the project's sponsor using a sponsor's brief document. Once the brief is written a project is initiated and a project manager is assigned to the project.

Plan a Project

The project plan sets out the specific requirements of the project. This includes a definition of the requirements, timelines, resourcing, procurement and risk. The project manager is responsible for the project plan and delivering the project against the plan. The project sponsor approves the plan and provides oversight throughout the project.

Design Phase

A completed design is a design that is informed by the requirements of the project, design criteria and standard design. We must complete the design. Only then is the design fit for achieving the outcomes of the project. The asset manager must approve the asset before the design process introduces it – all assets on the MainPower network are approved by the Maintenance Manager.

Construct

The Project Management Office (PMO) is responsible for project delivery, as detailed within the MainPower Project Delivery System. Only when the assets have a Fleet Management Plan, are entered into the CMMS, have maintenance schedules against the asset and all asset data is reflected in our GIS, can Practical Completion be issued and the asset put into service or energised.

Operate and Maintain

Asset criticality defines the level of maintenance. The treatment of the asset – in terms of maintenance activities (restoration or prevention) and or critical spares – is defined in line with the criticality flowchart. Asset data complete with template work orders entered into the CMMS and informed by rate cards develop annual resource planning (budgets, people, plant and equipment and materials).

Modify and Upgrade

Assets are assessed against the service levels. Sometimes this assessment highlights the need to modify or upgrade an asset. It is noted that assets can be upgraded due to changes in legislation, safe working procedures etc. Instances also arise where existing assets are relocated based on changes of service levels.

Refurbish, Renew or Dispose

Both asset condition and criticality inform asset renewal. Asset condition is a function of many considerations cumulating as an Asset Health Indicator (AHI). Maintenance activities, asset condition, compliance, AHI and asset criticality determine an asset renewal that is assessed against cost and risk to the business. The maintenance process for assets is described in the flowchart below.

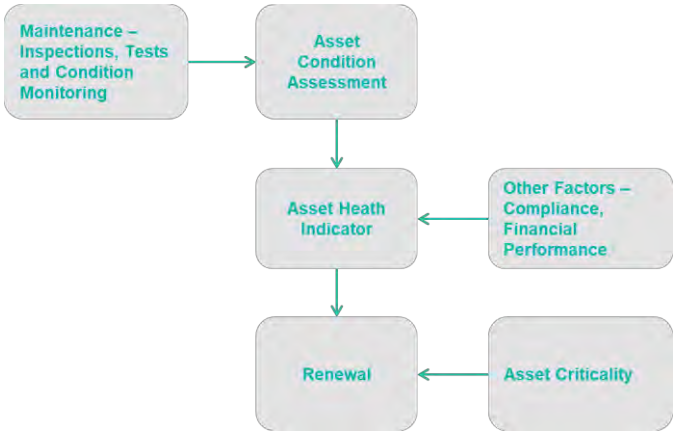


Figure 15 Asset Renewal

2.6 Information Systems and Asset Data

MainPower's lifecycle asset management processes are informed by total cost of ownership. Asset Maintenance Standards exist for all MainPower assets as well as defined maintenance treatments for all assets. The Asset Maintenance Standards are informed by the business objectives and Asset Management Policy and are implemented within MainPower's Computerised Maintenance Management System (CMMS).

2.6.1 Computerised Maintenance Management System

The CMMS adopted by MainPower is referred to as the OneAsset system. OneAsset is an Enterprise Resource Planning (ERP) tool primarily designed to support maintenance that delivers corporate objectives.

Maintenance standards that define what treatment we apply to our assets are implemented within the CMMS OneAsset system. Schedules and template work orders are applied to assets. The template work orders are developed to support all MainPower Asset Management Standards and detail the work required to be completed including the acquisition of condition data, into the work order that support strategic asset management and enables MainPower to balance cost, risk and performance.

All resource planning can then be achieved by linking works as required, through to supply chain management to actual business planning and forecasting.

Figure 16 OneAsset System

One Source of the Truth

The MainPower Asset Database is the single source of truth for all asset data and asset attributes. All asset data is defined and recorded against the asset in the single OneAsset system. All other systems that report asset data, such as the GIS, retrieve data from the OneAsset system. All data used for the condition assessment of assets is recorded within the OneAsset system, including the mobility solutions where data is entered by Field Staff.

Asset Operational Systems

The main system that is used to operate our asset is our SCADA (Supervisory Control and Data Acquisition) system. The SCADA system also logs historical loads on all equipment, informing our network development planning and ensuring load flow is within asset limits when reconfiguring the network for emergency response of planned outages.

Outage Management System

Our own, in-house developed, Outage Management System (OMS) is used to track outages and inform network quality performance reporting.

2.6.2 Asset Data

Asset data is critical to inform asset lifecycle and total cost of ownership including disposal. The data required to support this is achieved within the design phase of the asset lifecycle and is typically achieved through:

- Design data
- Compliance requirements
- Industry experience (EEA Asset Management Group)
- Manufacturer's requirements (operating and maintenance manuals)
- Business risk including environmental and operating risk

Once a need for an asset is identified and approved by the Asset Manager, an Asset Fleet Management Plan is developed for all new assets or updated where existing fleet plans exist. The fleet management plans ultimately translate maintenance lifecycle requirements in the form of schedules of work. All assets are implemented in MainPower's Computerised Maintenance Management System (CMMS). Once in the system, it is the Maintenance Manager's role to implement the Fleet Management Plan against the Asset i.e. applying schedules of work against the asset.

When assets are enabled in the CMMS and schedules are assigned to the assets, the CMMS develops 'work orders' for the ongoing management of asset. Work order templates define the work required, including the data collection points for capturing works completed and maintenance outcomes that inform the condition of the asset.

2.7 Limitation of Asset Data and Improvements

MainPower has good information on its HV assets and there is a project underway to document all of the LV systems. Site audits are carried out prior to any work planning process where work may be affected by the accuracy of LV data. Vegetation management data, identified in the previous AMP, is not integrated into the CMMS.

The main focus for asset data in the future is to centralise all asset data into a single source of information (OneAsset / OneEnergy ERP), including vegetation. This will provide the foundation for the automated logging of maintenance and condition assessment of all maintenance activities. All maintenance activities allow for asset data to be updated through inspections or routine maintenance.

2.8 Planning and Maintenance Processes

2.8.1 Network Planning

All network projects are assessed against:

- Capacity constraints; and
- Security of supply and reliability classification for feeders and zone substations.

At this point the following treatments are applied:

- Network constraints are identified by reviewing the capacity and the security of the network on a regular basis against network standards and policies.
- Should a constraint be identified, options for addressing it through reconfiguration of the network (e.g. by moving an open point) will be considered first, to optimise the use of existing network capacity.
- Should no reconfiguration options be available using the existing network infrastructure then other options will be investigated as part of the investment selection process.
- The options may include both network (installation of new lines, cables and transformers, voltage regulators or capacitors to create new capacity or allow utilisation of nearby capacity) and non-network solutions (such as localised generation or demand side management initiatives).
- Key inputs to the capacity and reliability review are the overarching planning criteria and load forecasts - which are updated on a yearly basis.
- The Development Plan includes potential projects identified to meet a need. This plan continually evolves.
- Each year, the immediate prioritised projects are developed in more detail, including business case assessments against alternatives.
- Project approvals are sought (refer below) and scheduled.
- Most development projects are delivered by MainPower's own field staff.

2.8.2 Maintenance Processes

The requirement to deliver maintenance on our assets is defined in MainPower's Asset Maintenance Standards. The Standards are then implemented within MainPower's CMMS ERP system. A summary of the maintenance workflow is detailed below, including the need to work within a controlled environment, the issuing of authorisation and receiving of asset condition data that is used to manage defect, inform renewals etc.

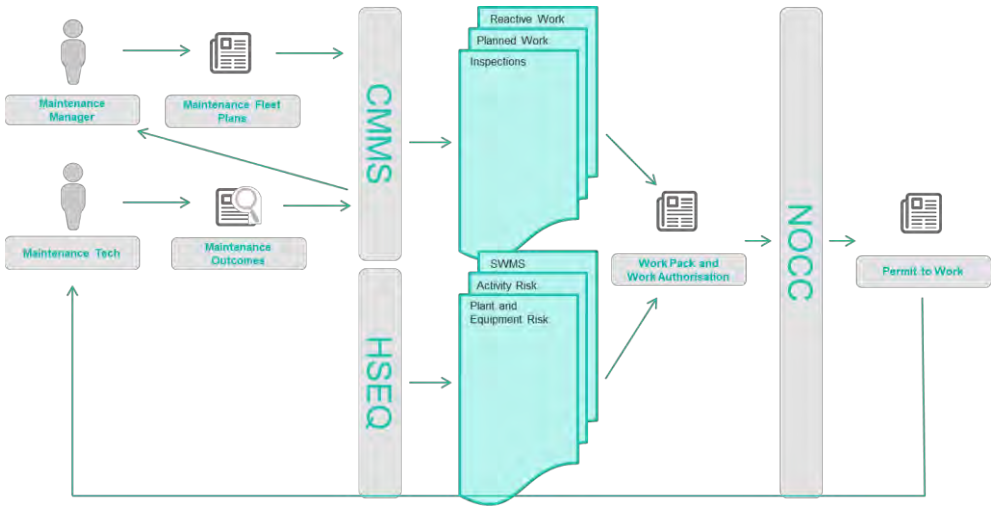


Figure 17 Asset Management Workflow Process

- The CMMS, either through preventative maintenance, faults (reactive) or defects, generates work orders detailing the work to be completed on the asset. Defects are managed in accordance with MainPower's defect management policy.
- All work activities are predefined within MainPower's work management system as rate cards. Activities are also linked to maintenance schedules. All activities are risk assessed and appropriate controls and competencies determined.
- Work is issued to field services via the work order system within the CMMS. Work orders are linked to schedules that are linked to assets. The work orders contain data collection points to record maintenance activity outcomes, informing compliance, asset condition, defects and future renewal.
- Permits to work (or 'Work Authorities') are issued for all work via MainPower's Network Operation and Control Centre. For all works, competency is assessed then authority is issued.
- All costs associated with completing the works are logged against the work order and reflected back through to the asset. This information is used to inform total cost of ownership. Service levels are

assessed against maintenance outcomes and cost. Fleet asset management plans are then updated as required as part of our commitment to continuous improvement.

2.8.3 Measuring Network Performance

- Our outage management system is GIS based, with all planned shutdowns managed with traces across the GIS to identify all affected customers and switching points.
- For unplanned outages, all relevant fault information is entered into the GIS after the event.
- Reports are run from the GIS to generate outage statistics as required.
- Where supply is restored progressively through switching over a period of time, the switching sequence will be recorded and used as the basis for recording the actual SAIDI impact on customers.
- Other measures are recorded with information extracted from GIS (such as line length), customer surveys, metering information, financial systems, and our health and safety and risk management databases.

Currently MainPower is implementing an Advanced Distribution Management System (ADMS) project that links our Outage Management System (OMS), Supervisory and Control and Data Acquisition (SCADA) and Distribution Management System (DMS). The goal of the project is to ensure MainPower's network is ready for a New Energy Future, within a safe, secure and sustainable management system that allows MainPower to drive continuous improvement through performance monitoring.

2.9 Documentation and Controls

2.9.1 Asset Management Documentation

Asset Management documentation is linked across three areas within the Business:

- Assets
- Asset management policies
- Asset Management Plan
- Asset Maintenance Standards
- Standard designs
- Construction specifications
- Operational requirements
- Operating standards (SOP, SWMS etc.)
- Process flows
- Work instructions
- Business continuity planning
- Capability
- Individual development plans
- Competency and training registers
- Contractor management controls

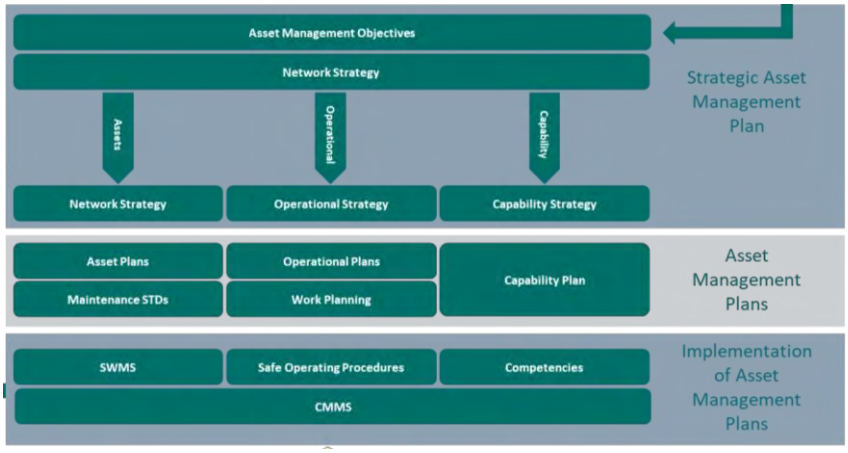


Figure 18 Asset Management Documentation

2.9.2 Document Management and Review

MainPower maintains an ISO9001 certified quality assurance program and continues to develop, implement and internally audit the program in accordance with this commitment. Relevant standards for asset management planning include design, purchasing, document and record management and environmental management. MainPower maintains a document control system under this certification.

The ISO9001 certification ensures annual review and continual improvement of the documentation systems.

2.9.3 Outsourcing

Where asset management design and construction are outsourced, contractors must comply with our asset management processes, controls and documentation systems. All maintenance tasks and asset data collection are maintained within the MainPower CMMS against the applicable asset. Costs associated with the maintenance are linked back via the work order to the asset.

2.10 Communication and Participation

MainPower communicates its Asset Management Strategy, objectives and outcomes to stakeholders as follows.

REPORTING TO	REPORTING TYPE
MainPower Trust to customers and the wider community	· Consultation on the Trust's Letter of Expectation to the MainPower Board · MainPower Trust's Annual Report and audited accounts
MainPower Board to MainPower Trust	· Company Annual Report includes Chairman and Chief Executive's statements and audited accounts · Annual information disclosure · Twice-yearly presentation includes financial and operational performance
Chief Executive to MainPower Board	· Chief Executive's statement in annual report includes narrative of year's highlights · Monthly board report, includes progress on significant projects and major outages
General Manager Network to Chief Executive and MainPower Board	· Annual report on budget and major projects · Monthly report includes year to date performance and progress against budget · Individual reports on major projects · Daily updates on areas of concern including health and safety
Managers	· Weekly direct report team meetings · One-on-one with direct managers · Daily updates during brief meetings including health and safety updates · Annual reports
Operations Supervisors to Grid Managers	· Weekly progress reports · Monthly meetings on progress to budget
External Contractor to Operations Manager	· Weekly progress reports · Monthly meetings on progress

Table 7 Reporting Asset Management Plans and Outcomes

Asset Management Plan 2019 – 2029

Section 2a – Network of the Future

This section details MainPower's electricity distribution network transformation roadmap. The roadmap comprises of two programs of work. These are Asset Management and Network Operational Excellence enabling MainPower's electricity distribution network to be ready for the 'new energy future'.

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2. Network of the Future

2.1 Introduction

Electricity distribution and the wider electricity energy sector is embarking on unprecedented change due to the decarbonisation of the economy (transportation and process heat sectors), new technologies (solar, batteries, EVs) and changing customer needs (consumers transitioning to prosumers).

This change will impact MainPower's electricity distribution network and the services we provide that support our network. For example, additional services that MainPower may be required to deliver to be ready for a New Energy Future could include:

1. A service that operates and develops an active distribution system comprising networks, demand, generation and other flexible Distributed Energy Resources (DER).
2. Becoming a neutral facilitator of an open and accessible market that will enable competitive access to markets and the optimal use of DER on distribution networks to deliver security, sustainability and affordability in the support of whole system optimisation.
3. Enables customers to be both producers and consumers; enabling customer access to networks and markets, customer choice and great customer service.

MainPower has already embarked on two main work streams to ensure that our electricity distribution network systems and processes are ready for a new energy future:

- Asset Ownership (transitioning from a DNP to a DSI); and
- Operation (transitioning from a DNO to DSO).

The need for two work streams signifies MainPower's view that within a new energy future there may need to be some separation of operational control and network asset management activities.

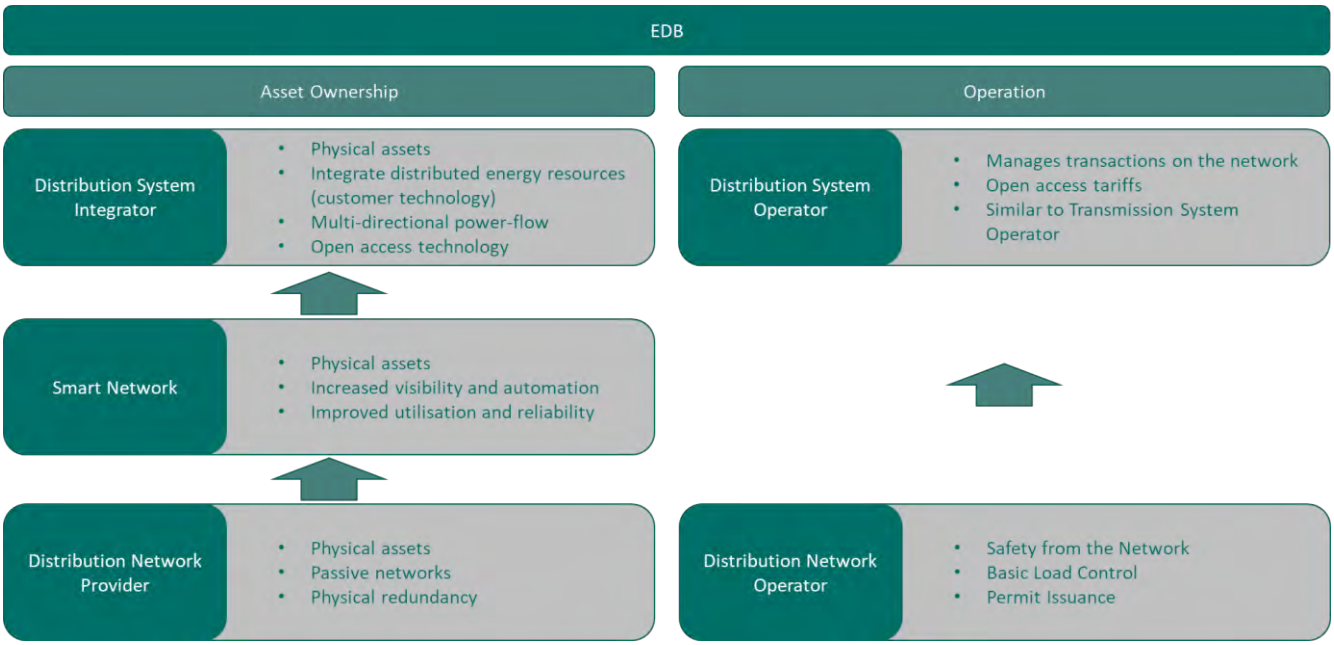

Figure 1 Transformation Road Map Program

Note:
It is unlikely that every EDB will transition into a DSO. While this remains to be determined it is likely that a DSO will be formed in regions. EDBs that have transformed their businesses into DSI will interface with DSO service providers, i.e. a DSO will provide DSOs services to several EDBs in the future.

Electricity Distribution Business (EDB)
In New Zealand the Electricity Distribution Business (EDB) is the network company or lines company that owns and operates the regional network of overhead wires and underground cables that supplies electrical energy to consumers. In New Zealand today, an EDB is typically a Distribution Network Provider (DNP) and Distribution Network Operator (DNO) combined into a single entity.

Distribution Network Provider (DNP)
A Distribution Network Provider (DNP) is the organisation that owns the electricity distribution network assets and provides the physical processes and systems that support the assets i.e. asset management, system maintenance, security of supply, system resilience, etc.

Distribution Network Operator (DNO)
A Distribution Network Operator (DNO) operates the network day-to-day to ensure the network conforms to safety requirements, controls the electrical load and controls access to the network. The DNO normally transacts between and connects suppliers and consumers of electrical energy with bulk supply points or grid exit points (GXPs) by means of the electrical distribution network.

Distribution System Integrator (DSI)
A Distribution System Integrator (DSI) allows for the widespread use of local generation sources connected to the network at multiple points, with associated multi-directional power flows. A DSI ensures open access arrangements for consumers and other market participants, allowing parties to transact over the network and to connect any device they wish, within acceptable safety and reliability limits.

Distribution System Operator (DSO)
A Distribution System Operator (DSO) securely operates and develops an active distribution system comprising networks, demand, generation and other flexible Distributed Energy Resources (DER). As a neutral facilitator of an open and accessible market it will enable competitive access to markets and the optimal use of DER on distribution networks to deliver security, sustainability and affordability in the support of whole system optimisation. A DSO enables customers to be both producers and consumers; enabling customer access to networks and markets, customer choice and great customer service.

Smart Network
A smart network is much the same as a network that a Distribution Network Provider would own and, in many cases, operate. The network is extended with monitoring, measurement, control and automation capabilities. This includes extended data and communications technology required to support the increased automation. Typically, there is a shift to decentralized control, allowing areas within the network to operate / selfheal, etc., in accordance with some predefined rules.

2.1.1 Function and Participant Interaction

New Zealand EDBs must transition their services to that offered by a DSI to be ready for a New Energy Future in order to remain relevant and to protect shareholder asset value. The transformation roadmap to realise and deliver value from new market opportunities is not trivial - it requires investment in the way EDBs currently do business, in their technology and in their people, adding an unprecedented level of complexity to the EDB business.

Function	EDB	DSO	SO
Network Operation	Deliver safety and reliability (i.e. keep the lights on) through the maintenance and operation of distribution network assets. Respond to customer needs.	Operate the electricity distribution network to maintain a safe and secure system. Coordinate and collaborate with the SO to manage potential conflicts to support whole system optimisation. Respond to customer needs.	Operate the transmission network to maintain a safe and secure system. Manage potential conflicts to enable whole of system optimisation.
Security of Supply and Resilience	Support local and whole of system resilience and security.	Enhance whole system security through the provision of local and regional flexible services.	Coordinate whole of system security of supply and resilience through restoration plans agreed with government, the regulator, other relevant agencies, DSOs and service providers (Aggregators).
Connections	Provide fair and cost effective distribution network access.	Provide fair and cost effective distribution network access that includes a range of connection options that meet customer requirements, and system needs efficiently.	Provide fair and cost effective transmission network access for customers through a range of connection options. Address the transmission impacts of distribution connections where required.

Function	EDB	DSO	SO
Services / Market Facilitation	Limited at present, for example, enable the flexible connection of DER to provide wider system services.	Interface with the SO (including information and control infrastructure) to enable development of distribution capacity products, creation of local network service markets and enable DER access/participation in wider balancing services for whole system optimisation. Facilitate local and national markets to access services through auctions and other market arrangements for whole system efficiency. Provide data / information to facilitate distribution markets and service provision.	Facilitate markets to provide services through the operation of market arrangements. Provide data / information to facilitate markets and service provision. A potential further role includes interfacing with DSOs (including information and control infrastructure) to enable the development of distribution capacity products, the creation of local network service markets, and to enable DER participation in wider balancing services for whole system optimisation.
Investment Planning	Deliver a network that securely operates through efficient, coordinated and economical network assets.	Coordinate with the SO and Transmission Owner to identify whole system options. These would include commercial DER options as well as distribution network investments.	Coordinate with DSOs and Transmission Owners to determine optimal whole of system investment options. These would include whole of system and commercial/operability options as well as network investment options.

Revenue	Adopts common methodologies and principles to set pricing for Distribution Use of System and Connections.	Sets Distribution Use of System prices for local network. Determines Point of Connection. Determines connections charges and informs connectees of Transmission reinforcement charges (if applicable). Considers impact of Exit Charging (dependent on size, variations and apportionment)	Set and administer Connection and Use of System charges for parties connecting to and using the Transmission system
Service Provision	Minimal at present.	A DSO to access services on behalf of others (e.g. SO or other EDBs and other DSOs), or provide services to others, where doing so is necessary to maximise whole system efficiency, and protects competition	Procure services from transmission connected resources, distributed energy resources (DER) and potentially, in the future, distribution and transmission networks. The SO would have no role in the direct provision of services but would invoke emergency Grid Code provisions if required to address market shortfalls.
Balancing	None	A DSO could operate local and regional balancing areas for whole system optimisation. This could include local actions to manage constraints, minimise losses and provide capability to contribute to maintaining the national energy balance.	Act as residual balancer for the System. Define and procure energy and network balancing services ahead of time (in market timescales) and close to real-time to balance generation and demand and ensure security and quality of supply. Work with DSO's to coordinate local and regional balancing areas and to utilise residual distribution capability for wider system balancing and whole system optimisation.

Table 1 Function and Participant Interaction

2.2 Asset Management Excellence

To achieve asset management excellence and to provide confidence to market participants and consumers alike, within a new energy future, MainPower has decided to ensure our asset management systems, process and practices are compliant with ISO 55001.

Within the last reporting period, using an external service provider, MainPower assessed our asset management maturity against ISO 55001. The following describes the current status including and the roadmap to achieve certification in the future.

2.2.1 ISO 55001 Current State

MainPower was assessed against 161 maturity assessment criteria within the ISO 55000 framework. MainPower was evaluated as being:

- 22% Compliant;
- 26% In progress of being compliance;
- 41% Partially compliance – no evidence of becoming compliant; and
- 11% Nil Compliance, providing an overall compliance.

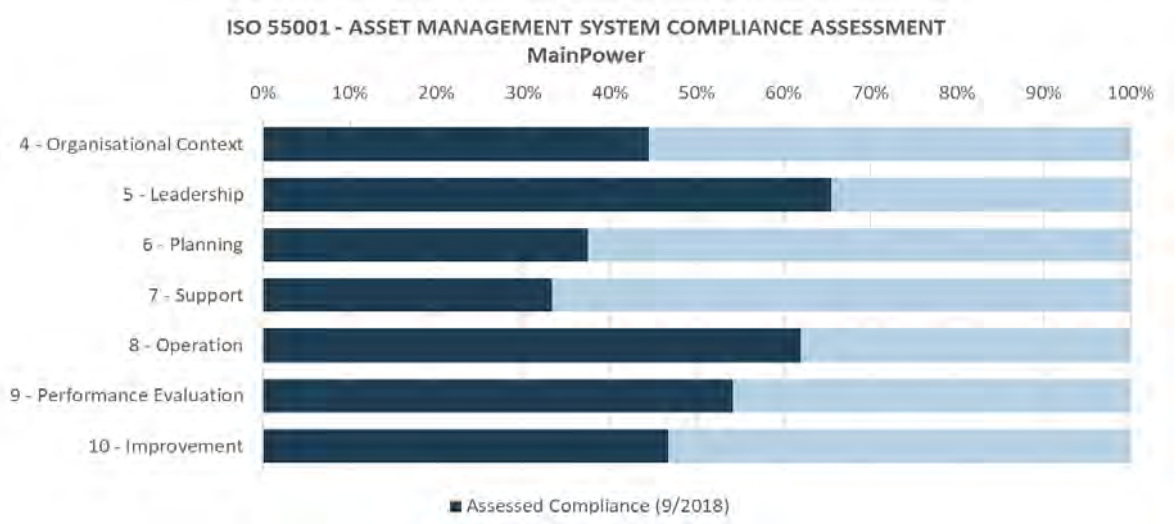

Figure 2 ISO 55001 Current State

2.2.2 Asset Maturity Roadmap

Recommendations required to achieve ISO 55001 alignment and certification have been mapped and proposed to be implemented over the next 3 – 4 years as follows including percentage compliance:

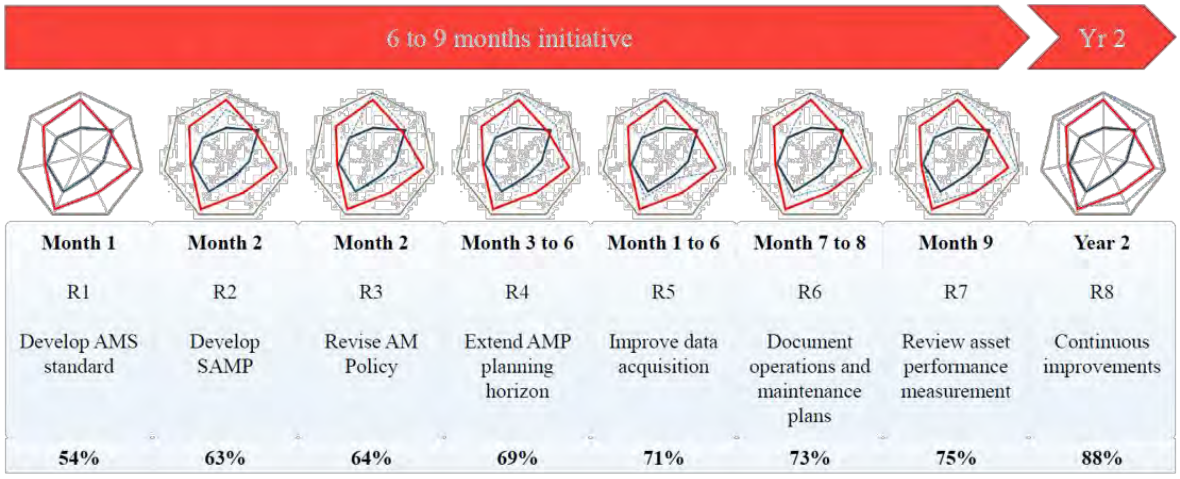

Figure 3 ISO 55001 Maturity Road Map

Recommendation	Improvement
R1	Document the AMS (Asset Management Standard) to provide clarity on the management system that has been designed to manage MainPower assets. This could be a short document that describes the scope of assets managed and the key components to the AMS, including people, process and technology. The relevant requirements in the Standard are 4.3, 4.4.1, 5.1.2, and 7.6.1. Improvement 5%
R2	Develop and implement a Strategic Asset Management Plan (SAMP) that clearly links the organisational asset management objectives to the tactical asset management practice. This could be implemented using digital technology, rather than hardcopy documents, to create a 'live' asset management environment and to readily engage stakeholders in the AMS, particularly the future planning of renewal works. The SAMP would also include clarification and/or development of AM objectives that cover technical (asset) and service delivery (stakeholder) outcomes. Improvement 9%
R3	Amend the current Asset Management Policy to confirm top management commitment to asset management and to guide the context of the AM. The relevant requirements in the Standard are 5.1.8 and 5.2.

	Improvement 1%
R4	Review and extend the current asset planning horizon, for asset renewal works, to improve visibility on the future financial liabilities relating to asset performance and risk. This is typically referred to as a 10 Year Capital Plan or Forward Works Plan. The relevant requirements in the Standard is 6.2.2. Improvement 5%
R5	Review the current asset data acquisition and management practices. The relevant requirements in the Standard is 7.5, which addresses information for asset management decision making. Improvement 2%
R6	Documented Operations and Maintenance Plans to capture practice knowledge for continuity in practice. The relevant requirements in the Standard are 7.6.2 and 8.1, which address creating and updating information for asset management purposes. Improvement 2%
R7	Reviewing and refining the method of service and asset performance measurement and monitoring including evaluation and analysis. The relevant requirements in the Standard is 9.1, which addresses monitoring, measurement, analysis and evaluation. Improvement 2%
R8	Review the progress made to the AMS, assess the resources, ensure staff are competent and continue to champion better asset management practices to build awareness and foster continuous improvements. The relevant requirements in the Standard are 5.1, 5.3, 7.2, 7.3, 7.4, 8.2, 9.3 and 10, which addresses continuous improvement. Improvement 13%
Total	Implementing all the recommendation will have the following effect to the compliance assessment: Improvement 39% Assessment Against Compliance 88%

Table 2 ISO 55001 Compliance Recommendations

2.2.3 Comparison with the Commerce Commission's Asset Management Maturity Assessment Tool

There are some similarities between the Commerce Commission's Asset Management Maturity Assessment Tool (AMMAT) and the ISO 55001 standard. The ISO standard assesses compliance against a fixed standard as compared to AMMAT which focusses on maturity and compares the utility to other similar utilities in the industry. The AMMAT is based on PAS55 which focusses on the actions that people take, whilst ISO 55001 has a wider focus on governance, systems, thorough understanding of principles and compliance to established standards.

2.3 Operational Excellence

The kernel of the MainPower network is the MainPower Network Operations and Control Centre (NOCC). Taking into consideration the day-to-day operational control of the electricity distribution network, a New Energy Future and the transformation of services to enable an Open Network Framework, MainPower reviewed its NOCC practices in the last reporting period. The review assessed our NOCC against:

- Industry best practice;
- Comply with Safety Manuals for the Electricity Industry (SMEI); and
- The Health and Safety at Work Act.

The review covered:

- Processes that govern activities undertaken by the Control Room;
- Compliance against requirements of SMEI (industry rules);
- Processes for issuing authorities / permits to staff for HV and LV access, as well as minor works apart from the network itself;
- Processes for managing staff competency to hold authority documents;
- Processes for ensuring safety of the works prior to issuing authority to work;
- Identifying any gaps, failings, non-compliance with the processes;

- Identifying areas of our processes which are not properly documented; and
- Selected incident reports to look for common themes and gaps in processes these may highlight.

2.3.1 Operational Maturity Roadmap

	Improvement		Target Date
Roles and Responsibilities	1. Using process to identify skills across the NOCC and ensure that these skills are spread across the team – not reliant on individuals. 2. Start targeting specific workstreams within the NOCC (WP, RP and Controller) so that roles can concentrate on their areas of responsibility only.	It is proposed to comprehensively process map all NOCC process. The introduction of specific roles within the NOCC will be introduced.	2019
Customer Interfaces	3. Implement improved outage communications to customers, for both planned and unplanned outages. 4. Automation of outage communications to customers. 5. Enable customers to access their own information – customer portal.	A more sophisticated Outage Management System is required to be implemented This is already in progress as part of the ADMS project.	2020
Functional Arrangement	6. Introduce a flat operating model, single screen for all system enhancing situational awareness 7. Map control room processes.	This initiative is supported and forms part of the ADMS project.	2020
Business Metrics	8. Introduce increased levels of automation within the NOCC for both operational effectiveness and performance reporting. 9. Examine options to ensure key data is available to all departments who plan access to the network (lines personnel / underground / substation / live-line activity / external works personnel).	Detailed reporting suffers within the NOCC due to the limited number of systems that support the NOCC. It is proposed in 2019 to understand what performance metric MainPower should monitor and to subsequently implement these metrics.	2020
People	10. Develop a succession plan for NOCC staff that includes attracting talent (future controllers). 11. Schedule regular workshops for Controllers and Field Operators to identify and understand issues leading to NOCC process enhancement including the NOCC Competency Framework. 12. Continue review of hours worked, implement plans to manage staff hours worked against risk i.e. the resource risk management plan has been implemented and this must be maintained to manage the associated risk.	The people that support NOCC operations are sought after across the country. Documentation of current risk within the Control Room has been completed and we are currently working our way through the controls required to mitigate the high and extreme risks. Future work remains ensuring an effective succession plan and continuous improvement program is in place to address longer term issues.	2022
Systems, Process and Practices	13. Document thoroughly all NOCC processes. 14. Identify key roles (WP, RP and Controllers) and understand the interfaces between the key roles, including the simplification of some the processes. 15. Review process for assuring field staff competency, for example, a database the reflects the competency of the staff receiving a permit or carrying out an activity on the network.	Systems process and practise are about to undergo transformational change as MainPower implements its ADMS project. This required MainPower to reassess these improvements upon go-live of the new system.	2021

	16. Review the tagging process- current process and issuance of single 'Do Not Operate' tag relies on the Control Room and increases the complexity of the Controller's roles. 17. Consider a process of managing the 'Whiteboard' including requesting and confirmed action. Whiteboards are typically limited to manage 30 operations; this solution may not be sustainable to support the business in the future. 18. There is an opportunity to improve Controller familiarity by undertaking refresher courses on a more regular and planned basis to ensure all personnel including the NOCC are refreshed in the all relevant processes and procedures and to ensure a consistent understanding across all Controllers and field operating personnel. 19. Basic safety controls for network access could be enhanced through development of the current systems or investment in a system that would provide better integration among the current processes. 20. Training and procedures need to clearly articulate each of the Network Access permit's requirements and constraints. (i.e. Entry Approval; Work Authority; Close Approach; Access Permit (HV); Test Permit (HV); Live Line (HV); LV Permit) 21. The two databases (WORM and Logbook) are potentially single points of failure due to the unsupported inhouse design of each system.		
Load Management	22. There is an opportunity for the system HMI to be revised to enable the Controller to have improved visibility of the system. Consideration should be given to exploring energy management systems that many distribution networks operate. 23. Need to review how the system is supported. 24. Look to integrating Load Management functionality into a future ADMS to reduce overhead of maintaining a separate system.	System HMI and SCADA will also be upgraded in the future as part of the ADMS project. Load management, the benefits of and better utilisation of negative generation remains a strategic focus for MainPower – once strategy is formulated and business objectives and planning are completed, these improvements will need to be reassessed.	2022
SCADA	25. Work closely with the Controllers to better determine requirements for desktop configuration. Undertake site visits to view possibilities. Consider also the remote work and disaster scenario. 26. There is always an opportunity to enhance the existing system by reviewing alarm priorities and grouping from an operational perspective. 27. Consider if there are critical aspects of system management that can benefit from modern notifications via SCADA e.g. Load Management. 28. In considering SCADA HMI improvements, all monitored devices on a 'normal' configuration of a feeder, should be presented on a single page to provide improved situational awareness.	Forms part of the ADMS project.	2020

	29. SCADA / ADMS are critical systems deserving of redundancy in design and implementation. However, the scale of operations at MainPower does not necessitate a full back-up Control Room. Consider a DR plan that provides for loss of access to SCADA / ADMS.		
Incident and Event Management	30. Develop a restoration process / procedure that provides a detailed response for prioritising fault activity based on good risk management practices. 31. Consider deploying a knowledge management system appropriate to the need of the Control Room. As a minimum, this should provide ready access to: a. Company operational and OH&S procedures b. Industry guidelines c. Technical support manuals d. Single-line Network and Station diagrams e. Protection settings f. Transformer and feeder circuit load ratings g. Contact listings (internal and external) h. Escalation processes i. Contingency plans etc.	Improvements to be revised, plans developed and integrated into the next business planning cycle.	2019
Supporting Systems	32. Recommend that the phone system be reviewed in terms of its current use and foreseeable future with a view to provisioning a redundant system that will meet the future needs of MainPower. 33. Investigate and confirm that the existing Corporate VOIP Server has limited or no redundancy and assess the importance of upgrading to ensure a redundant system is in place. 34. Review the VOIP Server in terms of – the number of incoming lines; the priority of incoming lines (via Caller Line Identification (CLI)), the number of lines allocated to the IVR. 35. Being a VOIP System enables the NOCC to make better use of the many user configurable settings that may help facilitate and streamline Control Room processes. 36. Consider replacing email systems with more real-time, SMS-based systems. 37. When considering new technologies (IoT), consider how they will integrate into core systems and functions. Assess the burden vs benefit this imposes on the Controller and Control Room processes. 38. Undertake cross-team familiarisation between OT and IT teams to develop understanding of the requirements and drivers for each of these teams and consider what skills may be cross-functional.	Improvements to be revised, plans developed and integrated into the next business planning cycle.	2019
Environment	39. There is value in having the current design of the room assessed for fatigue and general ergonomics	Improvements to be revised, plans developed and integrated into the next business planning cycle.	2019

	40. Several of the desks face the external windows and it is recognised that the competing lighting from the external source and the computer screens results in increased fatigue and eye strain. Consider facing desks away from external light sources.		
Resilience	41. Develop / review the generator testing regime. Ensure the generator testing includes extended onload testing to confirm all elements of the motor operation are ready for service (i.e. thermostat operation etc). 42. Develop / review the UPS testing regime. Ensure the UPS can undertake a 50% discharge operation on an annual basis. 43. An active DR plan was not available and needs to be developed. Consider the requirements for a Disaster Control Room and the systems that would need to be implemented. Note however that it is not recommended that a 'fully' redundant Control Room be established due to the cost. Consideration of 'multiple' options for a backup facility will maintain flexibility – a strength of MainPower's culture. 44. Develop a (simple) plan that lists options for a Disaster Control Room and the systems required to support a room for sustained operation. A 'Grab and Go' box with key documents would be a requirement, preferably securely located offsite and updated every 3 - 6 months 45. Examine the option to have after hours fault calls directed to a call centre in either New Zealand or Australia that has experience in surge type call activity and / or undertakes electricity fault calls. This would enable the Controller to focus on the Network activities. This process would require an electronic transfer of information from the Call Centre to the Control Room.	Improvements to be revised, plans developed and integrated into the next business planning cycle.	2019
Data Accuracy	46. Continue with the process of field checking all ICPs prior to a network interruption. Over time this will provide benefits with respect to Low Voltage control. The management decision to invest in this process recognises the importance of compliance in this area.	Improvements to be revised, plans developed and integrated into the next business planning cycle.	2019

Table 3 NOCC Operational Effectiveness

Asset Management Plan 2019 – 2029

Section 3 – Assets Covered

This section outlines MainPower's service area and details the assets covered including their configuration. The links between our network and Transpower's transmission system are also included.

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3. Assets Covered

3.1 Description of MainPower's Electricity Network

3.1.1 Regions Covered

MainPower's electricity network extends from Kianga, Stewarts Gully and Coutts Island in the north of Christchurch City, through the Waimakariri, Hurunui and Kaikoura Districts, up to the Clarence River and inland to the Lewis Pass.

The geographic extent of the network is represented in the map below, where every blue dot represents a customer connection.

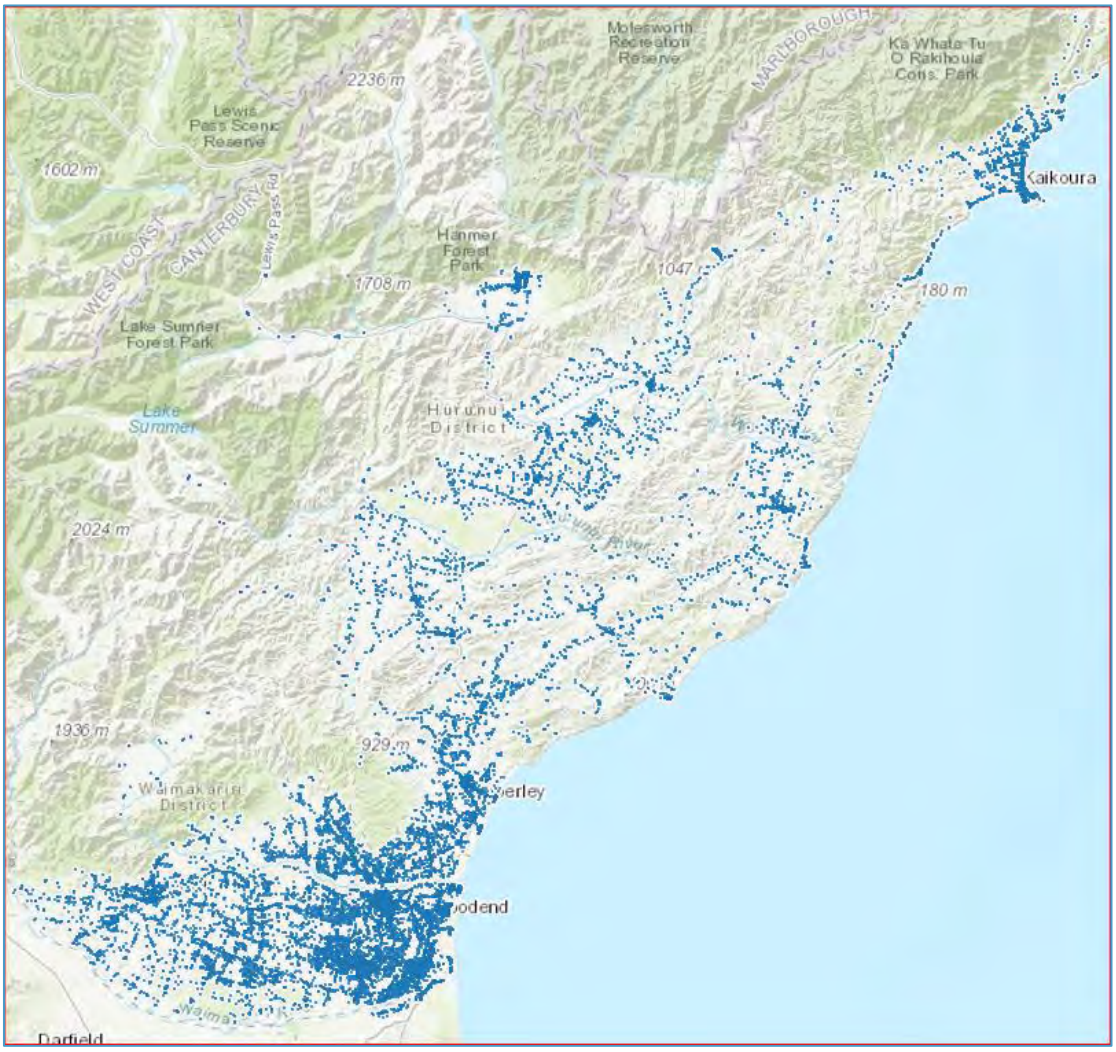


Figure 1 MainPower's Electricity Network Customer Geographic Distribution

3.1.2 Large Customers

Our large customers are:

- Daiken NZ Medium Density Fibreboard Mill at Ashley: The Daiken mill is supplied from the Ashley GXP via four 11kV feeders which provide reasonable levels of security. The Daiken controllers are able to disconnect power supply during emergencies, and maintenance is scheduled to coincide with Daiken maintenance programs or times of low production.
- Hellers meat processing plant at Kaiapoi: The site has undergone rapid growth and the total load is able to be switched between two 11kV feeders. Hellers meats have also installed a backup generator for critical supply during emergencies.

- Patience and Nicholson tool manufacturing plant in Kaiapoi: This plant can be supplied from either of two 11kV supplies from the Kaiapoi switching station, and one of these can also be swapped to an independent backup feeder.
- McAlpines sawmill at Southbrook: Recently this mill has been transferred onto a new high security dual feeder supplied switchboard which has reduced the risk of power interruptions to the site.
- Mitre 10 Megastore at Southbrook: This site has an alternative 11kV feeder.
- Belfast Timber kilns at Coutts Island: This plant is connected near the end of a rural 11kV spur line. No alternative supply is available at the site. Line maintenance is scheduled to coincide with plant maintenance programs.

We also have several large supermarkets and other commercial businesses located in Rangiora, Kaiapoi and Kaikoura. The transformers for each of these sites are part of ringed feeders with RMUs allowing alternative switching of supply in the event of a fault on one feeder.

3.1.3 Load Characteristics

Year	16		17		18		Peak
Substation	**Amps**	**MVA**	**Amps**	**MVA**	**Amps**	**MVA**	
Southbrook	1170	22.5	1182	22.7	1185	22.8	Winter
Swannanoa	384	14.8	406	15.6	394	15.6	Summer
Burnt Hill	386	14.8	399	15.4	391	15.0	Summer
Rangiora North	268	5.2	306	5.9	289	5.6	Winter
Amberely	268	5.2	307	5.9	313	6.0	Winter
MacKenzies Rd	130	2.5	85	1.6	82	1.6	Summer
Greta	69	1.3	71	1.4	66	1.3	Summer
Cheviot	173	3.3	164	3.2	164	3.2	Summer
Leader	80	1.5	80	1.5	76	1.5	Summer
Ludstone Rd	310	6.0	301	5.8	305	5.9	Winter
Mouse Point 22	522	20.1	380	14.6	382	14.7	Summer
Hanmer	225	4.3	248	4.8	250	4.8	Winter
Lochiel	7	0.1	8	0.1	7	0.1	Summer
Hawarden	178	3.4	183	3.5	188	3.6	Summer
Kaiapoi S1 *	470	9.0	477	9.2	465	8.9	Winter
Rangiora West *	420	8.1	491	9.4	432	8.3	Winter
Pegasus *	130	2.5	142	2.7	144	2.8	Winter
Kaiapoi North *	366	7.0	420	8.1	374	7.2	Winter

Table 1 MainPower Network Load Characteristics

3.1.4 Peak Demand and Total Energy Delivered

System Measure	2017	2018
Peak Load	112 MW	112 MW
Energy Entering the System	635 GWh	632 GWh
Energy Delivered	595 GWh	608 GWh
Loss Ratio	6.3%	5.8%
Load Factor	65%	65%
Customers	39,346	40,841
Zone Substation Capacity (base ratings)	135 MVA	132 MVA
Distribution Transformer Capacity	540MVA	557 MVA
Distribution Transformer Capacity Utilisation	20.5%	19.9%
Circuit length lines (kms)	5,017	5,052
Customer Group ICPs (Installation Control Points)		
Residential	32,196	33,157
General	5,933	5,909

Irrigation	1,432	1,413
Council Pumping	196	200
Streetlight	125	115
Large User	37	47

Table 2 Key MainPower Network Statistics

3.2 Network Configuration

3.2.1 Transmission Network Configuration

The 220kV South Island transmission network is owned and managed by Transpower New Zealand Limited. Four 220kV circuits supply Transpower's Islington Substation from the Waitaki basin, with double circuit and single circuit tower lines from Tekapo, Ohau and Benmore following different routes to Islington. A single circuit tower line also connects Livingston and Islington.

MainPower's distribution network is supplied via five Transpower Grid Exit Points (GXPs) from the 220kV and 66kV transmission circuits out of Islington. The following table provides a summary of the GXP substations in the North Canterbury region.

GXP	DESCRIPTION	
Kaiapoi	Transformer Capacity	76 MVA
	Firm Capacity	38 MVA
	Peak Load	27 MVA
	Configuration	Two 38 MVA 66/11kV three phase transformers
	Supply to MainPower	Eight 11kV circuit breakers
Southbrook SBK0331 and 0661	Transformer Capacity	80 MVA
	Firm Capacity	40 MVA
	Peak Load	44 MVA Combined
	Configuration	Two dual-rated 30/40 MVA 66/33 kV three phase transformers
	Supply to MainPower	Two 33kV circuit breakers Two 66kV circuit breakers
Ashley ASY011	Transformer Capacity	80 MVA
	Firm Capacity	40 MVA
	Peak Load	21 MVA
	Configuration	Two dual-rated 40 MVA 66/11kV three phase transformers
	Supply to MainPower	One transformer normally feeding five 11kV circuit breakers supplying the rural area. One transformer normally feeding four 11kV circuit breakers for the Daiken plant (a plant that produces Medium Density Fibreboard)
Waipara WPR0331 and 0661	Transformer Capacity	160 MVA
	Firm Capacity	80 MVA to the 66kV bus
	Peak Load	12 MVA
	Configuration	Two 80 MVA 220/66kV transformers directly connected to the Islington-Kikiwa 220kV circuits. The 66kV supply from these transformers feed a single 66/33kV dual-rated 10/16 MVA three phase transformer.
	Supply to MainPower	Two 33kV and one 66kV feeder circuit breakers and one 66kV load plant circuit breaker.
Culverden CUL0331 and 0661	Transformer Capacity	60 MVA
	Firm Capacity	30 MVA to the 33kV bus
	Peak Load	26 MVA
	Configuration	Two 30MVA 220/33kV transformers directly connected to the Islington-Kikiwa 220kV circuits. A 10/20 MVA 33/66kV transformer rated at 13.09 MVA with no fans has been installed to supply 66kV to Kaikoura.
	Supply to MainPower	33kV via two feeder circuit breakers and cables, 66kV feeder circuit breaker.

Table 3 Description of each GXP

3.2.2 Sub-transmission Configuration

The location of Transpower's GXPs supplying our network along with MainPower's zone substations and 66kV and 33kV sub-transmission circuits are shown below.

Figure 2 MainPower's Sub-transmission Network

3.2.3 Distribution Configuration

MainPower's distribution system is largely rural with many long radial spurs. The 22kV and 11kV distribution is approximately 90% overhead line network. The only areas of significant underground reticulation are the townships of Rangiora and Kaiapoi where 11kV reticulation in Rangiora and Kaiapoi is approximately 90% underground. The table below provides a summary of key information for each of MainPower's zone substations.

	General							Transformers			Switchgear	
Zone Substation	Peak Load (MVA)	Sub-transmission Security of Supply Level	Capacity (MVA)	Transformer capacity after a single fault	Capacity available after switching	Remote Control	Number of Feeders	Capacity (MVA)	Oil Containment	Seismic Restraint	Type	Feeder Circuit Breakers
Southbrook	22.9	2+	44	22	22.5	Yes	6	2 x 16/22	Yes	Yes	Indoor	6 Reyrolle vacuum
Swannanoa	16.0	2	46	23	26	Yes	5	2 x 11.5/23	Yes	Yes	Indoor	5 Tamco vacuum
Burnt Hill	15.7	2	46	23	26	Yes	6	2 x 11.5/23	Yes	Yes	Indoor	7 ABB UniGear ZS1
Rangiora North	7.0	2-	7	0	5.2	Yes	3	5/7	Yes	Yes	Outdoor	3 Nulec SF6
Amberley	5.6	2-	8	4	6	Yes	3	2 x 3/4	Yes	Yes	Indoor	3 Reyrolle oil
MacKenzies Rd	1.5	2	4	0	1.5	Yes	3	2/4	Yes	Yes	Outdoor	3 Nulec SF6
Greta	1.3	2-	4	0	0.5	Yes	3	2/4	Yes	Yes	Outdoor	3 Nulec SF6
Cheviot	3.5	2	4	0	0.5	Yes	3	2/4	Yes	Yes	Outdoor	3 Nulec SF6
Leader	1.6	2	2	0	0	Yes	3	1/2	Yes	Yes	Outdoor	3 Nulec SF6
Oaro	0.4	2	0.5	0	0	No	1	0.5	No	No	Outdoor	1 ME KFE vacuum
Ludstone	5.9	2	12	6	6	Yes	4	2 x 4/6	Yes	Yes	Indoor	4 South Wales oil
Hawarden	3.5	1	4	0	2.5	Yes	3	3/4	Yes	Yes	Outdoor	2 GPC oil, 1 Nulec SF6
Mouse Point	14.7	2	26	13	14	Yes	4	2 x 10/13	Yes	Yes	Outdoor	4 W&B SF6
Marble Quarry	0.1	1	0.2	0	0	No	1	0.2	No	No	Outdoor	1 GPC oil
Lochiel	0.2	1	0.2	0	0	Yes	1	0.2	No	Yes	Outdoor	1 Nulec SF6
Hanmer	4.7	1	6	2.5	0	Yes	2	4/6 + 2.5	Yes	Yes	Indoor	2 South Wales SF6
Colour Key:	*Less than 75% of capacity utilised*				*75-100% of capacity utilised*				*Over 100% of capacity utilised*			

Table 4 Zone Substation Key Information

Security of Supply Key:

1 A single fault will cause a loss of supply.

2- Two sub-transmission lines supply to near the substation; but a short, single spur line completes the circuit.

2 A faulted line can be bypassed by manually switching to an alternative line.

2+ A faulted line will be bypassed by automatic switching to an alternative line without loss of supply.

3.2.4 Distribution Substations

As our high voltage distribution network is predominantly overhead, the majority of distribution substations are pole mounted. Distribution substations in rural areas are typically pole mounted for transformers up to 200kVA and ground mounted above 200kVA, although many irrigation customers require their high voltage spurs to be underground with ground mounted distribution substations. Pole mounted transformers are protected with expulsion drop out fuses and low voltage HRC fuses where practical.

The main urban areas have largely underground distribution with ground mounted substations. Most substations located in residential or rural areas are located on private property within easements or land purchased by MainPower. Our distribution substations consist of a range of construction types and designs, as outlined below.

- Building Substations: Large buildings or rooms of poured concrete and stucco exteriors. These were generally built with exposed overhead 11kV buswork but most have been changed to more modern ground mounted RMU's. They are ideal locations for automated switchgear.
- Kiosks: Smaller predominantly front access steel kiosks housing the transformers and switchgear: RMUs are used with an 11kV HRC fuse protecting the transformer. The box design allowed for a maximum transformer size of 500 kVA, however, these have to be de-rated because of reduced cooling. Low voltage panels were typically the open style Lucy HRC fuses but many of these have been replaced with DIN standard switchgear.
- Mini-Sub: Mini-substation packages with RMUs in every second substation and air mounted fuses in the remainder.
- Outdoor: More recently outdoor transformers with cable boxes and separate front access outdoor cabinets for the RMUs and low voltage panels are being used. This design allows more flexibility for a wider range of switchgear for changing transformer sizes, for accessibility and allowing the full rating of the transformer to be used.

3.2.5 Low Voltage Distribution Configuration

Approximately 70% of our low voltage network is underground, typically located in the larger urban areas. Cables are typically terminated in plastic service boxes above ground with larger link boxes used to create tie points between substations where practical, increasing security of supply.

Overhead low voltage systems are located in smaller townships and in rural areas to enable cost effective supply to a number of customers from one transformer. Most overhead low voltage conductors are bare conductor or covered copper.

Almost all new low voltage reticulation since 1990 has been underground. Conversion to underground reticulation is the preferred replacement strategy for old low voltage lines where this can be economically justified.

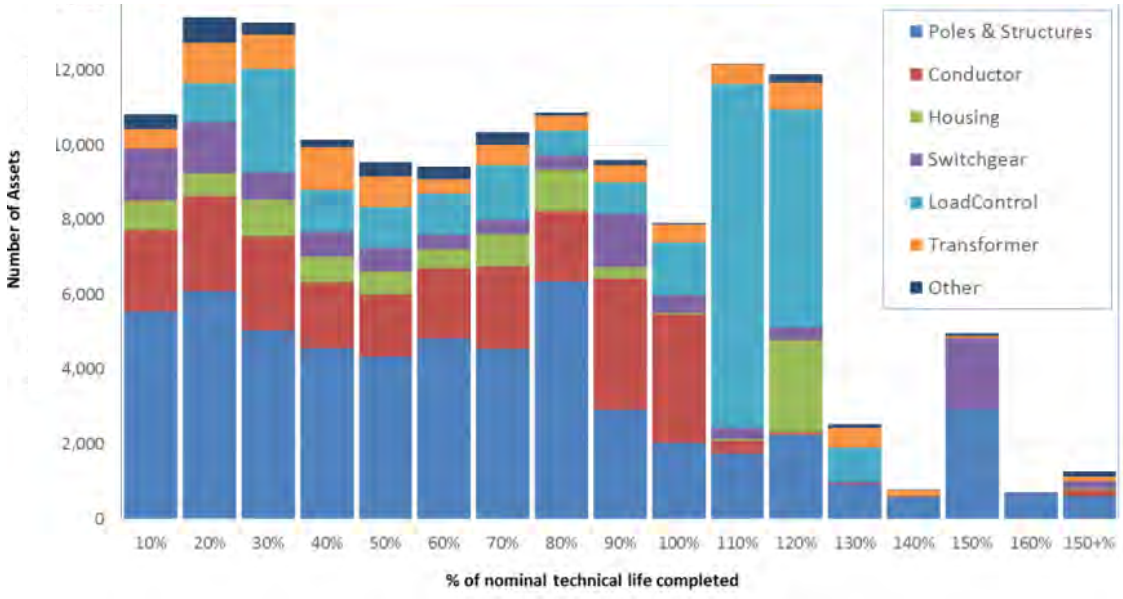
3.3 Description of Assets by Category

ASSET CLASS	SUB CLASS	LENGTH	COUNT	REPLACEMENT VALUE $
Communication	Aerial		193	618,756
	Fibre Optic		11	261,981
	Radio		190	904,591
	Remote Terminal Unit (RTU) and Card		75	989,790
	Transducer		97	105,512
Conductor	Under Ground High Voltage (UGHV)	329 km	1,421	47,667,708
	Under Ground Low Voltage (UGLV)	1,045 km	11,760	81,769,085
Structure	Pole and Line: Over Ground High Voltage (OGHV) and Over Ground Low Voltage (OGLV)	4,305 km	55,670	216,154,330
Customer Connections			39,919	

ASSET CLASS	SUB CLASS	LENGTH	COUNT	REPLACEMENT VALUE $
DC System	Cells		516	396,909
	Charge		55	241,099
	Converter		79	247,392
	Load Bank		17	118,717
Earthing			23	399,303
Easement			56	968,907
Fault Indicator			188	1,361,397
Housing	Substation Buildings		32	2,027,962
	Covers		765	3,232,119
	Substations Other		8,209	30,845,889
Land			156	4,816,637
Load Control	Injection Plant		45	2,272,859
	Relay		110	375,176
PCM (Control Systems Automation)			411	3,330,282
Structure	Oil Containment		21	475,486
	Pylon		42	1,948,000
Surge Arrestor			1,017	4,507,211
Switchgear	Disconnector		683	7,572,341
	Drop Out Fuse		9,336	27,481,425
	Frame/Bus		48	3,116,000
	High-voltage Circuit Breaker		285	8,154,663
	Ring Main Unit		414	5,324,988
Transformers			8,910	64,225,037
Miscellaneous Grid			1,003	2,290,828
Buildings	Non-Grid		176	31,676,361
Equipment, Furniture, Fittings, General Plant	Non-Grid		3,390	8,324,543
IT Hardware			792	2,589,903
IT Software			177	3,597,592
Land			31	5,256,666
Phone			39	11,850
TOTAL			**145,209**	**587,155,008**

Table 5 MainPower Assets

3.3.1 Age Profile of Assets



6.1

Figure 3 Assets Age Profile

Age profile of assets are presented considering a theoretical period of 40 years for all our assets. MainPower is replacing a number of poles on its network, so the poles and structures metric will reduce within the next reporting period. It is noted that MainPower assets are not replaced on age. Asset renewals are based on condition, asset health and risk.

3.3.2 Overview of Assets by Category

Sub-transmission
The sub-transmission system is a mixture of 33kV and 66kV circuits on hardwood poles, with newer lines predominantly constructed using concrete poles, with a few short-cabled sections.

Zone Substations
Network assets housed within zone substation buildings, or on zone substation sites, including power transformers, circuit breakers, disconnectors and projection systems.

Zone substation transformers above 1 MVA capacity have on-load tap-changers to regulate the bus voltages, with loads typically kept below the manufacturer ratings. These transformers have been subject to normal and typical urban and commercial load curves and cyclic loading.

Overhead Distribution
Large numbers of hardwood poles were historically used on the overhead network. Larch poles impregnated with creosote were used in the late 1950s through to the 1960s in combination with hardwoods. Treated Corsican pine poles were used from 1973 and concrete poles were also purchased from the mid-1970s. The main pole types used today are H5 treated Radiata pine and pre-stressed concrete.

Over the past eleven years a large number of lines have been converted from 11kV to 22kV by changing the insulators. This has largely been undertaken in rural areas experiencing high growth in irrigation demand and dairy conversions.

Underground Distribution
The majority of the high voltage underground cables are either 95mm^2 or 185mm^2 Aluminum although more recently 300mm^2 Aluminum cables are being used for major urban feeders or to supply distribution switching stations. Smaller sizes are being used for rural customer spurs.

Distribution Substations
Most customers are supplied from primary distribution substations at voltages of 11kV or 22kV. A small number of customers are supplied from SWER systems operating at 6.6kV or 11kV and a very small number of remote customers from distribution transformers on the 33kV sub-transmission system. However, as this arrangement constrains the operation of the sub-transmission system, they are being progressively removed.

Substations are either ground mounted, outdoors or within an enclosure, or pole mounted. As our distribution area is mainly rural, most substations are pole mounted. Most recent designs have used mini-subs, micro-subs, or the Pegasus Modular configuration using a standalone transformer with HV and LV cable boxes and a separate shell for the HV and LV switchgear.

MainPower has over 7,500 distribution transformers which cover a variety of manufacturers including Tyree, ABB, Astec, Tolley and Wilsons. Large quantities of transformers were purchased between 1967 and 1973 due to the growth in the distribution network at this time. Many of these were in the range of 10 to 30kVA.

Distribution Switchgear
There are a number of different types of circuit breakers and reclosers on the system, including bulk oil, SF6 and vacuum types. All circuit breakers purchased since 1995 are remote controllable.

Most of the air break switches installed between 1950 and 1980 were Canterbury Engineering types 955, DA2, DA27, NL7 and NG10. More recently Schneider's integrated spar mounted air break switches, and Electropar EPS2 switches have been used. Sealed switches are replacing critical air break switches and are almost all remote controlled.

During the 1970s and 1980s ABB's SD range of oil RMUs were used, followed in the 1990s by increased use of air-insulated Holec MD series (Magnefix) switchgear. The Holec Xiria sealed air insulated range have also been used since 2000.

Load Control
We employ Landis & Gyr SFU-G and SFU-K ripple injection plant using Decabit code for load control and tariff switching. The plants operate at an injection frequency of 283 Hz and all plants are GPS synchronised.

The majority of the receiver relays are in new Smart Meters or are Zellweger/Enermet RM3 installed between 1993 and 1997. The remainder are the later Landis & Gyr RC5000 series, and more recent purchases are RO3 type relays.

Street Lights
Most street lights are controlled by ripple relays located at local low voltage distribution substations where the relays receive a signal by ripple injection initiated from a light level sensor. Dedicated street light supply cables loop around a number of lights from each control point. A small number of lights are controlled from local photocell sensors. Street light relays are modern and reliable with extremely low reported failure rates.

SCADA
The Schneider Wonderware SCADA system will be replaced by an OSI Monarch platform by 2020. This is part of implementing the OSI Advanced Distribution Management System.

MainPower's first SCADA system used remote terminal units (RTUs) communicating with Conitel protocol and these have now either been completely changed to more modern DNP3 RTUs or been slaved to more modern RTUs on site. All remote sites are now communicating via the DNP3 protocol. Work is proceeding on new field devices with remote communication facilities. We are committed to using the latest distribution automation technologies to improve system performance and fault response times.

Communications
Our voice and data radio equipment has migrated to new systems over the past eight years and is operating reliably. Tait voice radios and MiMOMax data radios are currently employed. During 2016 a lone worker and worker down function was added to the voice radio platform through the use of portable radios working through the base vehicle radio.

Protection and metering systems
All modern zone substations use Areva, SEL or Siemens digital electronic protection systems. Older substations have GEC electromechanical relays which are still reliable but have limited setting ranges and functionality. A number of individual relays in these substations have been replaced in conjunction with circuit breaker replacements. We also own high voltage metering systems for several large users including the Daiken MDF plant and McAlpines timber processing plant.

Power factor correction plant
MainPower has no system power factor correction installations of its own, however the Daiken NZ mill at Ashley has two 11kV capacitor banks and Transpower have installed power factor correction for voltage support on the 66kV bus at Southbrook.

Property and Buildings
MainPower owns substation buildings, offices, administration buildings and operational buildings. All of our buildings are well maintained. MainPower relocated to a new, purpose built, head office and works facility in June 2014.

Assets owned at Transpower Grid Exit Points
MainPower owns metering and communications equipment at Transpower GXPs which connect to our network, to monitor load for load management and for revenue metering. All have Ion type meters, installed after 2000. MainPower's ripple injection plants are located in Transpower GXPs at Waipara, Ashley and Kaiapoi. We also have SCADA and local service equipment associated with load control at these sites.

Mobile Substations and Generators
We have invested in a mobile diesel generation plant to assist with reducing the number of planned interruptions. The plant is rated at 275kVA. The generator has been fitted on a tandem axle truck along with the transformer, protection systems and connecting leads. The generator is used during planned work to maintain the supply to customers and it has enough capacity to supply the average load of an urban transformer kiosk or can be connected to overhead lines at 11kV or 22kV supplying up to 100 customers. We also have a smaller 88 KVA generator for use with low voltage customers. This is often large enough to supply small subdivisions during maintenance.

3.3.3 Other Generation

MainPower owns and operates a 1MW generation asset located at Cleardale and is connected to the distribution network owned and operated by Electricity Ashburton. The Cleardale site is operated, managed and maintained in alignment with the MainPower network. This generation asset is identified as non-network and does not form part of MainPower regulatory reporting.

Asset Management Plan 2019 – 2029

Section 4 – Service Levels

This section outlines MainPower's approach to service levels, including performance monitoring aligned with yearly business planning processes and the long-term strategic direction of the business. In this section, we explain how we have determined the key performance indicators, our targets for the planning period, and how we have set them.

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4. Service Levels

4.1 Overview of our Services

Creating a network for the future requires an understanding of what our customers and stakeholders expect from us. MainPower's approach to stakeholder engagement was outlined in Section 2. Ultimately, our goal is to remain relevant to our customers and local community. That goal requires us to adopt new and different ways of thinking.

4.1.1 Using our Approach to Service Levels to Underpin Decision Making

Levels of required service are a significant component of asset management and underpin all lifecycle decision making. Levels of service are the outputs that a customer receives from an organisation.

4.1.2 Achieving Service Level Targets

It is expected that all service target levels presented will be achieved, other than in the event of unanticipated extreme circumstances.

4.2 Engagement and Services Targets

Customer engagement is increasing in significance as the electricity industry evolves and industry participants place more value on being relevant. Creating a strong, lasting relationship with customers today means will ensure we stay relevant tomorrow. Searching for ways to engage with customers (including using innovative strategies and campaigns) has resulted in a shift of thinking.

By listening to our customers and community, we have developed a clear understanding of the measures of performance that are most important to them and how MainPower is currently performing against those measures. Summary insights from recent customer research indicate that both residential and business customers view electricity reliability as a key performance deliverable.

MEASURE OF PERFORMANCE	SATISFACTION RATING TARGET 2020-2029
Continuity – keeping the power on	95%
Price – keeping costs down	70%
Restoration – reducing the length of time when power is off	85%
Quality – keeping flickering or dimming lights to a minimum	85%
Accessibility – easy to contact my provider when needed	85%
Communication – keeping you informed of the electricity network	85%

One future innovation to help us engage with our customers and our community

One future initiative to improve how we engage with our customers and our community is the introduction of a customer panel. That panel will have representatives from our various customer and stakeholder segments. We intend to use the panel to gather feedback from a broad range of our stakeholders and will contribute towards our strategic decision making.

4.2.1 Setting Performance Targets

Our connection agreement sets out the terms and conditions for delivery of line services to customers for the conveyance of electricity. We use customer feedback and engagement activities to ensure that customers' needs are reflected in service standards. Also informed by direct customer service interactions, customer service targets are set to at least maintain the existing level of service across the planning period.

4.2.2 Realising the Benefits of Monitoring and Improving Service Delivery

Monitoring and improving service delivery is vital if we are to establish trust and goodwill with customers and our stakeholders and maintain our reputation.

We take on different roles depending on the context or place where we interact with customers. We loosely group these roles into service provider, community partner, and future focused. Our service provider role primarily deals with the

customer goal of 'keeping the power on'. It includes direct interactions we have with customers around the connection and maintenance of their power supply. These core business activities make up a large portion of our contact with customers.

MainPower monitors service performance through a Voice of the Customer (VoC) research programme. A VoC programme is a process of understanding how customers perceive their interactions with MainPower. This understanding lets us establish a continual improvement process in which we use direct customer feedback to tailor the actions of our frontline staff as well as the more strategic actions of our senior people.

PERFORMANCE INDICATOR	TARGET 2020 – 2029
Customer Easy Score – effort required in dealing with MainPower[4]	2.5
CUSTOMER SATISFACTION[5]	
Friendliness of MainPower staff	4.5
Quality of work completed	4.5
Timeliness of service	4.5
Communication received throughout	4.5
Reliability of MainPower staff	4.5
The final price	4
SERVICE DELIVERY – RESPONSE	
Time taken for new power supply quote	15 working days
Time taken for new connection application to be processed	3 working days
Fault response time from first contact	2 hours

Table 1 Indicators of Service Performance

[4]Measure: 1 – Very low effort, 5 – Very high effort
[5]Measure: 1 – Very dissatisfied, 5 – Very satisfied

4.2.3 Resolving Customer Complaints

To achieve best practice service standards, MainPower has a free complaints resolution process to resolve issues customers may have with our activities and services. The complaints process is also a way of communicating with, and receiving feedback from, our customers and the community.

More broadly, complaints or 'customer feedback' are typically an opportunity to develop a relationship with customers by demonstrating the value placed on them by taking their concerns seriously and dealing with their concern effectively. A robust complaints process also offers an opportunity to fix problems and prevent them from re-occurring, which ultimately improves customer satisfaction.

PERFORMANCE INDICATOR	TARGET 2020 - 2029
Percentage of complaints resolved by end of day one	35%
Percentage of complaints resolved within two seven working days	50%
Percentage of complaints resolved within seven to twenty working days	10%
Percentage of complaints resolved after more than twenty working days	Less than 5%

Table 2 Indicators of Customer Complaints Resolved

4.3 Network Performance Targets

4.3.1 Measuring and Monitoring Quality of Supply

Quality of supply performance targets guide investment decisions and ensure that we continue to meet our customers' expectations and regulatory requirements.

MainPower's key reliability measures are:

- SAIFI (System Average Interruption Frequency Index), which measures the average supply interruptions for each customer during the year.
- SAIDI (System Average Interruption Duration Index), which measures the average minutes that a customer is without power during the year.

We also measure and monitor fault rates at different voltages, which are measured as number of faults per 100 km.

Reliability performance targets are derived from a combination of historical performance, network analysis, benchmarking with other lines companies and customer consultation.

PERFORMANCE INDICATOR	TARGET (per year) 2020 - 2029
SAIDI Planned (normalised)	260
SAIDI Unplanned (normalised)	80
SAIFI (normalised)	1.73
Unplanned faults per 100kms (during the year)	6.15

Table 3 Indicators of Reliability of Supply

Target values have been estimated using the budgeted work for the 10 year planning period. We are forecasting a significant increase in maintenance, replacement and growth related work being undertaken in 2019 and increasing to sustained levels over the 10 year period. Coupling this estimate with an increased focus on efficiently planning and managing outages to minimise the overall impacts to customers, it is estimated that the average outage duration for customers within the network is likely to increase beyond currently observed levels. Unplanned outages however, are expected to be consistent with what has been previously observed.

Future Innovations to improve supply Quality of Supply

MainPower is committed to improving quality of supply, with a specific focus on improving the customer experience. In a recent customer survey, 70% of respondents could recall at least one power outage (planned or unplanned) in the last 12 months. This increased to 95% for business customers. These results are based on customer perceptions and may not necessarily match actual outages. In addition to improving our communication channels and the way we keep customers informed, we plan to engage with customer groups and set agreed service standards based on what's important to them. The plan and standards may include location specific service levels, based on the number and duration of outages each year.

4.3.2 Resilience

Resilience is the measure of the impact environmental and external influences has on the network resulting in an outage to our customers. Customer research suggests that restoring electricity supply or reducing the length of outages is off is important.

PERFORMANCE INDICATOR	TARGET 2020 – 2029
Outages (External and Unplanned) – percentage restored in under 3 hours	97%

Table 4 Indicators for Restoration of Supply

4.3.3 Feeder Reliability

MainPower uses Feeder Reliability as a metric to understand if there are any individual feeders where the reliability of the feeder outside of a typical normalized reliability standard for that feeder.

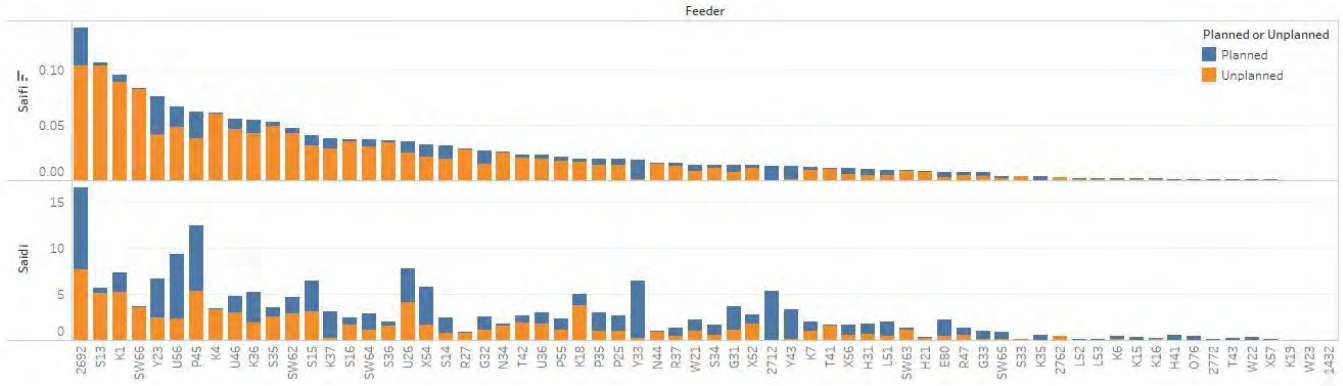

Figure 1 Feeder Reliability Planned and Unplanned - Typically

PERFORMANCE INDICATOR	TARGET 2020 – 2029
Feeder Reliability less than target per Feeder Per Year	8% of SAIFI

Table 5 Feeder Reliability

4.4 Efficiency and Effectiveness Performance Targets

Our efficiency and effectiveness targets are achieved by:

- Efficiently utilising assets and resources;
- Managing costs; and
- Meeting financial targets, consistent with our Energy Companies Act obligation to operate as a successful business.

4.4.1 Maintaining our Assets

PERFORMANCE INDICATOR	TARGET 2020 – 2021
Asset Management Standards	Implement Asset Fleet Strategies for all asset classes.
Asset Health	Establish and monitor asset health for all asset classes.
Asset Maintenance and Replacement	Apply condition and risk-based maintenance and replacement programs.
Regional Master Planning	Extend network planning to provide region specific master plans.
Engineering Design	Develop standard engineering designs across main asset classes.
New Energy Future	Monitor emerging technologies and conduct scenario planning.

Table 6 Areas of focus for asset management Indicators

4.4.2 Operational Effectiveness

PERFORMANCE INDICATOR	TARGET 2020 – 2029
Maintenance	95%
Replacement CAPEX	95%
Development CAPEX	95%
Field staff utilisation	76%

Table 7 Indicators of Operational Effectiveness

4.4.3 Financial Efficiency

MainPower's economic approach is to operate at the lowest sustainable cost while still maintaining high levels of safety performance for our customers and our staff.

PERFORMANCE INDICATOR	TARGET 2020 – 2028
Average line charge per customer	$1,244
Average kWh per customer	15,078

Table 8 Indicators of Financial Efficiency

4.5 Safety and Environment Performance Targets

MainPower's objective is to embed a health, safety, environment and quality culture that delivers safe, productive and environmentally responsible quality service.

4.5.1 Keeping Our Network and the Public Safe

Network Safety

Making safety a priority means providing a safe network and a healthy work environment. This is achieved by:

- Managing and communicating hazards and risks associated with the workplace, the electricity network and our business activities effectively;
- Ensuring that effective planning is in place for all projects;

- Ensuring that suitable Personal Protective Equipment (PPE) is provided to employees and is worn in line with industry guidelines and MainPower's requirements; and
- Ensuring that employees have an appropriate level of training, skill and knowledge to carry out their work safely.

We design, construct, commission, operate and maintain the electricity network and other company assets to ensure that they are safe, fit for purpose, and do not pose a risk to health. We also participate in industry-related benchmarking of safety incidents to provide a basis for measuring our performance.

Public Safety

MainPower promotes public safety around electricity in the MainPower region so that the community is very aware of safety issues. This includes collaborating with industry groups to develop a national strategy focused on agreed priority areas, with actual delivery at a local company level. Priority areas include asset security (willful interference, vandalism and theft of metal, as well as trespass) and accidental contact (such as overhead and underground cables, cars hitting poles), with a focus on high-risk risk audiences, including:

- Tradespeople and outdoor workers (such as farmers);
- Contractors and other non-electrical workers;
- Young males aged 16 to 25;
- Emergency services personnel; and
- Children.

PERFORMANCE INDICATOR	TARGET 2020 – 2028
Number of work-related accidents resulting in lost time	Nil
MainPower has implemented and audited its approach to network safety	No harm to the public directly caused by MainPower assets.
Public safety communications contribute to positive behavioural change[8]	28%

Table 9 Indicators of Safety Performance

[8]Measure: Percentage of respondents who changed or considered their behaviour due to a safety message from MainPower.

4.5.2 Complying with Our Environmental Responsibilities

MainPower places significant emphasis on being an environmentally responsible company and complying with our responsibilities. Key environmental performance indicators are outlined in the table below.

PERFORMANCE INDICATOR	TARGET 2020 – 2029
Understand our carbon footprint and other emissions	Develop policies for the measurement and management of CO_2 and SF_6 emissions.
Number of uncontained oil spills	0
Number of breaches of resource consent requirements	0

Table 10 Indicators of Environment Performance

4.5.3 Complying with New Zealand Legislation

MainPower is subject to legislative requirements under the following legislation:

- Building Act 2004
- Civil Defence and Emergency Management Act 2002
- Commerce Act 1986 (including the Electricity Information Disclosure Determination 2012)
- Electricity Act 1992
- Electricity Industry Act 2010
- Health and Safety at Work Act 2015
- Local Government Act 2002
- Public Works Act 1981
- Resource Management Act 1991

MainPower is also subject to regulatory requirements and codes of practice under the following legislation:

- Electricity (Hazards from Trees) Regulations 2003
- Electricity (Safety) Regulations 2010
- Health and Safety Regulations (various)
- NZ Electrical Codes of Practice

PERFORMANCE INDICATOR	TARGET 2020 – 2029
Number of regulatory non-compliance enquiries	0

Table 11 Indicators of Legislative Compliance

4.6 Benchmarking

The objectives of benchmarking is to observe and seek to understand how MainPower is performing as an organisation when compared with other EDB business. MainPower has been benchmarked within a group of seven network business, detailed below.

Organisation	ICP/km	ICP's
Alpine Energy	7.7	32,975
EA Networks	6.2	19,217
Eastland Network	6.5	25,512
Horizon Energy Distribution	9.9	25,000
MainPower NZ	**8.1**	**40,841**
Marlborough lines	7.5	25,374
Network Tasman	11.0	39,578
Top Energy	7.8	31,641
Median	**7.7**	**28,577**

Table 12 Benchmark Organisations

MainPower will assess itself against these EDBs as a minimum, but not limited to, profits, price, expenditure and network reliability. All companies are complex and other factors can significantly impact network performance. Therefore, we will assess ourselves using:

- Network density – indicated by the ratio pf customers connections per circuit kilometre; and
- Size of the Network – indicated by the total number of customers connection served.

4.7 Changes in Forecast Expenditure

A change in forecast expenditure that may materially affect performance definitions is not expected within the reporting year. Any instances where expenditure may affect network performance in the future will be reported and internal response defined and implemented.

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Section 5 – Network Development Planning

This section describes MainPower's approach to network development planning. Four aspects help to formulate our planning: analysis of maximum demands, network power flows, specific customer requests and demographic estimates.

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5. Network Development Planning

Network development planning is a significant focus for MainPower within our asset management framework and processes. Considering the changes already identified, the perceived way the MainPower network will be used in the future and the services that will be required by our customers (current and new market participants) will mean continuing to apply the current traditional distribution network approach of demand-based deterministic planning to network development planning will no longer meet the future needs.

The underlying elements and influences of these changes from the perspective of an EDB are seen as:

- Significantly greater integration between distributed generation, transmission and energy storage on the network, together with increased interaction with active traditional customers;
- New technologies producing variable power sources, two-way power flows and new demands that are already observed to be creating serious challenges on networks internationally;
- The impact of new commercial parties, models and business platforms working through both the distribution network and through the 'internet of things' but impacting on use of the network;
- A growing focus on energy communities, peer-to-peer trading, and local markets;
- The impact of non-linear loads, such as rapid EV chargers, on standard network infrastructure and the ability to manage the significant demand peaks and power quality issues these introduce at the low voltage distribution level.
- The potential for use of separated distribution micro grids where these are the most economical solution when considering renewals or new supplies; and
- The national transition to a low-carbon economy.

The above can be summarised as highlighting the need to move from the traditional passive distribution network to an active network that has more dimensions.

In response to this, MainPower is currently re-evaluating its network development planning methodology. In simplistic terms we see the need to move from the traditional distribution network approach of demand-based deterministic planning to scenario-based planning. To achieve this, new skills and systems will be required. We are actively engaged in identifying how these requirements will be met through learning from the experiences of others (both locally and internationally who have already addressed or are actively addressing these challenges) and by participating in the results, learnings and tools being made available from industry working groups such as GREEN Grid, ENA and EEA forums.

This evolution of our network development approach will help us better understand the range of capacity and service requirements the network will need to deliver and help minimise the risk of uneconomic network development.

We also recognise that as part of this new future for distribution networks, there will be increased opportunities for non-network solutions (where economically viable) and the opportunity for existing and new market participants to provide energy solutions. MainPower recognises the need to identify these opportunities in a timely manner to facilitate market response and potentially seek providers of non-network solutions.

While we review our network development planning process, our network development plans are primarily driven by safety, security of supply, reliability and compliance requirements and will evolve to include future requirements for the North Canterbury region.

The following section identifies the current deterministic planning process with some innovation based on our future thinking and early movements to a new model of network development planning.

5.1 Network Development Planning Criteria

Our network development is informed by our defined levels of service and performance, planning criteria and standard design implementations, which are a function of:

- Capacity;
- Power Quality Compliance;
- Security; and
- Reliability.

We use options analysis to consider alternative development and engineering solutions. When selecting a solution, we consider cost and sustainability.

5.1.1 Capacity

We must ensure there is sufficient capacity available to meet network peak load. This is provided through network capacity in conjunction with our demand side management capability.

We follow a process of forecasting network demand and assessing this demand against our security of supply standard to establish areas where we may experience a shortfall in capacity at a defined security level.

We plan to implement and monitor security performance indicators to show the capacity we provide at each security level.

5.1.2 Power Quality Compliance

One of the key criteria for distribution development planning is power quality compliance, such as voltage. Voltage performance is monitored by SCADA using field voltage measurements, load flow analysis, manual voltage checks (under normal and abnormal configurations) and investigations into customer complaints about power quality.

Voltage regulators are used at 11kV and 22kV to assist in maintaining the voltage within the statutory voltage limits. Voltage regulators are generally set to control in the band 100% to 102% of nominal voltage at sites with 1.25% control steps. Where either line drop compensation or 2.0% tap-changers are employed, voltage regulation is set to control within the band 11,000 – 11,300V. Line drop compensation is rarely used because of the large customer spread along the distribution lines.

Systems are generally designed to have less than 10% total voltage drop to the network connection point to allow for additional voltage drop, when the system is being supplied in an abnormal configuration e.g. during an equipment outage. In normal operating configurations this also allows for the bus voltage to be reduced by 1% to facilitate a higher penetration of distributed generation.

5.1.3 Security

Security of supply is the ability of the network to meet normal demand under contingency events, such as equipment failure. The more secure the network, the greater the ability to continue to provide supply during a contingency or perform restoration from a fault or series of faults.

Note that security of supply differs from reliability. Reliability is a measure of how the network actually performs and is measured through indices such as the number of times supply to customers is interrupted.

5.1.4 Reliability

The number and duration of service interruptions are of primary interest from the customers' point of view, as specified in Section 3. MainPower uses reliability statistics and targets to identify if and where system improvement is needed. We select development options based on the lowest whole-of-life cost to provide the functionality and meet target reliability outcomes.

5.1.5 Planning Criteria Summary

Our planning criteria for each part of our network is summarised below. While our development planning attempts to anticipate each of these criteria as a trigger for network investment, the explanations below provide a useful summary of the network consequences which lead to extension or upgrade decisions.

Project Type Criteria	Capacity	Reliability	Security	Voltage
LV Lines & Cables	Insufficient capacity to supply connection.	Voltage complaints	Establish or maintain defined level or security.	Voltage at consumers' premises consistently drops below 0.94pu.
Distribution Substations	Where loggers indicate over-loading. Greater than 75% rating where transfer capacity required. New loads would exceed thresholds.	Voltage complaints	Establish or maintain defined level or security.	Voltage complaints or modelled voltage levels low.
Distribution Lines & Cables	Peak load under emergency conditions exceeds capacity.	More outages than targeted.	Establish or maintain defined level or security.	Load flow analysis highlights voltage regulation problems.

		Design review highlights inherent weakness e.g. prone to snow damage.		
Zone Substations	Max demand consistently exceeds 100% of nameplate rating and no non-network solution available.	Less than target reliability.	Establish or maintain defined level or security.	Voltage regulation issues.

Table 1 Summary of Planning Criteria

5.2 Security of Supply Classification

The following sections describe how we define security of supply classifications for zone substations and feeders.

5.2.1 Zone Substation Security

Zone substations are classified for security according to the following table:

Substation Classification	Targeted Duration for First Interruption	Targeted Duration for Second Interruption
AAA	None	Repair time
AA+	15 seconds	Repair time
AA	45 minutes	Repair time
A1	Isolation time	Repair time
A2	Repair time	Repair time

Table 2 Security of Supply Zone Substation Restoration Times

Zone Substation Classification Descriptions

AAA *Supply is uninterrupted in the event of the outage of one major element of the subtransmission network. Load can be transferred to other substations without interruption by switching on the network if necessary to avoid exceeding ratings.*

AA+ *Supply may be lost in the event of the outage of one major element of the subtransmission network. Supply is restored automatically within 15 seconds by automatic switching at subtransmission or distribution level.*

AA *Supply may be lost in the event of the outage of one major element of the subtransmission network. Supply can be restored within 45 minutes by switching at subtransmission or distribution level.*

A1 *Supply may be lost in the event of the outage of one major element of the subtransmission network. Supply can be restored by switching after the faulted element is isolated.*

A2 *Supply may be lost in the event of the outage of one major element of the subtransmission network. Supply cannot be restored until the faulty element is repaired or replaced.*

5.2.2 Feeder Classifications

Distribution Feeders are classified according to the following table:

Classification	Description
F1	Large Industrial
F2	Commercial / CBD
F3	Urban Residential
F4	Rural

F5	Remote Rural

Table 3 Security of Supply Load Types

5.2.3 Security Level Selection

The table below shows the criteria and selection process for zone substation security level, based on the load type. This is applied subject to economic and technical feasibility.

Load Type	Zone Substation Maximum Demand			
	< 1 MVA	1 – 5 MVA	5 – 12 MVA	>12 MVA
F1	AA	AA	AA+	AAA
F2	AA	AA	AA+	AAA
F3	AA	AA	AA	AA
F4	A1	A1	A1	-
F5	A2	A2	-	-

Table 4 Selection Process for Zone Substation Security Level

5.3 Strategies for Cost Efficiency

- We employ standard designs for construction of our 22kV and 11kV overhead line structures while ensuring that our designs comply with the Electricity Regulations and the relevant New Zealand Standards and Codes of Practice. All new overhead lines are designed to AS/NZS7000:2016.
- We have standardised our design of 11kV underground cable and ground-mount substations, and the key components of our network, such as distribution transformers, cable, protection relays, battery chargers and fuses, to improve efficiency.
- We are remodelling our new connections process to become more customer focussed and are engaged in a business transformation process of our scheduling and planning systems to improve our workflow processes.
- We are collaborating with other Electricity Distribution Businesses to look for cost efficiencies from the standardisation of procedures, work practises and network access control requirements.

5.4 Use of Standard Designs

Standard designs are used to achieve, and are aligned with, MainPower's asset management objectives to continue to deliver a defined level of service to customers in a safe, reliable, economically efficient and sustainable manner that meets the expectations of stakeholders. Standard designs exist for all MainPower overhead structures. Work is currently being undertaken to further standardise our engineering solutions. Standard designs are identified through:

- Total cost of ownership;
- Economies of scale;
- Compliance;
- Service levels;
- Security of supply; and
- Safety.

5.5 Strategies for Energy Efficiency

MainPower has a focus on improving the energy efficiency of its network through reducing losses where reasonably practical, placing a high value on efficiency parameters when purchasing new equipment and on education programs to improve demand side management.

All conversions from 11kV to 22kV will cause a replacement transformer to be installed that meets the new Minimum Energy Performance Standard (MEPS). Additionally, we consider loss capitalisation when purchasing transformers. As a

company, MainPower actively promotes energy efficiency in the community through consumer education and our community sponsorship program (insulation and energy efficiency solutions). We are actively engaging with our customers and assessing demand side management concepts in regard to emerging technologies and consumer behaviour.

5.6 Project Prioritisation

A risk-based approach is applied to establish project prioritisation, in combination with other factors such as:

- Compliance and Safety;
- Meeting service obligations and targets defined by our customers;
- Cost benefit analysis; and
- Options analysis.

In general terms, development projects are prioritised as follows:

- Addressing compliance, health, safety and environmental issues;
- Customer driven projects for new connections or upgrades;
- Providing for load growth; and
- Meeting customer service levels.

Prior to the commencement of each planning period, potential projects for the following ten years are identified. Inputs to the prioritisation process include:

- Determining the primary driver for the project;
- Impact on customers should the project not proceed or be deferred;
- Seasonal requirements;
- Cost and funding implications;
- Alternative non-network solutions; and
- Planning uncertainties.

5.7 Demand Forecasting

Our network demand forecasting process forecasts demand at Transpower's North Canterbury Grid Exit Points (GXP) and MainPower's zone substations over the next ten years.

When developing demand forecasts, a number of key inputs are applied including:

- Population and household projections obtained from Statistics New Zealand;
- Local District Scheme and Community Plans;
- Notified changes in land use designations;
- Known commercial, residential and industrial developments;
- Historical electrical demands;
- Non-network solutions (such as demand management);
- Historical extreme movements in temperature and rainfall where this impacts on peak demand;
- Expected economic developments; and
- Emerging technology adoption, such as electric vehicles.

The table below shows the 10-year load forecasts for our zone substations:

Zone Substation	Peak	Capacity (MVA)	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Southbrook*	Winter	2 x 16/22	22.9	24.0	25.1	32.9	37.2	38.3	39.5	40.7	41.9	43.2
Rangiora North	Winter	5/7	7.0	7.0	7.0							
Burnt Hill*	Summer	2 x 11.5/23	15.7	16.0	16.3	16.6	17.0	17.3	17.6	17.9	18.3	18.6
Swannanoa*	Summer	2 x 11.5/23	16.0	16.3	16.6	16.9	17.2	17.5	17.9	18.2	18.5	18.9
Amberley	Winter	2 x 3/4	5.6	4.3	4.5	4.6	4.7	4.9	5.0	5.2	5.3	5.5
MacKenzies Rd	Summer	4	2.5	2.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Greta	Winter	4	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Cheviot	Summer	4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4
Hawarden	Summer	4	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.6
Ludstone Rd*	Winter	2 x 4/6	5.8	5.9	5.9	6.0	6.0	6.1	6.2	6.2	6.3	6.4
Leader	Summer	2	1.6	1.6	1.7	1.7	1.8	1.8	1.9	1.9	2.0	2.1
Oaro	Winter	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.5

Mouse Point	Summer	2 x 13	14.7	14.8	14.9	15.1	15.2	15.3	15.4	15.5	15.6	15.7
Hanmer	Winter	4/6 + 2.5	4.7	5.2	5.2	5.3	5.4	5.4	5.5	5.6	5.7	5.7
Lochiel	Winter	0.3	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Marble Quarry	Winter	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
** Capacity is based on a single transformer bank (i.e. N-1 criteria).*												
Colour Key:			< 75% of capacity utilised			75-100% of capacity-utilised			>100% of capacity utilised			

Table 5 Zone Substation 10-year Load Forecast

5.7.1 Southbrook Grid Exit Point (GXP)

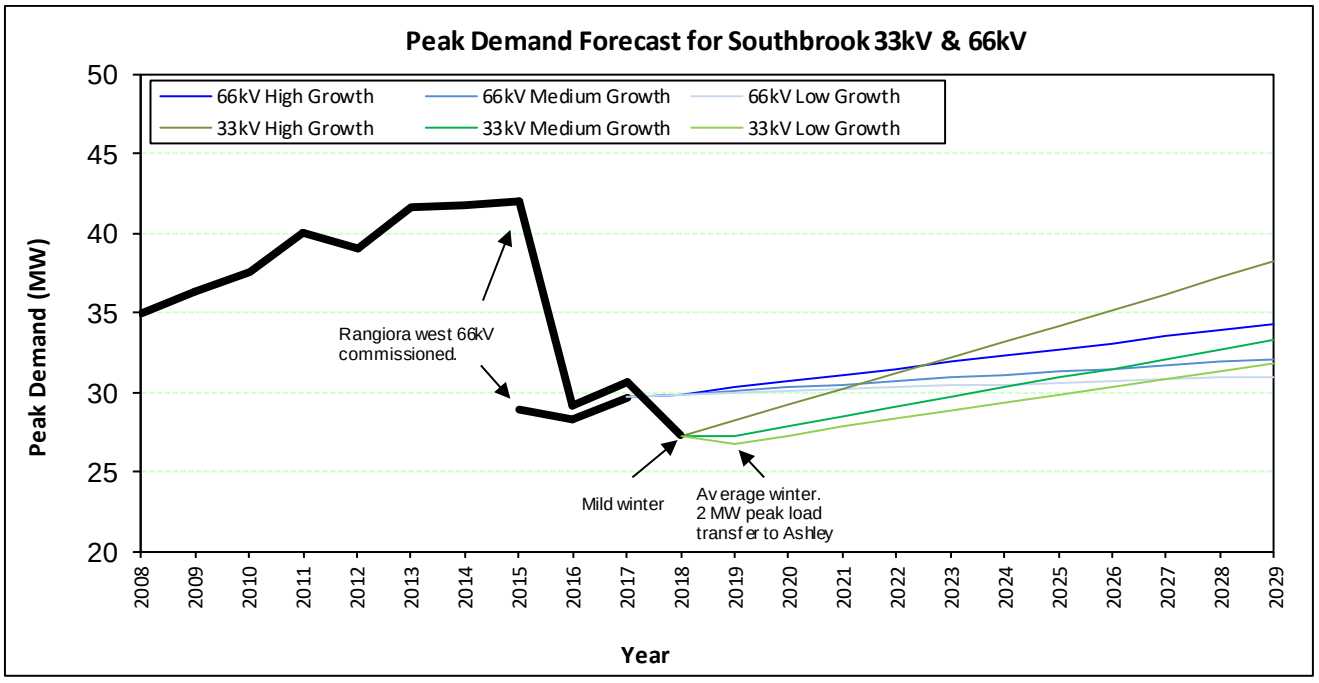

Figure 1 Southbrook GXP Forecasting

5.7.2 Kaiapoi Grid Exit Point (GXP)

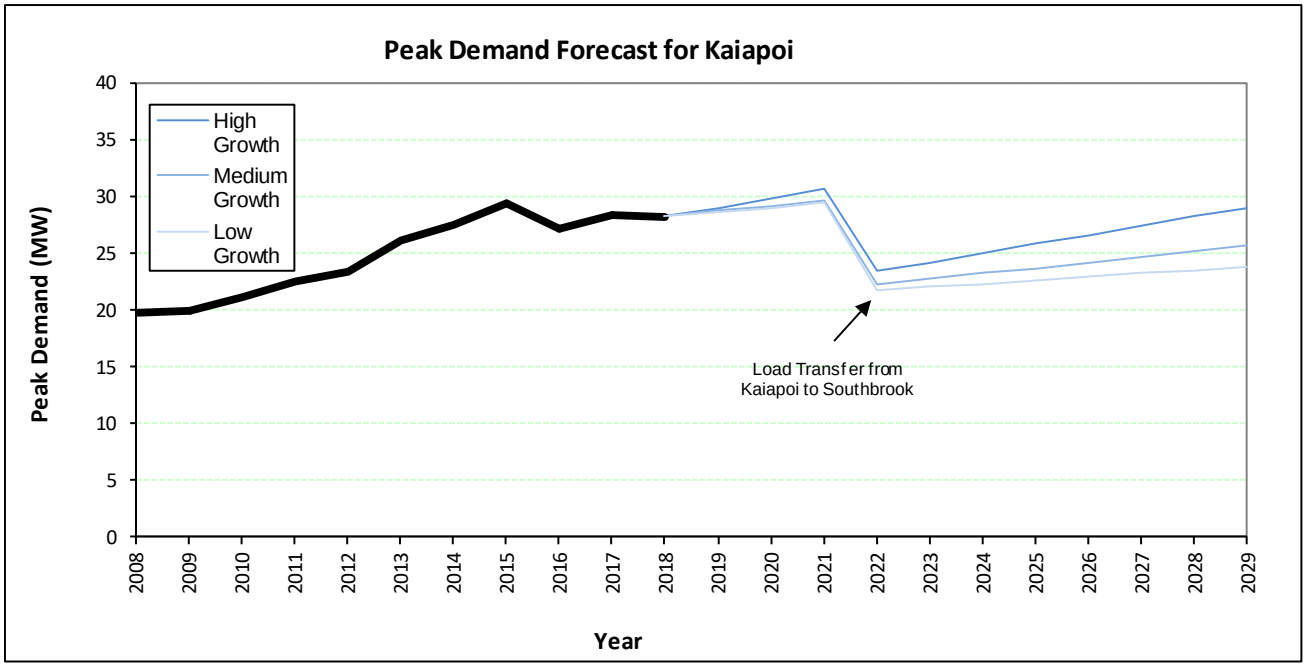

Figure 2 Kaiapoi GXP Forecasting

5.7.3 Ashley Grid Exit Point (GXP)

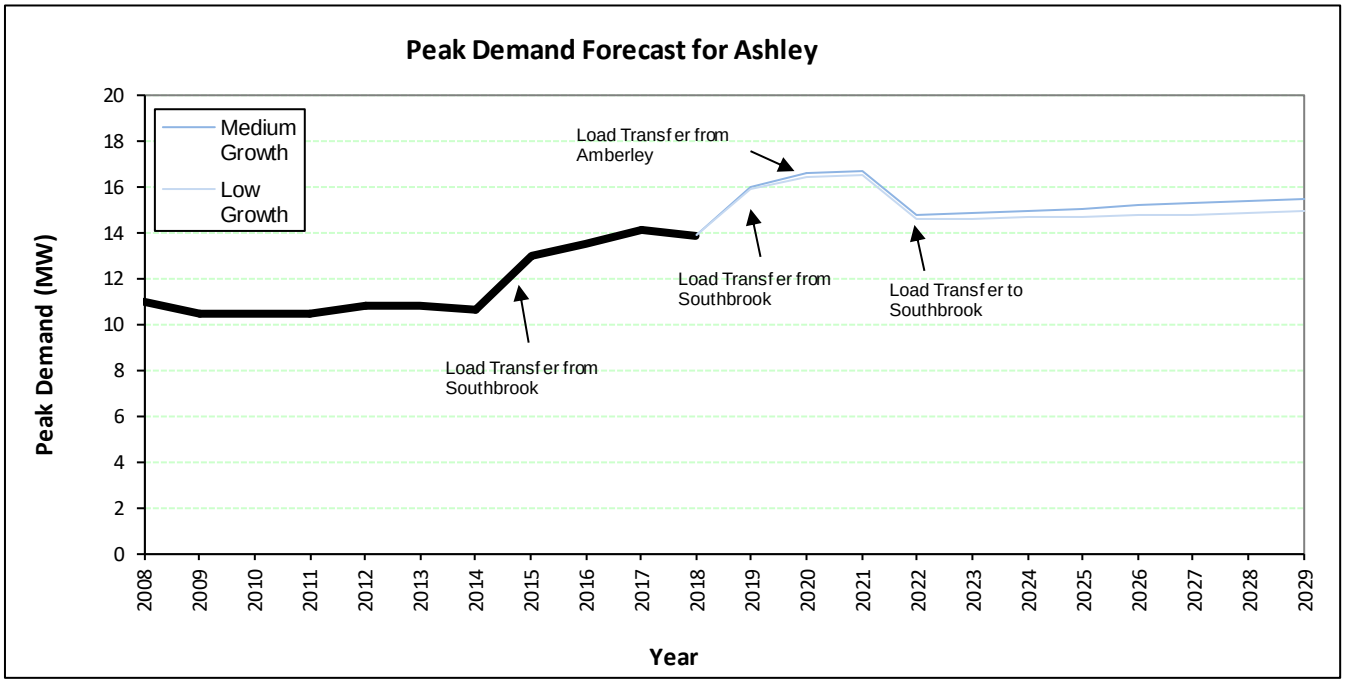

Figure 3 Ashley GXP Forecasting

5.7.4 Culverden Grid Exit Point (GXP)

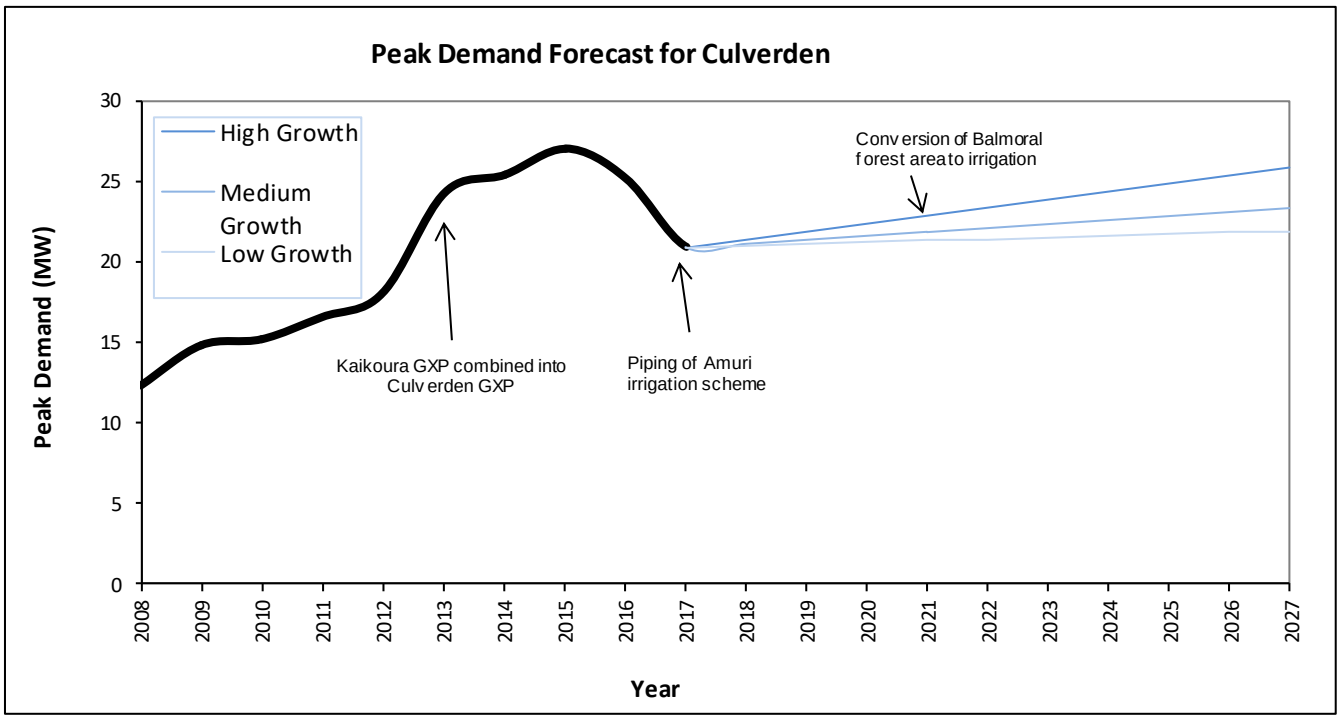

Figure 4 Culverden GXP Forecasting

5.7.5 Waipara Grid Exit Point (GXP)

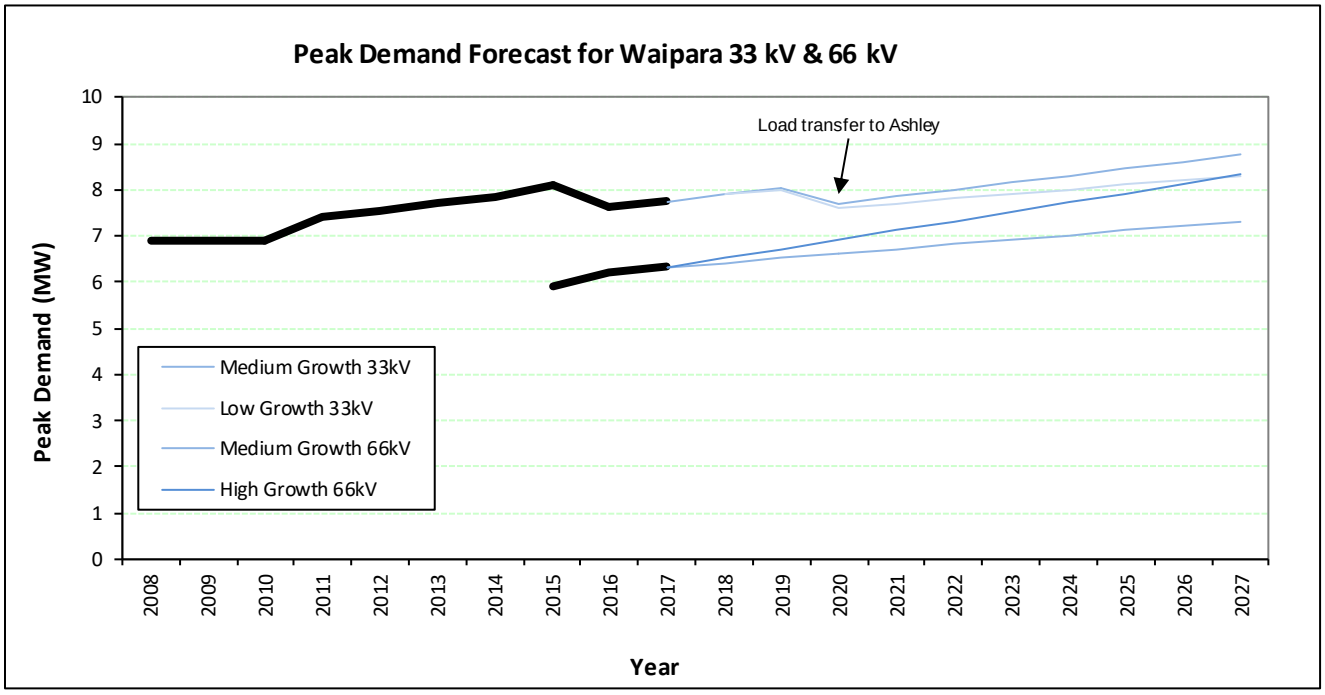

Figure 5 Waipara GXP Forecasting

5.7.6 Network Constraints

The following network constraints exist on the MainPower distribution network.

Element	Location	Constraint	Proposed Remedy
GXP	Southbrook	Achieving Transpower's load requirements during a half bus outage is very difficult.	• Discuss revised requirements and protection changes with Transpower to raise the load limit – Completed. • Continue to monitor load growth and opportunities for distributed generation. • Transition Southbrook from a 33kV to 66kV (FY21) and develop further 66kV interconnections between Waipara, Southbrook and Kaiapoi.
Sub-transmission	Southbrook to Waipara	Thermal limit on the loading capacity of Rangiora North substation when supplied from Waipara rather than Southbrook.	• Upgrade of the Southbrook substation (FY21) combined with reinforcement projects will allow Rangiora North to be decommissioned in FY23.
	Cheviot to Kaikoura	This circuit is limited by voltage drop and the capacity of in line voltage regulators at Claverley. It can only marginally supply Kaikoura during an outage of the normal Transpower 66 kV supply, even with the maximum available load control.	• Implement an interim voltage improvement solution using reactive power support at Ludstone in FY20. The upgrade from 33kV to 66kV from Cheviot to Oaro in FY20 will complement this to provide a higher capacity solution.
Zone Substation	Southbrook	The Southbrook zone substation exceeds it's 22MVA N-1 rating during peak winter periods.	• A specific Southbrook bus load control target has been implemented to maximise the time the load is kept within the N-1 rating. Approximately 2MW of load will be transferred to Ashley before winter 2019. The Southbrook zone substation will be upgraded to 66kV (starting FY20).
	Rangiora North	The Rangiora North substation operates up to its full rated load and load is increasing.	• The substation will be decommissioned following upgrade of the Southbrook zone substation.
	Amberley	The Amberley zone substation is approaching full load. This is acceptable in the short term as it is double banked and there are reliable alternative supplies from other zone substations to supply most of this area.	• Load will be reduced through load transfer to Transpower's Ashley GXP in FY20, and the MacKenzies Road substation in FY23.

Element	Location	Constraint	Proposed Remedy
	Leader	Increased irrigation growth will exceed the transformer rating by the end of the planning period.	• Upgrade the Cheviot to Oaro circuit to 66kV will double the substation rating.
	Mouse Point	This substation has a peak load of 15 MVA and is slowly rising. This is beyond its 13 MVA N-1 capacity.	• MainPower has installed emergency control on irrigation loads in this region to allow all but irrigation loads to be restored on a single 13 MVA transformer. A spare 8MVA transformer is held as a backup. Rebuild of the substation on a new site at 66/22kV is forecast around the end of the planning period.

Table 6 MainPower Network Constraints

5.7.7 Forecast Impact of Distributed Generation and Demand Side Management

All demand forecasts take into consideration the impact of existing and proposed distributed generation known to MainPower through engagement with our customers. This includes energy efficiency initiatives, with the major contributor being irrigation schemes converting to piped irrigation. Our load forecasting process considers the impact of the Demand Side Management scheme MainPower already employs.

5.8 Network Development Projects

The tables below show the major and reinforcement projects for the 10-year planning period:

5.8.1 Major Projects

Project Title	Project Cost ($,000)									
	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Ludstone Zone Substation 11kV Switchgear Replacement	660									
Kaikoura Zone Substation Transformer Fan Upgrade	49									
Cheviot to Oaro Subtransmission Line Upgrade	150	716								
Ludstone Zone Substation Capacitors		228								
Kaikoura Zone Substation Capacity Upgrade								4,000		
Southbrook 66kV Substation Upgrade	1,500	5,100								
Amberley Zone Substation 33kV Security Upgrade	50	785								
Southbrook 33kV Substation Decommissioning			248							
Rangiora North Zone Substation Decommissioning				50						
Ashley to Tuahiwi 66kV Subtransmission Line - Stage 1				1,250						
Ashley to Tuahiwi 66kV Subtransmission Line - Stage 2					740					
Southbrook to Tuahiwi 66kV Subtransmission Line - Stage 1						1,242				
Southbrook to Tuahiwi 66kV Subtransmission Line - Stage 2							1,512			
Tuahiwi 66/11kV Zone Substation						1,000	5,000	1,776		
Harwarden 33kV Zone Substation Rebuild					2,500	2,500				
Mouse Point Zone Substation Rebuild										6,000
Hanmer 33kV Subtransmission Line Conductor Upgrade	150					150				150
Amberley 66kV Zone Substation Rebuild								3,000	3,000	
Major Project Subtotals	**2,559**	**6,829**	**248**	**1,300**	**3,240**	**4,892**	**6,512**	**8,776**	**3,000**	**6,150**

Table 7 Major Projects

5.8.1 GXP Projects

Project Title	Project Cost ($,000)									
	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Kaiapoi GXP - GXP and Tower Line Purchase										
Southbrook GXP - Upgrade from 33kV to 66kV		480								
Southbrook GXP - 66kV Bay for Tuahiwi Circuit							1,000			
Ashley GXP - 66kV Bay for Tuahiwi Circuit							912			
Ashley GXP - 66kV Bay for Amberley Circuit									1,440	
Culverden GXP - GXP Purchase		3,000								
Waipara GXP - 66kV Bay for Amberley Circuit									1,440	
GXP Project Subtotals		**3,480**					**1,912**		**2,880**	

Table 8 GXP Projects

5.8.1 Reinforcement Projects

Project Title	Project Cost ($,000)									
	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Rangiora - Northbrook Rd link	84									
WDC Blake St link	128									
X53 - X56 link Burnt Hill	128									
Rangiora - East Belt north	340		80							
Amberley south deloading	240			200			200			
Northbrook Feeder		222								
Reinforce X52 Burnt Hill		182								
Kaiapoi - Island Rd upgrade		200								
Reinforce SW63 Swannanoa		157								
Greta - Cheviot 22kV link			487							
Cheviot - Leader upgrade			283							
Network Automation and Reliability Improvement	80	100	100	100	100	100	100	100	100	100
Network Reinforcement - Unscheduled		139	50	700	900	900	700	900	900	900
Network Reinforcement Subtotals	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**	**1,000**

Table 9 Reinforcement Projects

5.8.1 Network Project Cost Summary

Project Title	Project Cost ($,000)									
	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Major Project Subtotals	2,559	6,829	248	1,300	3,240	4,892	6,512	8,776	3,000	6,150
GXP Project Subtotals	3,800	3,480					1,912		2,880	
Network Reinforcement Subtotals	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Network Project Totals	**7,359**	**11,309**	**1,248**	**2,300**	**4,240**	**5,892**	**9,424**	**9,776**	**6,880**	**7,150**

Table 10 Network Projects Summary

5.8.2 Network Project Summaries

PROJECT TITLE	AREA	PROJECT CATEGORY	DESCRIPTION
Ludstone Zone Substation 11kV Switchgear Replacement	Kaikoura	Replacement	Restore security of supply by replacing 11kV switchgear.
Kaikoura Zone Substation Transformer Fan Upgrade	Kaikoura	Capacity	Install fans on the Kaikoura 66/33kV transformer to increase its capacity.
Cheviot to Oaro Subtransmission Line Upgrade	Kaikoura	Capacity	Move the 66kV/33kV transition from Cheviot to Oaro and install voltage regulation at Oaro.
Ludstone Zone Substation Reactive Support	Kaikoura	Reactive (VAR) Support	Increase Ludstone capacity by 0.4MW through localised VAR support.
Kaikoura Zone Substation Capacity Upgrade	Kaikoura	Capacity	Rationalise Ludstone and Kaikoura zone substations to replace aging assets and meet expected load growth.
Southbrook 66kV Substation Upgrade	Rangiora	Capacity	Increase the Southbrook N-1 capacity from 22MW to 45MW. Decommission Southbrook 33kV assets and Rangiora North substation.
Amberley Zone Substation 33kV Security Upgrade	Amberley	Security of Supply	Provide a 33kV N-1 supply for Amberley zone substation from Ashley via an 11/33kV autotransformer. The existing N-1 supply is removed with the Southbrook substation upgrade project.
Southbrook 33kV Substation Decommissioning	Rangiora	Decommissioning	Decommission existing Southbrook 33kV zone substation.
Rangiora North Zone Substation Decommissioning	Rangiora	Decommissioning	Decommission existing Rangiora North 33kV zone substation.
Ashley to Tuahiwi 66kV Subtransmission Line - Stage 1	Tuahiwi	Capacity	Construct new 66kV line from Ashley GXP to Rangiora Woodend Road.
Ashley to Tuahiwi 66kV Subtransmission Line - Stage 2	Tuahiwi	Capacity	Construct new 66kV line from Rangiora Woodend Road to new Tuahiwi zone substation site.
Southbrook to Tuahiwi 66kV Subtransmission Line - Stage 1	Tuahiwi	Capacity	Construct new 66kV line from Tuahiwi zone substation site to edge of Rangiora township.
Southbrook to Tuahiwi 66kV Subtransmission Line - Stage 2	Tuahiwi	Capacity	Install 66kV cable from the new Southbrook to Tuahiwi 66kV line into Southbrook GXP.
Tuahiwi 66/11kV Zone Substation	Tuahiwi	Capacity	Construct new 40MVA 66/11kV zone substation at Tuahiwi.
Harwarden 33kV Zone Substation Rebuild	Harwarden	Capacity	Rebuild and increase Hawarden zone substation capacity for new irrigation load (timing uncertain).
Mouse Point Zone Substation Rebuild	Culverden	Capacity	Rebuild the Mouse Point substation at 66/22kV.
Hanmer 33kV Subtransmission Line Conductor Upgrade	Hanmer	Reliability	Improve mechanical strength of the Hanmer 33kV line by replacing sections of the 33kV line with stronger conductor.
Amberley 66kV Zone Substation Rebuild	Amberley	Capacity	Rebuild Amberley zone substation at 66/11kV on new site.
Rangiora - Northbrook Rd link	Rangiora	Security of Supply	Install link between two feeder routes through the new subdivision on the east side of Rangiora and Northbrook Road.
WDC Blake Street Link	Rangiora	Security of Supply	Link between WDC and Blake Street to improve security of supply to both substations.
X53 - X56 link Burnt Hill	Oxford	Security of Supply	Install link between Burnt Hill zone substation feeders X53 and X56 at Parish Road.
Rangiora - East Belt North	Rangiora	Security of Supply	Install interconnection link between developments in Rangiora East and East Belt North.
Amberley South De-loading	Amberley	Security of Supply	Reduce the Amberley zone substation load by upgrading supply capacity from the neighboring Ashley GXP and MacKenzies Road zone substation.
Northbrook Feeder		Capacity	Extension of existing feeder out of Southbrook zone substation to supply subdivision developments in East Rangiora.
Reinforce X52 Burnt Hill	Oxford	Capacity	Reinforce feeder X52 out of Burnt Hill zone substation.

Kaiapoi - Island Road Upgrade	Kaiapoi	Reliability	Upgrade Island Road feeder.
Reinforce SW63 Swannanoa	Swannanoa	Security of Supply	Install link to allow load transfers and switching between feeders.
Greta - Cheviot 22kV link	Cheviot	Security of Supply	Link Greta 22kV to Cheviot to provide 2MVA of load transfer capacity.
Cheviot - Leader upgrade	Cheviot	Security of Supply	Improve 11kV transfer capacity between Cheviot zone substation and Leader zone substation by approx 1.5MVA.
Network Automation and Reliability Improvement	General	Reliability	Increase structural strength of overhead lines prone to snow and wind.

Table 11 Summary of Projects

5.8.3 Distribution Innovation

Master Planning

MainPower's future focus in network development planning includes development of regional master plans; documents that will detail projected demand growth, reliability statistics and network projects in defined North Canterbury areas.

The purpose of the Master Plans is to:

- Improve stakeholder engagement including local Councils, suppliers of technology, community and energy users;
- Provide a consultative platform to accept new technology or behavioural changes to assist with deferring network expenditure, reducing supply related costs;
- Detail our approach to network argumentation and the service levels delivered. Where no feasible market driven alternative solution exists, MainPower may then apply a traditional network development planning approach;
- Provide regional documents to all stakeholders, market participants and energy consumers; and
- Facilitate a market response by encouraging the use of non-network or non-lines network solutions. Solutions do not necessarily need to be delivered by MainPower, they can be supplied, maintained and operated by others.

5.9 Distributed Generation Policies

Our policies on distributed generation are located on our website at www.mainpower.co.nz under 'Get Connected'. These set out the requirements for connecting distributed generation (of less than 10kW and greater than 10kW) and general safety requirements. We also comply with Part 6 of the Electricity Industry Participation Code, in this respect.

5.10 Uneconomic Lines

The remote nature of parts of our network results in remote network assets which test the bounds of economic investment. As part of our network development planning processes, we would like to identify remote uneconomic supplies and explore through a consultation process with customers and market participants, alternative solutions for supplying these locations when the present assets are due for replacement. This may include trials of options such as deployment of alternative micro-grid solutions where these are the preferred economic solution. Where any new technologies deployed are proven to provide reliable and cost-effective supply, our preference will be to decommission uneconomic lines in the future.

5.11 Non-Network Solutions

5.11.1 Load Control

We use ripple control to manage peak demand, alleviate network constraints, defer capital investment and reduce transmission charges. Irrigation load can also be controlled during contingencies or at times of system constraints. Other initiatives under consideration are tariff restructuring to encourage night load.

The introduction of the Upper South Island Load Control system has resulted in a flat load profile for the upper South Island transmission system. Additional controls are being used to ensure that individual GXP and zone substation peaks are managed. In particular, the Southbrook zone substation load is actively managed through winter peak loads to maintain security levels (to achieve N-1 loading whenever possible). The Kaikoura load is also controlled during maintenance outages on the Culverden-Kaikoura 66kV line. At these times our 66kV/33kV coastal backup line is unable to transmit the normal daily peaks.

5.11.2 Demand Side Management

Demand side management involves measures to manage power system load and optimise its use. In 2004, MainPower embarked on a program to implement a number of demand side management initiatives. To date, the benefits of implementing this program have included:

- Reduction in peak loads on the network;
- Reduction in costs associated with Transpower peak charges and deferred network capital investment;
- Providing customers with opportunities to reduce their energy costs;
- Demonstrating a commitment to energy efficiency; and
- Raised awareness of MainPower in the community.

5.11.3 Distributed Energy Resources (DER)

Aligned with MainPower's 'Demand Side Management' scheme, 'non-network' solutions such as the Distributed Energy Resources (solar, storage, energy efficiency) are seen as a way to offset or delay traditional network augmentation. MainPower is already deploying enabling technologies within its network that can also be used for the management of DER in the future. The purpose of the technology is to aggregate DER that is typically deployed close to the load and behind the meter.

Asset Management Plan 2019 – 2029

Section 6 – Lifecycle Asset Management (Maintenance and Renewal)

This section outlines MainPower's approach to asset management and how we link our everyday maintenance decisions and activities to our corporate objectives. This provides line-of-sight from our corporate objectives informed by our Asset Management Plan, through to our asset management lifecycle strategies for individual asset classes, to our everyday maintenance activities.

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6. Lifecycle Asset Management (Maintenance and Renewal)

This section covers MainPower's lifecycle approach to asset management consisting of maintenance, renewal and refurbishment; including policies, criteria and processes. The asset management objectives as identified in Section 2 help set the strategic direction to our approach.

We apply a whole-of-life approach to lifecycle asset management, from the creation of assets, operation and maintenance, to decommissioning and disposal at end of life. We strive to make investment decisions which balance asset life, functionality, performance, and cost.

Where critical spares, built-in redundancy or redesign is not viable to achieve our business objectives, we complete failure mode analysis on the assets, identifying all failure modes and applying reliability centred maintenance to achieve the required outcomes. This and other maintenance treatments are detailed in following sections.

6.1.1 Key Drivers for Maintenance Planning

MainPower adopts a condition criticality approach to asset maintenance practice. The drivers for maintenance include:

Customer

- Quality of Supply aligned with customers' expectations;
- Efficient and sustainable expenditure; and
- Network dependence.

Regulatory requirements

- Routine test in accordance with regulation (Pole Inspections, RCD Testing); and
- Public safety in accordance with NZS 7901: Electricity and Gas Industries – Safety management systems for public safety.

Operational

- Safety when operating; and
- Effective network operational capability.

Continuous Improvement

- Optimisation of OPEX and CAPEX budgets (Managing Long Run and Short Run Marginal Cost);
- Optimise lifecycle efficiency of the assets;
- Works planning and using forecasts to inform budgetary requirements; and
- Collection and analysis of condition data.

6.1.2 Criteria for Criticality-based Maintenance

Asset criticality describes the consequence of asset failure, assists with understanding and managing risk within the network and achieving the levels of service we aim to provide customers. Asset criticality is used for prioritising quality of supply, risk, resilience, and dependence.

- **Quality of Supply** is an asset's ability to deliver the service within the levels of service limits as intended in the design, including maintenance activities;
- **Risk** is the potential for quantifiable damage, injury, liability or loss caused by external or internal vulnerabilities;
- **Resilience** is the ability to respond given disruption to an asset to deliver the service as intended in the design;
- **Dependence** is the significance that removing any individual asset has on the ability of the network to deliver the service it was designed to perform.

Our maintenance planning and renewal activities aim to support the asset criticality model with asset data and information. Our maintenance activities are driven from:

- Inspection data;
- Repairs;
- Failure mode and effect analysis;
- Reliability; and
- Renewal programmes.

How our maintenance activities and renewals are applied, based on criticality, is shown in the flowcharts below.

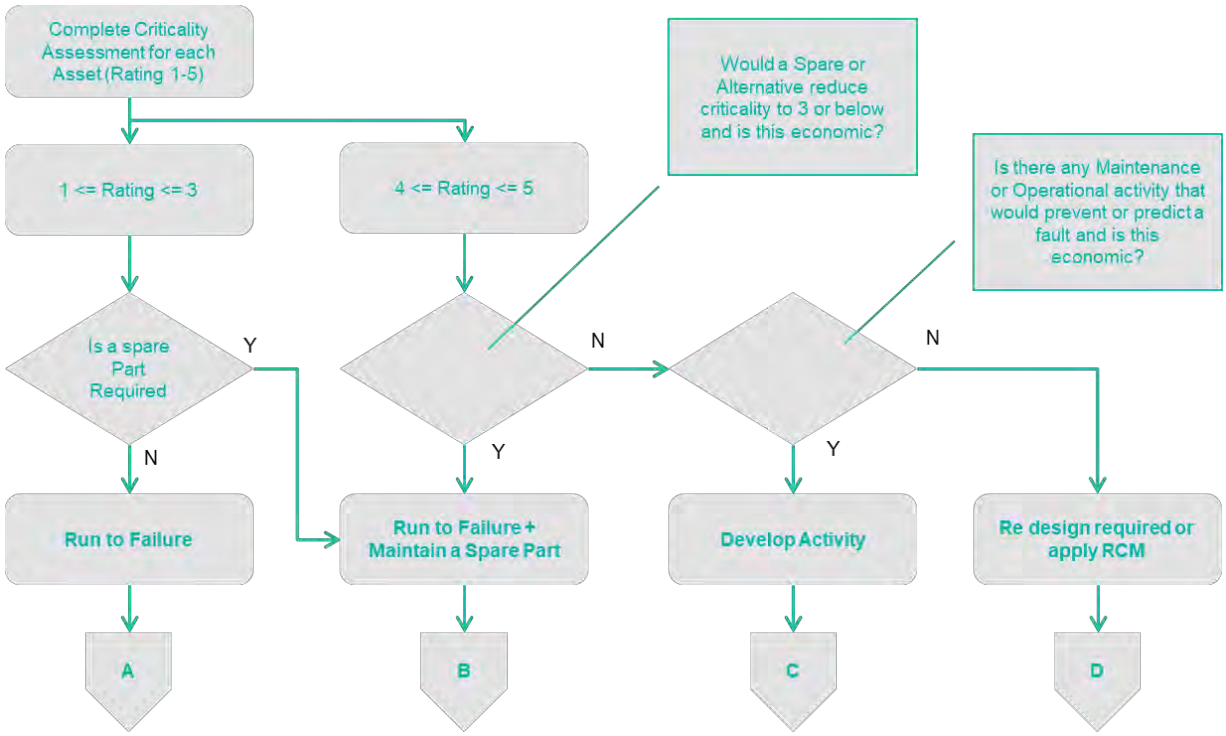

Figure 1 Criticality Flowchart, Part A

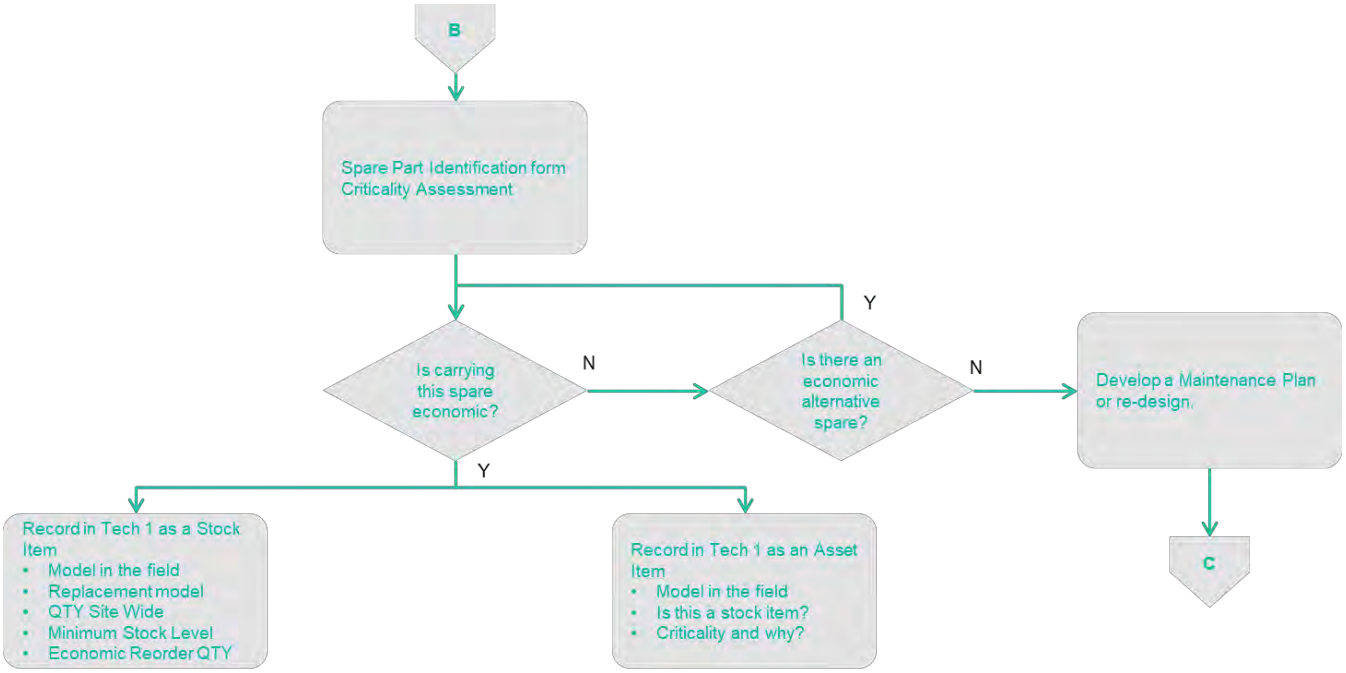

Figure 2 Criticality Flowchart, Part B

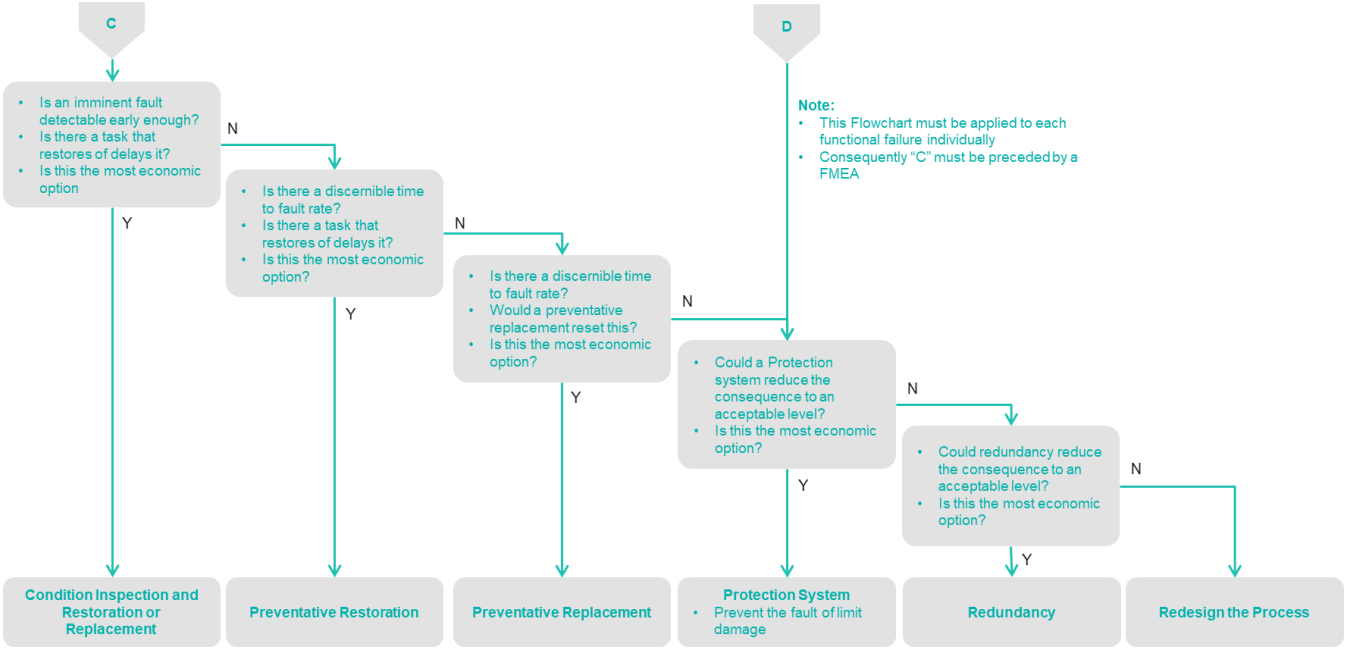

Figure 3 Criticality Flowchart, Part C

6.2 Routine Maintenance and Inspection

6.2.1 Maintaining and Inspecting Structures

The table below describes the maintenance or renewal categories, actions required, and timeframes for various structure components.

COMPONENT	MAINTENANCE/RENEWAL CATEGORY	ACTION
Poles	Asset inspection/condition assessment	5 yearly pole test and overhead inspection. 2.5 yearly overhead network inspection programme.
	Routine and preventative	Maintenance determined on condition assessment and number of customers affected.
	Refurbishment and renewal	Condition-based.
	Fault and emergency	Fault response. Reactive repair.
Conductors	Asset inspection/condition assessment	5 yearly overhead inspection for corrosion, binder fatigue, incorrect sag done as part of the overhead inspection programme.
	Routine and preventative	Scheduled maintenance determined by the Overhead Network Inspection Programme.
	Refurbishment and renewal	Condition-based.
	Fault and emergency	Fault response. Reactive repair.
Cross Arms	Asset inspection/condition assessment	5 yearly inspection forms part of the overhead network inspection programme.
	Routine and preventative	2.5 yearly visual inspection as part of the overhead network inspection programme.
	Refurbishment and renewal	Renewal if visual assessment failure of with the overhead network inspection programme.
	Fault and emergency	Fault response. Reactive repair.
Line Hardware	Asset inspection/condition assessment	5 yearly inspection forms part of the overhead network inspection programme.
	Routine and preventative	2.5 yearly visual inspection as part of the overhead network inspection programme. Kidney insulators replaced when lines are replaced.
	Refurbishment and renewal	As identified by the overhead network inspection Standard.
	Fault and emergency	Fault response. Reactive repair.

Table 1 Structures Inspection

6.2.2 Maintaining and Inspecting Underground Cables

The table below describes the maintenance or renewal categories, actions required, and timeframes for various cables.

CABLE	MAINTENANCE/RENEWAL CATEGORY	ACTION
All Cables	Asset Inspection/Condition Assessment	2 yearly partial discharge testing on 33kV cables and critical feeder cables and thermal imaging of cable terminations. Due to low failure rate no renewals are scheduled during the planning horizon.
	Fault and Emergency	Fault response. Reactive repair.

Table 2 Underground Cable Inspection

6.2.3 Maintaining and Inspecting Zone Substations

The table below describes the maintenance or renewal categories, actions required, and timeframes for various zone substation components.

COMPONENT	MAINTENANCE/RENEWAL CATEGORY	ACTION
Transformers	Asset inspection/condition assessment	3 monthly inspection including visual inspection, tap change operation count, battery test, oil containment inspection, alarm flagging, oil levels and silica gel breather test. Impedance (excitation) tests on larger transformers every 5 years. Yearly earth testing.
	Routine and preventative	Condition-based maintenance based on oil analysis, tap changer operations and results from the 3 monthly, 12 monthly and 5 yearly maintenance inspections.
	Refurbishment and renewal	Condition-based assessment.
Compounds	Asset inspection/condition assessment	3 monthly buildings and property inspection. Annual thermal imaging to detect hot spots.
	Routine and preventative	Condition-based maintenance as a result of inspection.
	Refurbishment and renewal	Driven by upgrade requirements to increase capacity.
Batteries	Asset inspection/condition assessment	Real-time SCADA monitoring of electronic chargers and sealed lead batteries.
	Routine and preventative	3 monthly testing of voltage and specific gravity on non-monitored banks and chargers in line with the Battery and Charger System Maintenance Standard.
	Refurbishment and renewal	Replacement based on reported condition or after 5 years.
Protection Relays	Asset inspection/condition assessment	3 monthly and 3 yearly protection system maintenance in line with the Protection System Maintenance Standard.
	Routine and preventative	Relay health monitored by SCADA.
	Refurbishment and renewal	Based on load requirement and/or obsolescence.

Table 3 Zone Substation Inspection

6.2.4 Maintaining and Inspecting Switchgear

The table below describes the maintenance or renewal categories, actions required, and timeframes for various switchgear.

SWITCHGEAR	MAINTENANCE/RENEWAL TYPE	ACTIONS
Circuit Breakers, Reclosers and Sectionalisers	Asset inspection/condition assessment	Ongoing monitoring of operations count, maintenance history, battery and earthing details, visible numbering and line connections. Yearly partial discharge of high priority-circuit breakers and terminations. Yearly thermal imaging of auto recloser terminations.
	Routine and preventative	Maintenance of circuit breakers is based on how many trips since last service, the local fault level and the manufacturer's recommendations. Yearly oil maintenance and gas pressure checks for circuit breakers and auto reclosers.

SWITCHGEAR	MAINTENANCE/RENEWAL TYPE	ACTIONS
	Refurbishment and renewal	Condition-based replacement.
	Fault and Emergency	Fault response. Reactive repair.
Ring Main Units	Asset inspection/condition assessment	Yearly monitoring of ABB SD ring main switches. 5 yearly internal inspection of ABB SD ring main switches.
	Routine and preventative	Maintenance scheduled according to date of last maintenance. 5 yearly drain and fuse resistance testing on ABB SD ring main switches. 5 yearly surface cleaning and contact inspection of Magnefix ring main switchgear.
	Refurbishment and renewal	Condition-based.
	Fault and emergency	Fault response. Reactive repair.
Air break switches	Asset inspection/condition assessment	Thermal imaging during summer peak and winter peak.
	Routine and preventative	7 to 10 yearly exchange servicing. Maintenance priority based on whether the switch is an open point in the system, how many customers are connected beyond the switch and how often the switch is operated.
	Refurbishment and renewal	Replacement when history of poor operational reliability, high failure rate or progressively higher maintenance costs. 25 switches a year will be replaced under maintenance for the next five years.
	Fault and emergency	Fault response. Reactive repair.

Table 4 Switchgear Inspection

6.2.5 Maintaining and Inspecting Transformers

The table below describes the maintenance or renewal categories, actions required, and timeframes for various transformer asset types.

ASSET TYPE	MAINTENANCE TYPE	ACTIONS
Distribution Kiosks and Substations	Asset inspection/condition assessment	Yearly visual inspection for rust, rot, weeds and graffiti. Yearly inspection and thermal imaging of low-voltage. Additional check of critical substations during peak load periods.
	Routine and preventative	Weather proofing as identified by yearly inspection.
	Refurbishment and renewal	No refurbishment programme. Renewal occurs as required from inspections or during upgrades.
	Fault and emergency	Reactive repair. Weather or third-party damage.

ASSET TYPE	MAINTENANCE TYPE	ACTIONS
Distribution Transformers	Asset inspection/condition assessment	Yearly earth test on earth return and zone substation transformers. 10 yearly earth test on all other transformers.
	Routine and preventative	Minimal maintenance required and limited to when transformers are removed from service or exchanged for line maintenance or upgrade. Full oil test and follow up with oil filter/change if required when being exchanged or replaced. Small pole mounted transformers are usually scrapped if maintenance is required. External inspections and touching up of surface rust.
	Refurbishment and renewal	Required only during line maintenance or upgrade.
	Fault and Emergency	Fault response. Reactive repairs.

Table 5 Transformer Inspection

6.2.6 Maintaining and Inspecting Vegetation and Secondary Systems

The table below describes the maintenance or renewal categories, actions required, and timeframes for vegetation and secondary systems.

OTHER	MAINTENANCE TYPE	ACTIONS
Vegetation	Asset inspection/condition assessment	2 yearly inspection by dedicated MainPower inspector.
	Routine and preventative	Trees trimmed by feeder on two yearly rotation or more regularly in high-growth areas.
	Refurbishment and renewal	N/A
	Fault and emergency	Reactive vegetation control.
Ripple Injection Systems	Asset inspection/condition assessment	2 yearly inspection and testing by Landis and Gyr.
	Routine and preventative	Maintenance identified by yearly inspection.
	Refurbishment and renewal	No renewals scheduled during the planning horizon.
	Fault and emergency	Fault response. Reactive repairs.
Communications Equipment	Asset inspection/condition assessment	Bi-annual full radio equipment testing on site. Twice yearly check.
	Routine and preventative	As above.
	Refurbishment and renewal	
	Fault and emergency	As above.
Mobile Generation	Asset inspection/condition assessment	Inspection in line with the Standby Generator Maintenance Standard.
	Routine and preventative	3 and 12 monthly scheduled maintenance in line with the Standby Generator Maintenance Standard.
	Refurbishment and renewal	No renewals scheduled during the planning horizon.
	Fault and emergency	Monthly testing in line with the Standby Generator Maintenance Standard.

Table 6 Vegetation and Secondary Systems Inspection

6.2.7 Maintenance Expenditure Projections

MainPower Network Maintenance										
Category	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Subtransmission Overhead Lines	19,328	23,023	20,216	20,216	20,216	20,216	20,216	20,216	20,216	20,216
11kV and 22kV Overhead Lines	1,529,433	1,821,856	1,599,722	1,599,722	1,599,722	1,599,722	1,599,722	1,599,722	1,599,722	1,599,722
400V Overhead Lines	363,362	432,836	380,062	380,062	380,062	380,062	380,062	380,062	380,062	380,062
Earths	33,746	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
Subtransmission Underground Cables	33,746	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000
11kV and 22kV Underground Cables	368,771	546,400	546,400	546,400	546,400	546,400	546,400	546,400	546,400	546,400
400V Underground Cables	166,865	247,240	247,240	247,240	247,240	247,240	247,240	247,240	247,240	247,240
Asset Information Management	16,873	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000
Meters	6,749	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Protection	55,883	82,800	82,800	82,800	82,800	82,800	82,800	82,800	82,800	82,800
Communication Systems	155,770	230,800	230,800	230,800	230,800	230,800	230,800	230,800	230,800	230,800
Control Systems	202,743	300,400	300,400	300,400	300,400	300,400	300,400	300,400	300,400	300,400
Load Management	312,349	462,800	462,800	462,800	462,800	462,800	462,800	462,800	462,800	462,800
Switchgear	724,382	1,073,300	1,073,300	1,073,300	1,073,300	1,073,300	1,073,300	1,073,300	1,073,300	1,073,300
Transformers	112,865	167,230	167,230	167,230	167,230	167,230	167,230	167,230	167,230	167,230
Substations	164,138	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200
Buildings and Enclosures	159,819	236,800	236,800	236,800	236,800	236,800	236,800	236,800	236,800	236,800
Grounds	30,776	45,600	45,600	45,600	45,600	45,600	45,600	45,600	45,600	45,600
Generators	67,491	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Vegetation	674,911	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Network Maintenance Opex Subtotal	**5,200,000**	**7,149,286**	**6,871,570**	**6,871,570**	**6,871,570**	**6,871,570**	**6,871,570**	**6,871,570**	**6,871,570**	**6,871,570**

Table 7 Maintenance Expenditure

6.2.8 Systemic Problems

Poles

Some of the concrete poles in the Kaikoura region were locally poured with inferior aggregate. These have suffered more rapid decay, require regular inspection and require replacement at 60 years of age or less.

Concrete poles purchased since the mid-1970s have shown no deterioration or reduction in strength during this time. We expect these poles to last a minimum of 70 years and only minor monitoring for cracking or flaking will be required before 2030.

Conductors

The use of squirrel conductor was widespread during the 1970s and 1980s, however, we have found that this size conductor fails badly under snow loading. All new designs comply with the minimum snow loading recommended in AS/NZS7000:2010.

Cross Arms

Older lines were constructed with the narrow 75 mm face of the cross arm against the pole face making for a weaker construction, more susceptible to lichen build up and rot.

Through the 1970s and 1980s many cross arms were changed regardless of their condition, which has increased the overall average condition of cross arms.

Cables

High voltage cables on rural spur supplies (e.g. irrigation pumps) which at times have almost no load, can be subject to operational issues with over voltages due to ferro-resonance. This is not yet known to have caused early cable failure but has caused surge arrestor failure and extended outages for some customers. The problems are triggered by single phase operation, typically due to a fuse clearing a fault. Attempts to mitigate the ferro-resonance problems include fitting ganged three phase fuse assemblies which all clear quickly, minimising single phase operation and also fitting capacitors to change the resonance tuning.

LV cables terminations leading to UV degradation of exposed tails. These are repaired as they are identified. Some conductors have suffered corrosion due to water penetration. This is primarily an issue for the screens of neutral screen cables and the cores of 4 core stranded cables. The failure rate is currently very low, but this may ultimately determine the end of life of the cables. Very few cables have exhibited significant deterioration due to thermal overloading.

Switchgear

We have 33kV type OKW3 circuit breakers at many of our zone substations. A number of mechanical failures have occurred on some of these units in recent years and subsequently they will be replaced over the next five years as their condition deteriorates.
ABB/Andelect Series 1 units are scheduled for replacement over the next two years in conjunction with replacement of old Long & Crawford switchgear due to safety issues.

6.3 Renewals

We recognise that traditional age-based replacement and reactive renewals of assets is no longer a suitable approach for managing our assets. We are moving to more prescribed assessments of asset renewals through adoption of condition-based risk management framework to quantify and inform replacement programs. This framework will be aligned with the EEA Asset Management Working Group's publication relating to the asset health Index.

Asset renewal is assessed against:

- Risk;
- Service levels; and
- Optimal cost to achieve business objectives.

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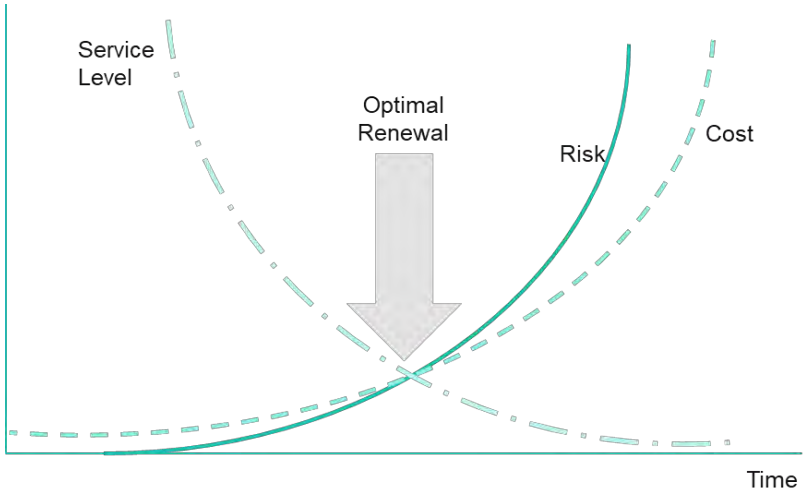

Figure 4 Optimal Renewal

6.3.1 Renewal Expenditure

MainPower Network Replacement										
Category	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
Subtransmission Overhead Lines	48,098	38,819	21,228	21,228	21,228	21,228	21,228	21,228	21,228	21,228
11kV and 22kV Overhead Lines	4,965,567	3,071,808	1,679,831	1,679,831	1,679,831	1,679,831	1,679,831	1,679,831	1,679,831	1,679,831
400V Overhead Lines	399,094	729,800	399,094	399,094	399,094	399,094	399,094	399,094	399,094	399,094
Earths	9,074	11,968	11,782	9,074	6,852	6,852	9,815	11,528	11,435	7,917
Subtransmission Underground Cables	-	-	-	-	-	-	-	-	-	-
11kV and 22kV Underground Cables	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
400V Underground Cables	805,552	890,765	899,234	990,464	909,574	806,559	738,966	701,289	846,149	1,058,177
Asset Information Management	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
Meters	7,816	6,308	6,438	7,685	15,185	31,306	57,269	85,514	106,654	116,089
Protection	69,709	72,652	72,762	69,709	80,612	114,443	167,051	220,818	259,582	279,436
Communication Systems	139,178	136,353	139,178	154,064	160,943	165,001	166,068	185,351	198,105	207,648
Control Systems	11,777	12,644	11,777	12,790	22,978	42,533	68,917	92,932	110,366	119,048
Load Management	-	-	696	9,811	36,752	82,948	125,233	140,022	117,796	76,951
Switchgear	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Transformers	665,561	748,068	704,199	661,793	630,905	665,561	785,954	987,945	1,172,736	1,311,154
Substations	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
Buildings and Enclosures	48,924	58,174	48,924	40,529	29,936	28,241	37,946	62,008	89,943	116,052
Grounds	2,210	2,210	1,339	561	144	-	-	-	-	-
Compliance and Safety Replacement Projects	916,540	-	-	-	-	-	-	-	-	-
Network Replacement Capex Subtotal	**9,804,100**	**7,494,568**	**5,711,483**	**5,771,635**	**5,709,035**	**5,758,597**	**5,972,373**	**6,302,561**	**6,727,918**	**7,107,626**

Table 8 Renewal Expenditure

6.3.2 Innovations

MainPower has implemented maintenance schedules against assets within the CMMS – OneAsset. Template work orders have been set up for some asset classes complete with data collection points to record the outcome of maintenance activities. Data collection points are also used to record information to help determine condition of the assets. More accurate data relating to our assets will lead to the optimisation of renewing our assets.

Pole maintenance has also been deployed as the new maintenance standard for all pole assets. The process allows us to renew poles based on asset condition and criticality. All data collection points, determined when completing the maintenance activities, are assigned against the pole asset within the OneAsset system. Poles are tested using offline technology that synchs once the device is brought back into coverage area.

6.3.3 Projects Planned

Pole Renewals 2019-2029

The major component of asset renewals (Direct Replacement) is MainPower's pole replacement plans. Pole renewal plans for Sub Transmission, LV and HV Distribution is circa $7m annually.

Andelect Switchgear Replacement 2019-2022

Commencing a program to remove all ABB 1 Andelect switchgear from the network. Renewals are informed by project obsolescence, are not maintainable and cannot be operated live, impacting network performance.

6.4 Non-Network Assets

6.4.1 IT Systems

MainPower's IT system consists of multiple software applications hosted internally on physical architecture within a data centre or operated as Software as a Service (SaaS). Future application roadmaps are focussed around SaaS as the primary application deployment methodology to reduce hardware requirements and application management needs. Disaster Recovery is provided via replication of the internally hosted systems to Computer Concepts data centre in Christchurch.

Integral to the support of this architecture is an integration layer that facilitates the movement of data and synchronisation of master records to ensure integrity between applications.

The key components of MainPower's IT platform are:

- A TechnologyOne ERP integrated platform that is used for all asset management, works management and financial reporting (which includes standard modules for finance, payroll, stores, reporting etc.);
- A SmallWorld GIS which is used as the primary data repository for electricity distribution asset data; and
- A CRM from SalesForce for managing ICP data including registry obligations, billing history etc. and manages shareholder information on behalf of the Trust.

Software Assets

Asset book value, at 31 March 2019, is forecast to be $928,000.

In 2018 MainPower implemented Microsoft Office 365 to replace on premise Exchange and all desktop Microsoft Office licensing. This has moved a potential 3 yearly capital cost (to upgrade to latest version) into an operational cost on a 'per active user' basis.

Hardware Assets

Asset book value, at 31 March 2019, is forecast to be $888,000.

In 2017 MainPower moved from purchasing printers and faxes to a leased model through Ricoh NZ. This has moved these capital costs to operation and is based on a 48-month contract commencing March 2017.

Maintenance and renewal policies for the above assets.

MainPower has the following replacement policies for IT systems:

- 3 years for desktop PCs (approx. 45 PA);
- 3 years for laptops (approx. 12 PA);
- 3 - 4 years for tablets and mobile devices (approx. 50 PA); and
- 3 - 4 years for server infrastructure dependant on warranty costs and capacity requirements.

Major software applications are patched regularly, and maintenance / application releases deployed annually to remain within vendor warranty frameworks i.e. TechnologyOne is updated twice yearly, GIS annually and SalesForce quarterly.

Future maintenance and replacement decisions are based on GAAP but a strategic directive of 'cloud first' for all software applications is in place including future deployments of TechnologyOne.

Capital expenditure next 5 years

For the 2019-2020 financial year, capital expenditure on IT has been forecast as $650,000. This is made up of four strategic projects around document management, PABX replacement and other IT services. There is an allowance for replacement of 1/3 of all desktops, laptops and tablets as per current hardware refresh cycles.

In addition, $2m has been allocated for the implementation of an Advanced Distribution Management System (ADMS) in 2019-2020, this project commenced in 2018 and will run for approximately 18 months.

Future IT capital expenditure is estimated at $550,000 per year for the following four years.

Maintenance and Renewal Projects

Advanced Distribution Management System Replacement

MainPower's existing Supervisory Control and Data Acquisition (SCADA) system has reached end-of-life. The latest version of the incumbent SCADA solution is not capable of delivering the functionality needed by MainPower. The focus of this project is to implement and integrate of the OSI ADMS for the operational control of the MainPower Network.

Enterprise Resource Process Upgrade

The TechnologyOne platform will be migrated to a SaaS offering with significant improvements to the ERP product's usability and the available functionality. The transition to SaaS over the next four years provides access to the new functionality which enables improvements to our asset management and operational practices.

Technology Integration

The Dell Boomi Integration platform will be implemented during 2019 to replace the existing bespoke integrations, enable rapid deployment of new integrations and enable proactive operational monitoring of the integration environment.

Data Warehouse and Decision Support Expansion

Further investment in data warehouse and analytics technology is planned to improve the strategic and operational decision making, with a focus on opportunity identification and improved service delivery.

Integrated Management System and Current State Management

A capability to leverage the current state of the organisation will be implemented to enable service improvement. The organisation will implement the ProMapp and State3 technologies to create and maintain visibility of the organisation's current state from process, people, technology and customer experience perspectives.

Document Management

A core component of our operational capability is controlling and accurately versioning documents and ensuring that the organisation can easily access these documents. The current document management system no longer meets the requirements of the business, and the project is intended to implement an integrated, modern, and secure document management solution.

Asset Management Plan 2019 – 2029

Section 7 – Risk Management

This section outlines MainPower's approach to risk management, including information on how we identify and manage both the operational and network impact of risks.

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7. Risk Management

7.1 Overview of How We Manage Risk

MainPower recognises that risk management is an integral part of good governance and best management practice and has adopted the principles of risk management as detailed in AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines.

The Chief Executive has ultimate responsibility and accountability for ensuring that risk is managed across MainPower. The Chief Executive and Executive Leadership Team provide leadership, agree the strategic direction and risk appetite and promote a health and safety-oriented culture to ensure the best outcome for MainPower and the community.

The MainPower Board actively considers risks during strategic and tactical decision-making processes, as do all levels of management, and determine the level of residual risk/appetite they are willing to accept. MainPower takes a risk-based approach to managing internal and external projects, operational and strategic risks i.e. risks are managed and monitored according to severity.

MainPower management conduct a full six-monthly review of their department's risks with monthly monitoring of high risks and quarterly monitoring of medium and low risks. Management also conduct out-of-cycle reviews of operational, project or strategic risks if:

- Material changes occur;
- There is a breakdown of controls or new risks emerge e.g. organisation change;
- Major process or system change;
- Failure of controls; or
- There is a major incident or compliance breach, serious complaint or significant near miss.

MainPower invests the appropriate time and resources into training and awareness for all employees, in particular; managers, nominated risk and control owners, and employees with specified risk and emergency management roles.

7.1.1 Risk Categories

MainPower categorises risk within two areas:

1. Strategic Risk – the continual process of identifying, assessing and managing risks, affected by internal and external events and risks that could impede MainPower's ability to achieve business strategy and taking rapid action when risks are realised.

2. Operational Risk – the risk of loss resulting from inadequate or failed internal processes and systems, human factors or from external events. They arise in day-to-day operations and require specific and detailed response and monitoring schemes. It captures business continuity plans, environmental risk, crisis management, process systems and operations risk, people related risks, health and safety, and information technology risks.

Within these two categories, asset management risk includes:

- Activity, plant & equipment risk;
- Project risk; and
- Network risk.

The Assets and Capital Works team develop, implement and maintain their own risk registers specific to their areas of responsibility. All identified risks are assessed and re-assessed on an annual basis within each function or when there is change in circumstance. This is reviewed by the Assets and Capital Works Manager, who may escalate the risk to the Strategic or Operational Risk Register for reporting and monitoring purposes.

All risk is managed within the MainPower Risk Management Framework where extreme and high risk is reported to the MainPower Board by the MainPower Audit and Risk Committee.

In addition, risk is a fundamental component of the capital sanctioning process where it is a business requirement to identify exposure to risk both pre and post project.

7.1.2 MainPower Risk Matrix

MainPower operates a Risk Matrix that includes four levels of risk – Extreme, High, Medium and Low. The area bordered in blue is deemed acceptable risk; there is an informed decision to accept that the event may occur and acceptance of the consequence.

Likelihood (How Often)	**Consequence Effect** Risk Rating				
	Insignificant	**Minor**	**Moderate**	**Major**	**Extreme**
Almost certain	**M1**	**H1**	**H1**	**E1**	**E1**
Likely	**M2**	**M2**	**H2**	**E2**	**E2**
Possible	**L1**	**M3**	**H3**	**H3**	**E3**
Unlikely	**L2**	**L2**	**M4**	**H4**	**H4**
Rare	**L3**	**L3**	**M5**	**M5**	**H5**

Table 1 Matrix Ranking Risk by Likelihood and Consequence

7.2 Activity, Plant and Equipment Risk

All activities required to operate and maintain the network; including plant and equipment used to operate and maintain the network, are risk assessed. An example of this approach is outlined in the figure below.

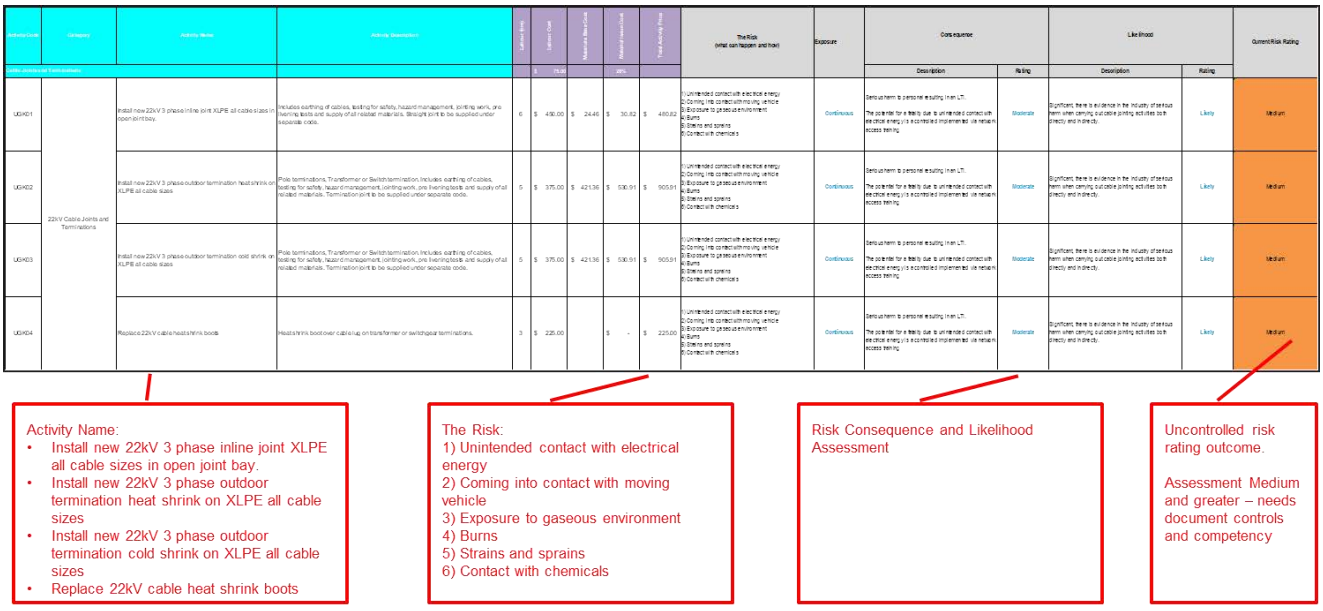

Figure 1 Overview of Operational and Maintenance Activity Risk

Controls are formulated to treat risk and the post treatment risk is evaluated to ensure alignment with MainPower's appetite for risk. Risk treatment includes, but is not limited to:

- Use of special controls (SWMS, SOP, Permit to Work, etc.); and
- Competency requirements.

The controls, residual risk score and responsibilities are updated and detailed in the respective risk register, as shown in the figure below.

Figure 2 Controls, Residual Risk Score and Responsibilities

7.2.1 Permit to Work Control

An outline of the permit to work control process is included below.

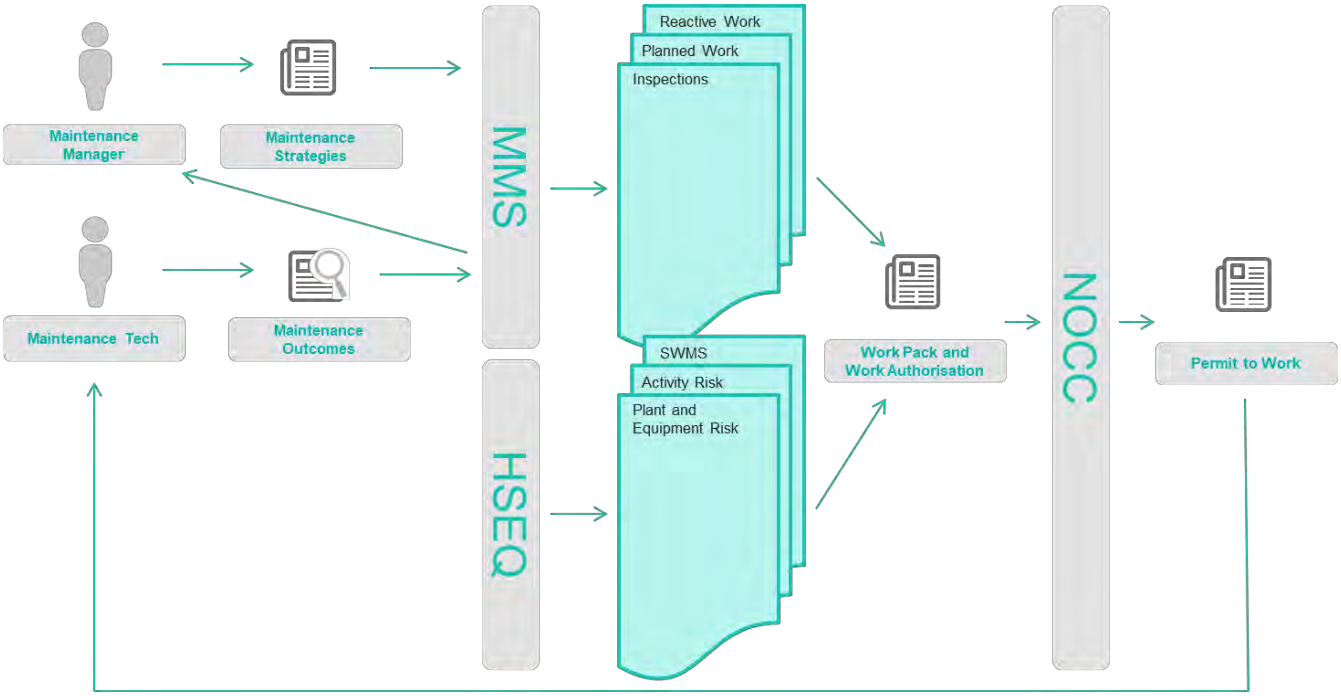

Figure 3 Permit to Work Control

Assurance of risk treatment for activity, plant and equipment risk can be demonstrated by the figure below.

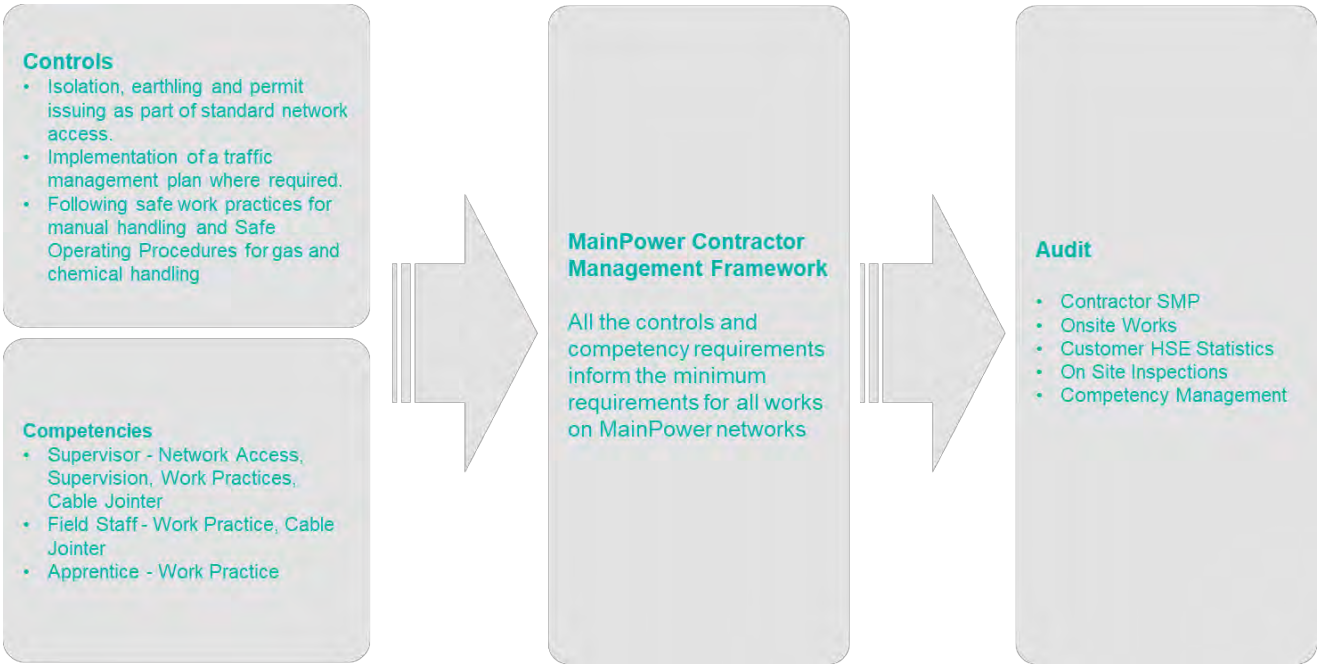

Figure 4 Assessment of Risk for Activity, Plant and Equipment

7.3 Project Risk

All projects are risk assessed, informing project delivery risk, including safety by design. It is the role of the project manager to update and maintain the Project Risk Register periodically, including the enabling of identified controls.

7.4 Network Risk

MainPower has conducted the following risk assessment studies:

- High Impact Low Probability (HILP) event assessment;
- Physical risk to Grid Exit Points (GXPs), zone substations, transmission and distribution systems; and
- Compliance with the RMA.

Natural hazards considered include:

- Earthquakes, avalanches and landslides;
- Tsunami;
- Volcanic activity
- Floods, snow, wind and lightning; and
- Extreme temperatures, drought and wild fires.

7.4.1 Measuring High Impact, Low Probability Risks

Natural hazards with the potential to damage major network assets that affect the most customers are considered for risk mitigation. Those assets are:

- 66kV and 33kV sub-transmission systems;
- Zone substations; and
- Communications systems.

	Earthquake	Avalanche	Landslide	Tsunami	Volcanic	Flood	Snow	Wind	Lightning	Temperature	Drought	Wild Fire	Climate Change
66 kV Sub-transmission System	H	H	H	L	L	M	H	M	L	L	L	H	L
33 kV Sub-transmission System	H	H	H	L	L	M	H	M	L	L	L	H	L
Zone Substations	M	L	L	L	L	L	L	L	M	L	L	M	L
Communication Systems	M	L	L	L	L	L	L	M	H	H	L	H	L

Table 2 Assessment of High Impact, Low Probability

7.4.2 Mitigating Risk at Grid Exit Points

Grid Exit Point (GXP) stations are situated at Kaiapoi, Southbrook, Ashley, Waipara and Culverden. Transpower has completed an extensive programme of seismic damage mitigation, which includes MainPower's GXPs. The assessment concludes that Transpower's assets can withstand earthquakes up to the magnitude experienced in the Kaiapoi region in 2010.

7.4.3 Studying Our Sub-transmission and Distribution Systems

We have undertaken a qualitative study on the impact of natural disasters on our sub-transmission and distribution systems. That study identified earthquakes as being of greatest risk to our sub-transmission system.

We considered three earthquake intensity scenarios for the network. The average damage ratios shown below represent the percentage of the full replacement value of the assets likely to be damaged for those three scenarios.

	1:500 years	1:200 years	1:100 years
Sub-transmission Network	6.2%	3.2%	1.2%
Distribution Network	17.0%	9.8%	4.1%

Table 3 Summary of Average Damage Ratio on Our Sub-transmission Network and Distribution Network

While some sections of each system are assessed at a ratio above 10% under certain earthquake scenarios, overall damage to the sub-transmission and distribution systems does not exceed 6.2% and 17.0% respectively, under any of the three earthquake scenarios.

Natural hazards of flood, windstorm, electrical storm, snow storms and tsunami to the sub-transmission and distribution system are considered in the table below. Information is sourced from external publications such as the Canterbury Regional Council "Natural Hazards in Canterbury" report, which has been reviewed against network design criteria.

	Observations	Probability/Consequence
Flood	The risk to overhead lines from flood hazard is limited, even in a 100-year flood event. Damage is isolated, resulting from landslips and/or subsidence or damage to individual poles sited within the normal course of a river. A 500-year flood event would result in extensive flooding of some urban areas and subsequent damage to ground-mounted distribution equipment.	Probability: Low Consequence: Low
Windstorm	Damage to overhead lines is routinely caused by high winds. Historically this results in minor and isolated damage. Our design criteria meet or exceed the requirements for a 50-year return period event as set out in Australian/New Zealand Standard AS/NZS7000:2016. The most severe winds are winds from the northwest (these occurred in 1945, 1964, 1975, 1988 and 2013). The peak wind speed of 193km/hr recorded in August 1975 exceeded the 100-year recurrence interval. Average recorded wind speeds in Christchurch approach 45% of design speed on 54 days a year and 66% on three days a year. Canterbury has recorded four significant tornado events in the last 25 years; none were located in our distribution area.	Probability: High Consequence: Low

	Observations	Probability/Consequence
Electrical storms	Most parts of Canterbury experience few electrical storms. Over the plains an average of less than five thunder days occur each year, with the highest frequencies from September to March. Near the Alps, an average of twenty thunder days occur each year, with the highest frequencies in April and May. Zone substations, transformers and communications equipment are protected with lightning arrestors.	Probability: Moderate Consequence: Low
Snow storm	Canterbury occasionally experiences weather bombs which deposit heavy wet snow on overhead lines. Higher inland areas can be subject to ice build-up with coincident wind loading which puts high loads on overhead infrastructure. Isolated sections of overhead lines may also be exposed to a theoretical risk of avalanche.	Probability: Moderate/High Consequence: Low
Tsunami	Tsunami hazards are uncertain, however, it is recognised as realistic for Canterbury. There is a potential significant hazard at the mouth of both the Waimakariri and Ashley Rivers, at Leithfield Beach, Motunau, and at Kaikoura where the narrow continental shelf and presence of submarine canyons makes this area particularly susceptible, especially Goose Bay and Oaro. The majority of overhead lines are not generally exposed to this hazard.	Probability: Remote Consequence: Insignificant

Table 4 Hazard Identification of Sub-transmission and Distribution Systems

7.4.4 Developing Natural Hazard Exposure Limits for our Zone Substations

We have developed natural hazard exposure limits for our zone substation assets, using a weighting factor for the strategic importance of individual sites. This weighting is based on asset value, peak load and the capability to switch load away from the substation. The measures used to define risk factors and risk priorities are:

- Risk Factor = Probability (years recurrence) x Consequence (% damage); and
- Natural Hazard Exposure = Risk Factor x Weighted Strategic Importance.

This assessment identifies earthquake hazards as the greatest risk to zone substations.

Flood hazards for zone substations are not rated as significant due to the location and/or the resilience of design of a substation in a 1 in 500-year flood event (the likelihood that a 500-year flood event will occur in any given year). Other meteorological hazards have comparatively high probabilities, but the consequence for these assets is generally insignificant or modest.

7.4.5 Ensuring Ongoing Communications and Robust Control Systems

MainPower's voice and data networks have radio sites located at Mt Grey, Mt Cass, Mt Thomas, Dead Mans Hill Beltana, Wallace Peak and Ludstone. Mt Grey and Wallace Peak in particular, are often exposed to heavy snow that can damage aerials and cause power to fail. The sites have battery backup which, in the event of severe snow, can fail before we can access the sites.

The data network supports the Supervisory Control and Data Acquisition (SCADA) system and the Load Control system. Loss of data communication impacts on both these systems. The ability to control load may be especially important during cold weather, and we have enough local staff at or near remote sites to manually operate the load management system.

Our in-vehicle radio communication system can act as a backup for the cellular network. A fleet of strategically located vehicles can relay information through each vehicle's radio system.

7.4.6 Identifying and Assessing Physical Risks to our Sub-transmission and Distribution Systems

MainPower has assessed the major physical risks for the sub-transmission and distribution systems. That assessment used the NZS 4360:1999 methodology to identify the top 40 significant physical risks.

We assessed risks and hazards to the environment, including:

- Accidental excavation;
- Telemetry failure;

- Water ingress;
- Vehicle impact;
- Explosion; and
- Creaks in electrical connection.

We also assessed potential risk from willful human behavior and naturally occurring hazards (including rot, fire, and plant and animal activity) above and below ground.

The assessment assigned probability of occurrence and consequence scores that considered:

- Loss of supply;
  Personal injury;
- Damage to MainPower's property or the property of a third party;
- Impact on the environment; and
- Transpower power consumption peaks above allocation.

The assessment results show that:

- The highest risk score is a vehicle impact on the 33kV pole line feeding the Rangiora North Zone Substation; and
- The fortieth score is vehicle pollution affecting the Oaro Zone Substation.

Of the top 40 risks identified, 17 risks had a risk score greater than 200. We have reduced this number of risks, or mitigated the risk, so that only eight risks now have a risk score greater than 200, as shown in the table below. These are not risks that MainPower can readily manage.

Risk	Asset	Hazard	Risk Score
1	Rangiora North tee line (917)	Vehicle impact	308
2	Kaiapoi #3 (Hilton)	Accidental excavation	308
3	Kaiapoi #2 (Fuller)	Accidental excavation	308
4	Southbrook S17 (Flaxton)	Vehicle impact	272
5	Culverden GXP – Hanmer line (1222)	Gradual erosion of land	270
6	Culverden GXP – Hanmer line (1222)	Landslip	270
7	Ludstone – Oaro line	Plant or animal activity	210
8	Motunau – Omihi line	Vehicle impact	204

Table 5 Assets with a Risk Score Greater than 200

7.4.7 Identifying and Mitigating Risks to Our Zone Substations

The most likely types of asset failure in our zone substations are protection, tap-changer contacts, circuit breakers, bus-work and transformers, in that order. Table 6 assesses each type of asset and explains how the impact of failure is further mitigated.

Asset Failure	Issues that Contribute to Failure	Mitigation
Protection	Typically caused by complex under/over voltage protection and transformer Buchholz and inter-trip systems on older sites. Protection fails during paralleling of feeders. Battery failure.	A protection design review has been completed to standardise the types of systems used and settings. Protection systems are simplified or removed when appropriate. The risk of damage occurring to a transformer or to customer equipment due to an under/over voltage event is extremely low. Additional precautions and cross checks are now made before undertaking any load transfer switching. Battery voltage is inspected monthly.
Tap-Changer Contacts	Tap-changers have moving parts that suffer from wear.	Tap-changers are inspected regularly. Tap position and voltage is continually monitored via SCADA; if a tap-changer fault occurs we can quickly deploy staff to fix the problem. Spare contact parts are maintained in stock.
Circuit Breakers	Circuit breakers and reclosers approaching their end of life become increasingly unreliable.	A replacement programme is under way on old circuit breakers.

Asset Failure	Issues that Contribute to Failure	Mitigation
		Any zone substations with two or more 11 kV feeders can bypass one faulty circuit breaker if necessary. If a circuit breaker fails at the remaining smaller rural sites, we can easily bypass the faulted circuit breaker as a temporary measure to restore power. The sophisticated adjustable protection systems on new circuit breakers mean that we can keep one spare circuit breaker for use at multiple sites.
Bus-work	Bus-work can suffer from broken insulators, deterioration of the fault current, and negative external influences.	Split bus systems and double-banked transformers help to provide some redundancy.
Transformers	A transformer bank can fail suddenly because of an internal explosion.	Spare emergency power transformers are kept in stock for transformer failures. Some larger sites (i.e. GXPs, Southbrook, Kaikoura and Culverden) have dual transformer banks to provide redundancy. Designs allow for transfer of load between zone substations to provide additional redundancy where possible. In a civil emergency, we can use additional initiatives such as asking other lines companies to provide spare transformers. We would use diesel generation sets where appropriate. Planned upgrade projects will improve cover when transformer fails in the future.

Table 6 Mitigation of the Effects of Zone Substation Assets Failing

An additional mitigating technique is load control. We will use load control as the first mitigation technique by using our Decabit injection system at zone substations during peak load. The table below shows the amount of load control available on each GXP station.

GXP	Load reduction available assuming water heating has been on all day	Load that must be restored assuming that water heating has been off for three hours
Southbrook	5.3 MW	16.5 MW
Kaiapoi	2.6 MW	8.1 MW
Ashley	0.5 MW	1.0 MW
Waipara	1.3 MW	4 MW
Culverden	1.4 MW	4.5 MW

Table 7 Available Load Control by Grid Exit Point

7.4.8 Enabling a Flexible 66kV and 33kV Sub-transmission System

The sub-transmission system between Southbrook and Waipara and between Waipara and Kaikoura can transfer load either way. This flexibility offers an alternative supply to major and minor zone substations located along this route. The same now also applies to the two sub-transmission circuits between Southbrook and Swannanoa and Burnt Hill. For this reason, any asset failure on these line routes would only cause a short duration interruption while power is switched from the other supply.

Spare parts are carried in sufficient quantity to cover the most likely cause of asset failure, including conductor, insulators, poles and hardware.

No 33kV radial lines to other substations have an alternative supply. Even so, these substations typically have a smaller number of customers and we can rectify any asset failure quickly because we have spares available.

A 22kV supply from Mouse Point can back up the Waipara Hawarden 33kV line for most of the year.

7.4.9 Ensuring Alternative Supply Routes for our Distribution System

Major 22kV and 11kV feeders are backed up by alternative supply routes. Where more than two major feeders supply an area, generally each feeder is designed to carry a maximum of 75% of its rating. This allows some spare capacity for backup. Where only two feeders are available, then designs are based on maximum loadings of 50% of their rating.

Major low-voltage networks are designed on a similar basis to the distribution system. In an emergency in an urban area, we can generally link low-voltage networks to ensure supply is maintained.

We hold minimum quantities of spares to cover faults and emergencies on the distribution network. These spares also include critical larger items such as distribution transformers, switchgear, and poles.

Likely causes of asset failure in underground systems are termination and joint problems as well as excavation damage.

7.4.10 Ensuring Alternative Supply is Available for Main Towns on our Network

Asset failure in the main urban areas of North Canterbury and Kaikoura can affect many customers. In these areas we use alternative supplies to ensure customers continue to receive electricity, as described in the table below.

Location	Supply Options
Rangiora	The level of interconnection between all six feeders is high. Two feeders from Southbrook are capable of 9 MW each, one is capable of 8 MW, and one is capable of 7 MW. The two feeders from Rangiora North are capable of 4 MW each. At peak times, the network is capable of meeting load with one feeder out from each of the Southbrook and Rangiora Substations.
Kaiapoi	All four feeders at Kaiapoi have a high degree of interconnection and are capable of supplying 4 MW each. At peak times, the system is capable of meeting the load requirements with one feeder out of operation.
Amberley	Amberley is supplied from both the Broomfield and Balcairn feeders, using tie-points at Douglas Road and Greys Road. We can shift load to Mackenzies Road and the Rangiora North Substation to ensure backup is available.
Cheviot	We can supply the entire town feeder from the north feeder by using a tie-switch outside the Cheviot Substation.
Culverden	Culverden has two main supply options using the 22kV supply from two feeders out of Mouse Point Substation. Another 22kV supply is available from Hawarden Substation to the south if needed.
Hanmer	Hanmer is supplied from either of the Argelins or Scarborough feeders except in the most heavily loaded periods (typically holiday weekends during winter). During these times heavy load controlling is required to maintain supply to all customers. A new paralleling point to the east of the town gives greater supply security to the Hanmer Springs business district.
Kaikoura	The Ludstone Substation has four feeders that can supply into the Kaikoura town. The north and south feeders are lightly loaded, and can back each other up, or either of the two town feeders. The Churchill Street and town feeders are more heavily loaded and require a combination of feeders to take over supply without overloading a remaining feeder during peak times. Each feeder has multiple paralleling points and enough capacity, with many combinations of circuits, to supply the town. Load control is unnecessary.
Oxford	Most of the 11kV distribution system in the town of Oxford is overhead. We can easily isolate a fault and quickly restore supply to customers. All three feeders from the Oxford Substation can take over the town supply if necessary. Alternatively, Bennetts Substation can supply the town area, but this depends on the level of system loading (which is high in summer due to irrigation load).
Woodend	The main alternative supply to the town of Woodend is via the Waikuku feeder out of Southbrook Substation. During emergencies the Kaiapoi Substation can also supply the town, but this involves a phase shift across the Southbrook and Kaiapoi GXP Substations.

Table 8 Alternate Supply

7.4.11 Reviewing our Asset Failure Recovery Systems

An independent expert has reviewed our asset failure recovery systems. Their assessment considered the eight biggest asset failure scenarios based on impact on our customers. Those scenarios included zone substation transformer failure, feeder cable failure, major circuit breaker failure and major line failure.

Procedures to restore assets following failure are documented and are robust. Even so, the expert's assessment made some recommendations from which we developed an action plan. Those recommendations and the plan are shown in the table below.

Recommendations	Action Plan
Procure oil spill kits (if the risk is considered great enough) for any sites that do not yet have them.	Oil spill kits are in the vehicles.
Ensure that the spare 33/11 kV transformers and one of the two Kaikoura transformers are kept on standby for use. Consider moving the spare transformer to the substation most at risk of failing.	Spare transformers are kept on stock. Spare 2.5 MVA transformer is now located at Hanmer.
Consider building extra transformer pad and bus-work at remote single transformer substations so they can to fit the dimensions of the spare transformer.	The portable generator truck provides a better backup facility.
Ensure sufficient spare lengths of 66kV and 33kV single-core XLPE cable are stored at Rangiora – suggest a minimum of 3 lengths (each of 10 metres), along with two complete sets of jointing kits, two complete termination kits, six jointing sleeves, six termination lugs and a compression tool.	Jumper cable sets are made up and stored in the yard.
Ensure sufficient spare lengths of 22kV and 11kV single-core XLPE cable are stored at Rangiora – suggest a minimum of three lengths (each of 10m), along with two complete sets of jointing kits, two complete termination kits, six jointing sleeves, six termination lugs and a compression tool.	Jumper cable sets are made up and stored in the yard.
Ensure three spare 66/33kV poles and arms are stored at each of Mouse Point or Culverden GXP, Swannanoa or Burnt Hill, and Cheviot.	Minimum quantities of spares are maintained at Rangiora, with some items stored at depots.
Ensure a spare 33 kV breaker and a reasonable array of spares for all makes are held at Rangiora.	Spare 11, 22 and 33kV circuit breakers are held at Rangiora.
Ensure access is secured to 4x4 line trucks with Palfinger, hydraulic post-hole borer and elevated platform.	MainPower and its subsidiaries own or lease all the equipment.
Ensure the equipment to locate faults in cables is maintained in full working order and always available.	The process to ensure equipment maintenance and availability starts in 2019.
Prepare switching plans for restoring supply if a fault occurs on Cable S13 – S421, or Fuller, Hilton, Waipara – Cheviot and Kaikoura – Waipara lines. Consider protection settings and any phase differences.	Already developed as refresher training programmes for controllers.
Secure access to an excavator to help dig up faulty cables – could be helpful to pre-arrange services with local contractors.	Secure access becomes available in 2019.

Table 9 Recommended Measures and Action Plan to Reduce Risk

7.4.12 Improving Security of Supply due to Transpower Upgrading its Assets

Transpower's risk management plans for all of its GXP stations in North Canterbury are shown in the table below. Recent upgrades mean that MainPower now has four 66 kV circuits supplying into the southern region. This has improved our security of supply into the largest load area.

Site	System No	Installed Capacity	Cooling	Ratio (kV)	Contingency Plans
Ashley	T3/T5	2 x 40 MVA 3 ph	ONAN OFAF	66/11	N-1 capacity Spare bank at Islington
Culverden	T1	2 x 30 MVA 3 ph 1 x 10/20 MVA 3 ph	ONAN ONAN	220/33 66/33	N-1 capacity Spare bank at Islington
Kaiapoi	T1/T2	2 x 40 MVA 3 ph	ONAN OFAF	66/11	N-1 capacity Spare bank at Islington
Southbrook	T1/T2	2 x 30/40 MVA 3 ph	ONAN OFAF	66/33	N-1 capacity Spare 20MVA bank at Islington
Waipara	T3	1 x 10/16 MVA 3 ph	ONAN OFAF	66/33	Spare 20MVA bank at Islington Waipara load can be spread across other MainPower substations

Table 10 Transpower's Risk Management Plans for their Grid Exit Points

Notes

1. ONAN = oil natural air natural
2. OFAF = oil natural air forced
3. N-1 is an indication of power supply security that specifically means that when one circuit fails, another will be available to maintain an uninterrupted power supply

7.5 Risk Mitigation

7.5.1 Applying our Asset Maintenance Programmes to Mitigate Risk

All our maintenance programmes mitigate risk. How we apply maintenance to each asset depends on the risk that asset presents to our business. Details about our maintenance programmes are set out in Section 5.

7.5.2 Using Emergency Control Procedures and Control Plans for Risk

We have developed a number of emergency control procedures over time. We continually refine them as we become aware of issues with them, and continually develop new control procedures to respond to emergencies.

We have control procedures for a range of health and safety emergencies, including for fire, earthquake, severe storm, flood, intruders, bomb threat, pandemic, oil spill, and release of hazardous or toxic substances. We also have control plans in place for hazards that our staff face every day at work.

7.5.3 Using Contingency Plans When an Asset Fails

We have established contingency plans for when an electricity system asset fails and when our information technology (IT) systems fail. We have built a portable generator truck to help provide an alternative power supply when and where a backup power supply is not available through normal electrical configurations.

We have reduced the risk that our IT systems will fail. We accomplished this by installing a Hosted Disaster Recovery Site in Christchurch. Comprehensive backup plans, data replication and real-time system monitoring ensure the continuity of our key IT systems. We have set up a fully secure, remote access service. This service allows staff to work from anywhere if our site at Fernside Road or sites at other depots fail completely and staff cannot enter the buildings.

7.5.4 Using a Business Continuity Plan to Minimise Disruption to Our Business after a Disaster

Our business continuity plan helps to minimise disruption after a disaster. We have identified our critical business activities and processes and the types of events that can interrupt them.

The plan has assessed major risks arising from:

- Poor communications (including unreliable information technology systems);
- Disruption of electricity supply during a natural disaster;
- Disruption of electricity supply after an asset fails;
- Disrupted systems and lack of staff during a pandemic; and
- Legislative non-compliance.

Included in the plan are the conditions and responsibilities for activating the plan, along with detailed recovery procedures covering Civil Defence response, electricity distribution network recovery, information system recovery and recovery from a pandemic.

The plan also includes detailed information for emergency control procedures, contact lists, emergency stock, operating procedures, vital records and fallback procedures for load control, SCADA and communications.

See ‘Liaising with Civil Defence and Emergency Management’ later in this section for when the plan is triggered.

7.5.5 Using an Incident Management Plan to Respond to Any Disruptive Incident

The Incident Management Plan guides our response to any disruptive incident that has a serious impact on our staff, operations, services and credibility. The plan outlines how we will strategically and operationally manage our response so that we can continue to deliver those functions and services that are critical to our business.

Part of our response is to adopt an incident management framework that outlines how we respond to and operate any disruptive incident. The framework is based on New Zealand’s Coordinated Incident Management System (CIMS) and comprises a strategic response level, a tactical response level, and an operational response level.

7.5.6 Actioning Our Crisis Communications Plan

Our crisis communications plan outlines the roles, responsibilities and procedures that will assist us when we communicate with various audiences (including the public) during a crisis. The plan provides guidelines to manage communications effectively. We can easily adapt the guidelines to any crisis situation. When a crisis occurs, the need to communicate is immediate. Creating and carrying out internal and external communication strategies can help to prevent a crisis from developing into a communication crisis — or at least minimise the impact of a communication crisis. The crisis communications plan is intended as a communication tool only. Its purpose is to manage communications during a crisis and mitigate risk to our reputation. It is not an alternative for an incident management plan that would direct the overall crisis response or a business continuity plan that would help us to resume business operations as quickly as possible.

7.5.7 Liaising with Civil Defence and Emergency Management

As a 'Lifeline Utility', we are obliged under the law (including the Civil Defence Emergency Management Act 2002) to ensure we can continue to function, even potentially at a reduced level, during and after an emergency, and that we have plans available to ensure continued operation. We are also obliged to participate in developing the National Civil Defence Emergency Management (CDEM) Strategy and CDEM Plans, and to provide technical advice to the Director and CDEM Groups as required.

As noted above, some of our recovery plans will activate once predetermined triggers are met.

Our Business Continuity Plan triggers are:

- Breach of service levels – distribution system;
- Breach of critical human resource levels;
- Inability to re-establish electrical supply; and
- Inability to supply water over the long term.

Our Disaster Recovery Plan triggers are:

- Breach of service levels – Information Systems (IS) system; and
- Need to relocate IS or control centre services.

All Standard Operating Procedures relevant to recovering our business functions and services will also activate.

7.5.8 Using Insurance Practices to Minimise the Impact from Loss of, or Damage to, Our Assets

We maintain an insurance programme. Its objective is to cost effectively minimise the impact to MainPower from any loss of, or damage to, our assets. We currently operate three insurances that are relevant to our network operation:

- Public liability insurance: $20 million;
- Materials damage: $40.382 million on stations including zone substations, load plants and contained structures; and
- Ground-mounted transformers: $5.5 million.

It is not cost effective to insure the remaining sub-transmission and distribution systems with external providers. MainPower maintains a self-insurance fund of $3 million to cover those network assets that cannot be cost effectively insured. The amount of insurance is regularly reviewed and held in a self-insurance fund. We last reviewed the fund in November 2017.

Asset Management Plan 2019 – 2029

Section 8 – Evaluation of Performance

This section details MainPower's performance measurement, evaluation and improvement.

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8. Evaluation of Performance

The evaluation of MainPower's performance for the reporting year is broken into the following components and commented on below.

- Project Delivery (Physical Performance)
- Financial
- Service Levels
- Asset Maturity

8.1 Project Delivery Performance

MainPower's lifecycle asset management processes are structured on a total lifecycle cost of asset ownership. The framework has its foundation in the activities that occur over the lifetime of the physical asset. These activities are outlined in the figure below.

8.1.1 Grid Exit Point

Description of planned project activity related to Grid Exit Points (GXP).

Description	Work	Status	Update
Kaiapoi	Possible GXP purchase from Transpower.	Idea	Under Review
Southbrook	New feeder required to support load growth in Woodend and Pegasus. Forms part of the new Rangiora East Zone Substation.	Planning	Will now be provisioned as part of the Southbrook substation upgrade 2020/2021
Ashley	New feeder required to support load growth in Woodend and Pegasus. Forms part of the new Rangiora East Zone Substation.	Planning	Required for network upgrade 2023

Table 1 Grid Exit Point Planned Project Activity

8.1.2 Sub-transmission and Zone Substation

Description of planned project activity related to sub-transmission and zone substations.

Description	Work	Status	Update
Ludstone Switchgear Renewal	Renewal of Ludstone switchgear restoring n-1 supply as determined by MainPower design and security of supply criteria.	Planning	In design – to be completed by 2020.
Waipara Kaikoura Capacitor Installation	Improve voltage stability as determined by MainPower design and security of supply criteria.	Planning	In design – to be completed by 2020.
Culverden Hanmer Conductor Strengthening	Upgrade of conductor for purpose of snow loading enabling security of supply for 1 in 10-year snow event.	Planning	Staged upgrade in conjunction with pole renewal work to be confirmed following pole assessments.
Ashley River Crossing, smarts road deviation	Improve voltage stability as determined by MainPower design and security of supply criteria.	Planning	Will now be provisioned as part of the Ashley Tuahiwi 66kV build 2023.

Table 2 Sub-transmission and Zone Substation Planned Project Activity

8.1.3 Distribution Network

Description of planned project activity related to the distribution network.

Description	Work	Status	Update
Cheviot North Voltage Regulator and Capacitor Installation	Improve voltage stability as determined by MainPower design and security of supply criteria.	Planning	In design, construction to be 50% complete by year end.
Cheviot South Voltage Regulator Installation	Improve voltage stability as determined by MainPower design and security of supply criteria.	Planning	In design, construction to be 50% complete by year end.
Ashley Regulator and Capacity Installation and Conductor Upgrade	Improve voltage stability as determined by MainPower design and security of supply criteria.	Planning	In design, construction to be 50% complete by year end.

Table 3 Distribution Network Planned Project Activity

8.1.4 Secondary Systems

Description of planned project activity related to secondary systems.

Description	Work	Status	Update
SCADA Upgrade	Upgrade SCADA system to latest version – 'Wonderware' and ensure solution is ADMS ready	Design	Transition from Plan
Advanced Network Management System Installation	Reviewing market solutions that add value to day-to-day network management but also supports MainPower's vision for the 'Network of the Future'.	Idea	New
Voice, Telemetry, Automation and protection systems	Complete the development of a comprehensive master plan detailing MainPower's physical secondary systems that support MainPower's vision of 'Network of the Future'.	Idea	New

Table 4 Secondary Systems Planned Project Activity

8.2 Financial Performance

	Area	Budget 2018	Actual 2018	Budget 2019	Year to Date 2019	Budget 2020
Capital Expenditure (Capex)	Customer	$4,600,200	$6,714,496	$5,060,000	$3,585,522	$6,800,000
	Growth	$1,860,045	$153,089	$330,000	$689,396	$1,584,000
	Renewal	$5,659,315	$1,569,137	$5,740,616	$2,790,356	$8,863,000
	R.S.E	$706,349	$426,076	$1,038,000	$301,090	$2,256,316
	Relocations	$-	$121,835	$-	$-	$-
Operating Expense (Opex)	Preventive	$2,539,862	$1,251,104	$2,877,070	$1,707,021	$2,262,544
	Fault	$1,549,995	$1,365,431	$1,537,651	$953,320	$1,131,272
	Vegetation	$1,000,000	$675,970	$1,010,000	$547,379	$674,911
	Refurb	$-	$306,075	$-	$870,248	$-
	Operate	$-	$1,563,823	$-	$946,664	$1,131,273

Table 5 MainPower Financial Performance Overview

MainPower experienced strong customer lead growth on the network with new subdivisions such as Ravenswood part A and B. Other expenditure remained below planned while MainPower re-evaluates its OPEX and CAPEX spend as follows:

- Operational Costs

  This is reflective of MainPower reviewing its approach to asset management and implementing a system that is lowest cost to maintain while not compromising our corporate objectives. It is expected that operational costs will return to budgetary levels as our asset maturity increases.

- Capital costs

  This is reflective of MainPower reviewing its approach to network planning and ensuring we have asset condition and criticality data that informs renewals and the enhancement projects are aligned with MainPower Security of Supply Standards. As MainPower asset maturity increases it is expected that actual and budgeted will align.

8.3 Service Levels

8.3.1 Evaluation of Customer-Oriented Performance

Broad Focus	Performance Indicator	Actual 2019	2019 (YTD)	Target 2019	Target 2020
Service Performance	Customer Easy Score – effort required in dealing with MainPower	2.95[1]	3.03	2.5	2.0
Customer Satisfaction[2]	Friendliness of MainPower staff	3.86	4.49	4.5	5.0
	Quality of work completed	4.43	4.75	4.8	4.8
	Timeliness of service	3.57	4.0	4.5	4.5
	Communication received throughout	3.29	3.92	4.5	4.5
	Reliability of MainPower staff	3.57	4.03	4.5	4.5
	The final price	3.23	3.94	4	4
Customer Complaints	Percentage of complaints resolved by end of day one	30%	27%	35%	35%
	Percentage of complaints resolved within two to seven working days	37%	30%	50%	50%
	Percentage of complaints resolved within seven to twenty working days	23%	11%	15%	15%
	Percentage of complaints resolved after more than 20 working days	10%	32%	Less than 5%	Less than 5%
Corporate Social Responsibility	**Community Trust Score – perceptions of competence and benevolence[3]**				
	Is capable and effective	88%	89%	90%	90%
	Carries out it's duties very well	91%	87%	90%	90%
	Acts in the interest of local residents	81%	79%	90%	90%

Table 6 Evaluation of Customer-Oriented Performance

[1]Measure: 1 – Very low effort, 5 – Very high effort
[2]Measure: 1 – Very dissatisfied, 5 – Very satisfied
[3]Metric of trust and confidence based on three statements: carries out duties well, is capable and effective, and acts in the interest of local residents.

MEASURE OF PERFORMANCE	IMPORTANCE RATING 2019[2]	SATISFACTION RATING 2019[3]	SATISFACTION RATING TARGET 2020-2029
Continuity – keeping the power on	96%	95%	95%
Price – keeping costs down	97%	55%	70%
Restoration – reducing the length of time when power is off	88%	86%	85%
Quality – keeping flickering or dimming lights to a minimum	90%	90%	85%
Accessibility – easy to contact my provider when needed	92%	83%	85%
Communication – keeping you informed of the electricity network	86%	79%	85%

Table 7 Summary of Research Insights

[2]Measure: Percentage of respondents rating the aspect 'important' and 'very important'.
[3]Measure: Percentage of respondents rating the aspect 'satisfied' and 'very satisfied'.

8.3.2 Quality of Supply

Broad Focus	Performance Indicator	Actual 2018	YTD 2019	Target 2019	Target 2020
Reliability of Supply	SAIDI (normalised)	213	163	123	170
	SAIFI (normalised)	1.44	1.29	1.57	1.71
	Unplanned faults per 100kms (during the year)	6.33	3.50	6.10	6.37
	Unplanned outages – percentage restored in under 3 hours	95.4%	75%	97%	97%

Table 8 Network Performance Targets

In 2017 we exceeded our target SAIDI and SAIFI due to less than optimal outage planning. In the current reporting cycle we are within targets because of improved processes around the management of planned outages, where the work planning role has been implemented to ensure that our works program aligns with our outages.

8.3.3 Resilience

PERFORMANCE INDICATOR	Actual 2018	YTD 2019	TARGET 2019	TARGET 2020–2029
Unplanned outages – percentage restored in under 3 hours	95.4	75%	97%	97%

Table 9 Resilience

8.3.4 Feeder Reliability

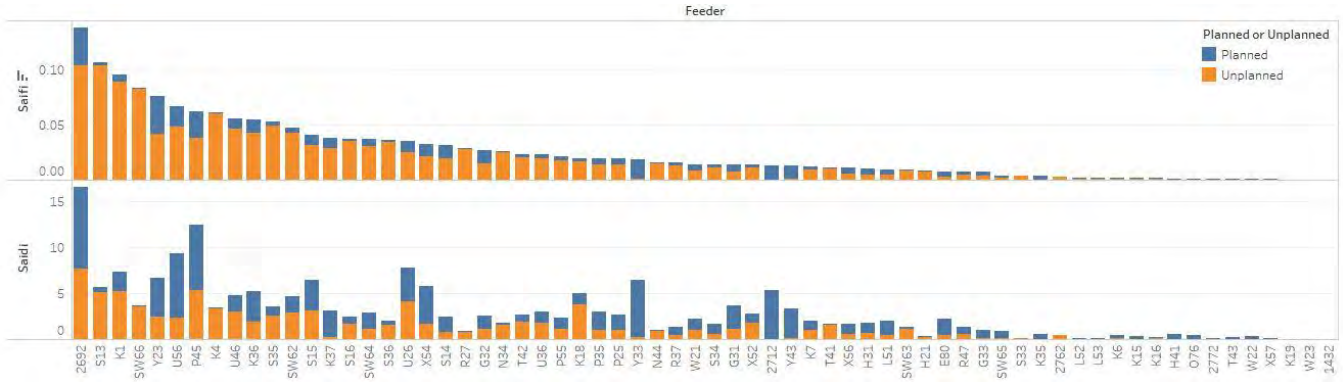


Figure 1 Feeder Reliability Planned and Unplanned

Summary

- The worst performing feeder was 2692 which feeds the Loburn area. Defective conductor and birds were the main causes of disruption along this feeder. It is expected that this will be addressed due to planed upgrades in the area.
- Feeder S13 had two main causes of unplanned outage; defective equipment and machinery contact. The machinery contact was the result of subdivision construction and as such is unlikely to be repeated. Removing this from the SAIFI contribution would bring this feeder under the desired level.
- Feeder K1 performed poorly due to vehicle accidents and a number of lightning related outages.

8.3.5 Operational Effectiveness

PERFORMANCE INDICATOR	Actual 2018	YTD 2019	TARGET 2019	TARGET 2020–2029
Planned Work Vs Actual Work (Cost)	91%	N/A	95%	95%
Field staff utilisation	76%	N/A	76%	76%

Table 10 Operational Effectiveness

8.3.6 Financial Efficiency

PERFORMANCE INDICATOR	Actual 2018	YTD 2019	TARGET 2019	TARGET 2020–2029
Average line charge per customer	$1124	N/A	$1,244	$1,244
Average kWh per customer	15.078c	N/A	15.078c	15.078c

Table 11 Financial Efficiency

8.3.7 Overall Safety

PERFORMANCE INDICATOR	Actual 2018	YTD 2019	TARGET 2019	TARGET 2020–2029
Number of work-related accidents resulting in lost time	2	N/A	Nil	Nil
Number of Public Safety Incidents	Nil	Nil	Nil	Nil
Public safety communications contribute to positive behavioural change[8]	28%	N/A	28%	28%

Table 12 Safety

[8]Measure: Percentage of respondents who changed or considered their behavior due to a safety message from MainPower.

8.3.8 Regulatory Compliance

PERFORMANCE INDICATOR	Actual 2018	YTD 2019	TARGET 2019	TARGET 2020–2029
Number of regulatory non-compliance enquiries	0	0	0	0

Table 13 Regulatory Compliance

8.3.9 Environment Performance

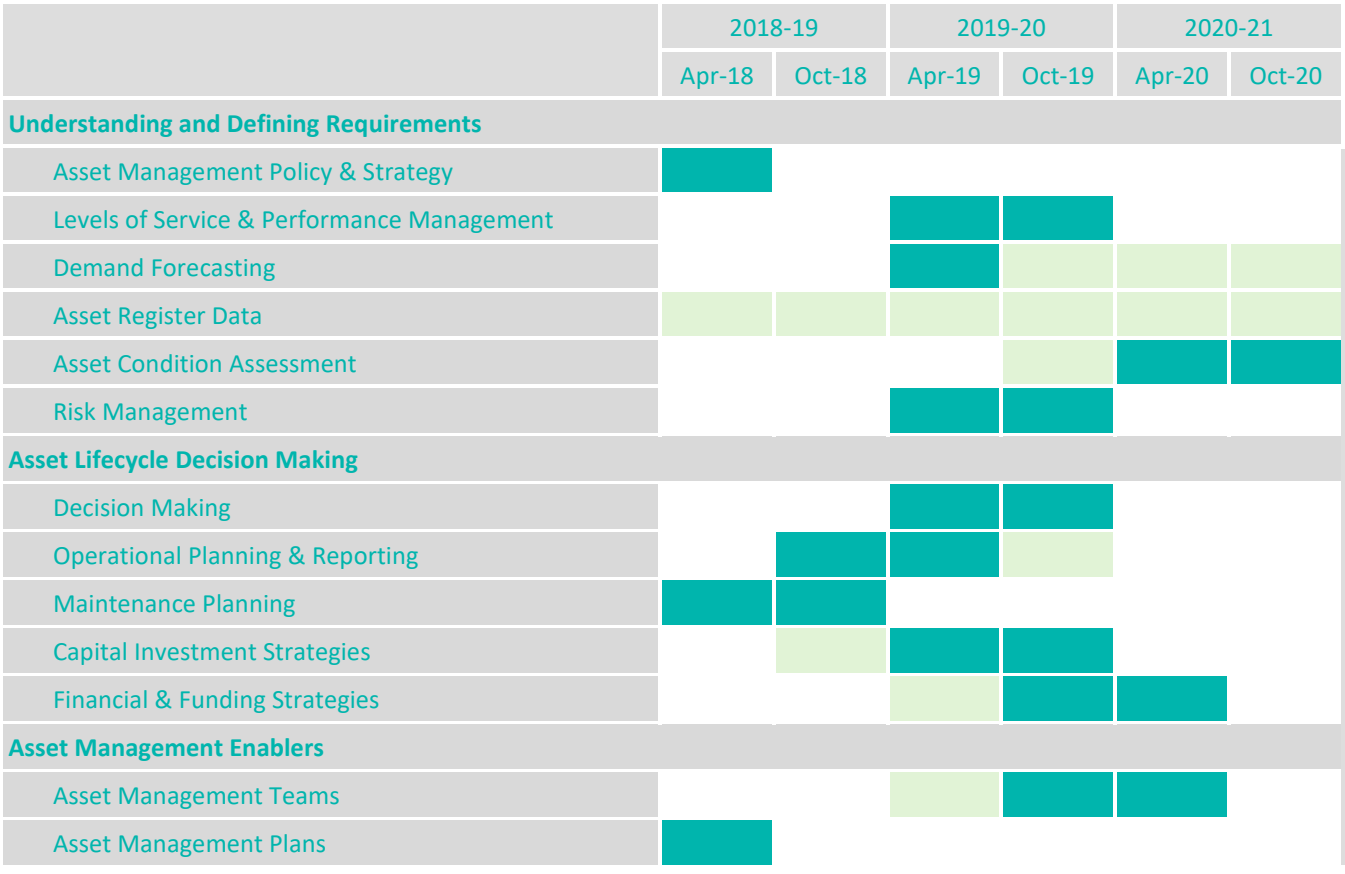
PERFORMANCE INDICATOR	Actual 2018	YTD 2019	TARGET 2019	TARGET 2020–2029
Understand our Carbon Footprint	N/A	N/A	N/A	Develop Targets
Number of Resource Consent Breaches	0	0	0	0

Table 14 Environmental Performance

8.4 Asset Maturity

8.4.1 Asset Maturity Against Plan 2018

The following implementation plan details how MainPower proposes to reach the Asset Maturity targets identified over the next three years.



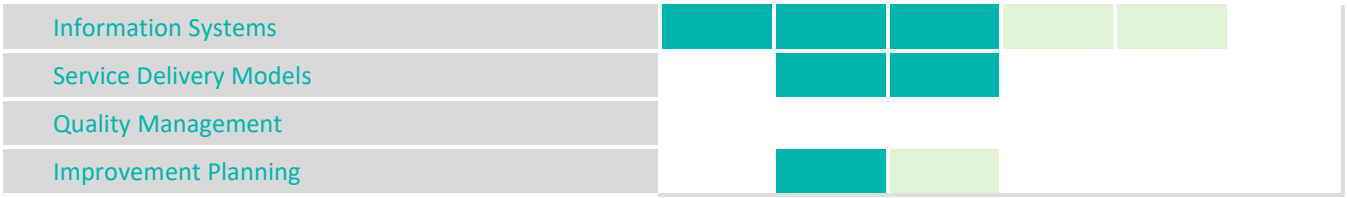


Table 15 Asset Maturity Implementation Plan

Understanding Defining Requirements	Improvement	Actual	Target Date
Asset Management Policy and Strategy	MainPower's approach to asset management has been clearly defined and linked to the Statement of Corporate Intent and business strategy, through the Asset Management Policy to the Asset Management Plan.	Completed. Asset Policy developed creating alignment between corporate objectives and asset management.	2018
Levels of Service and Performance Management	MainPower has introduced the Voice of the Customer Programme that has enabled MainPower to translate customer requirements into network performance.		2019
Demand Forecasting	This remains a key focus for MainPower, taking into consideration customer segments, location and network impact of an economy as it transitions to low carbon.		2019
Asset Register Data	Major advancements have been made in ensuring asset data, including condition data, is logged against the asset in the Computerised Maintenance Management System (CMMS).	Completed. Went live with a new CMMS, poles loaded, remainder of the assets in Q1 2019.	2018
Asset Condition Assessment	A condition assessment program is in place for poles, MainPower's largest asset class by quantity. All pole renewals are now informed by condition data, compliance and criticality.		2019
Risk Management	Risk has been integrated into Assets and Capital Works, including division or team risk, Plant, Equipment and Activity Risk, including documentation of controls. High risks are introduced in the Corporate Risk Register.		2019

Table 16 Understanding Defining Requirement's Improvements

Lifecycle Decision Making	Improvement		Target Date
Decision Making	Decision making for major capital is assessed against a capitalisation process that is informed by a security of supply standard and reliability classification. MainPower is introducing risk-based decision making across its business.	Completed. MainPower introduces its security of supply standard – projects link to this standard.	2019
Asset Class [Renewal] Strategies (ACRS)	A Condition and Criticality Framework has been introduced and largely remains to be implemented.		2019
Operational Planning and Reporting	Business emergency response plans and escalation are developed and implemented. Asset planning is informed by demand (i.e., quantity of customer connections etc).		2019
Maintenance Planning	Maintenance activities are prescribed for all asset classes. These remain to be implemented in the CMMS for all assets.	Completed. MainPower has asset maintenance standards for all its assets, these are being introduced into the CMM in Q1 2019.	2018
Capital Investment Strategies	Capital expenditure is prescribed linking cost, risk and network performance.		2019

Lifecycle Decision Making	Improvement		Target Date
Financial and Funding Strategies	Funding for capital expenditure exists on a 10-year cycle, informed by asset performance, reliability and supporting assumptions.		2019

Table 17 Lifecycle Decision Making Improvements

Asset Management Enablers	Improvement		Target Date
Asset Management Teams	The Assets and Capital Works team has been created within MainPower. Staff understand their roles and asset management best practise is supported by the Executive Leadership Team.		2019
Asset Management Plan	MainPower's AMP describes service levels, assets and includes a 3 year and 10 year forecast of expenditure. Asset management improvement plan created.	Completed. This asset management plan.	2018
Information Systems	A comprehensive asset register exists. Systems have been introduced to track customer requests and defects. Works management remains to be automated using schedules linked to assets creating work orders automatically.	Completed. MainPower CMMS is now the one source of the truth for all our assets.	2018
Service Delivery Models	Service Level Agreements are currently being implemented, defining minimum levels of service required from internal crews and where external providers are required, formal contracts exist.		2019
Quality Management	MainPower is accredited to ISO9001 and all asset management processes are documented.		2019
Improvement Planning	Improvement planning is currently in place and includes efficiency and productivity within the business and an upgrade to the CMMS. The projects are approved, funding in place and progress against the plan is reported to the executive and Board.		2019

Table 18 Asset Management Enablers Improvements

8.5 Benchmarking

MainPower will assess itself against other EDBs in accordance with Profits, Price, Expenditure and Network Reliability.

It is important to note that electricity networks are complex, and these complexities cannot be fully represented by the information and indicators available through the data published in accordance with the information disclosure framework. Topography, climate, growth rates (past and current), historical design practices and network configuration are all factors which can significantly impact network performance. This analysis therefore provides a high-level indication of performance only.

8.5.1 Network Operating Expenditure

Network Operating Expenditure, which includes planned and unplanned network maintenance and fault response, was low this year for MainPower. This reflects MainPower reviewing its Asset Management practices, detailed in the last AMP. Expenditure is expected to increase to above the peer group average as MainPower implements its revised asset management practices.

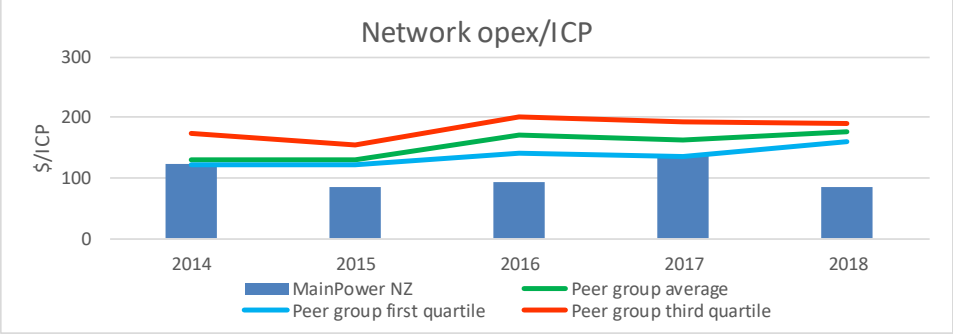


Figure 2 Benchmark – Network Operating Expenditure

8.5.1 Non-Network Operating expenditure

Non-network Operating Expenditure which includes corporate, business support, asset management planning and Network Operation, has increased by 50% since 2014 and is now similar to the peer group average.

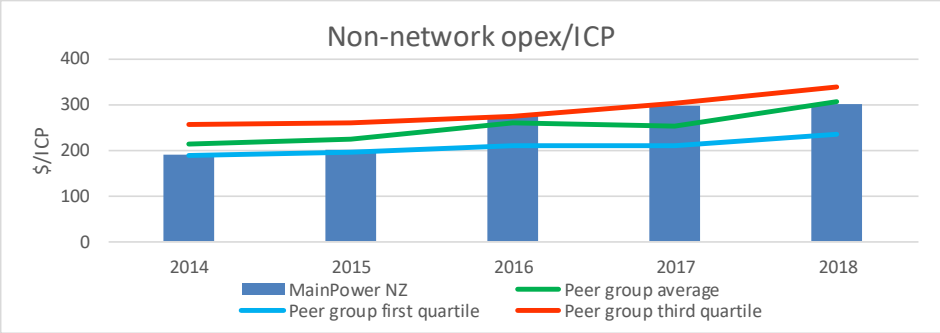


Figure 3 Benchmark – Non Network Operating Expenditure

8.5.2 Capital Expenditure on Network Assets

Capital expenditure is the cumulative expenditure required to delivery Network:

- Capacity;
- Security of Supply; and
- Asset Renewals.

Overall MainPower's capital expenditure on network assets was in line with its peer group first quartile. Going forward this is expected to increase due to works required to address security of supply and MainPower's renewals program.

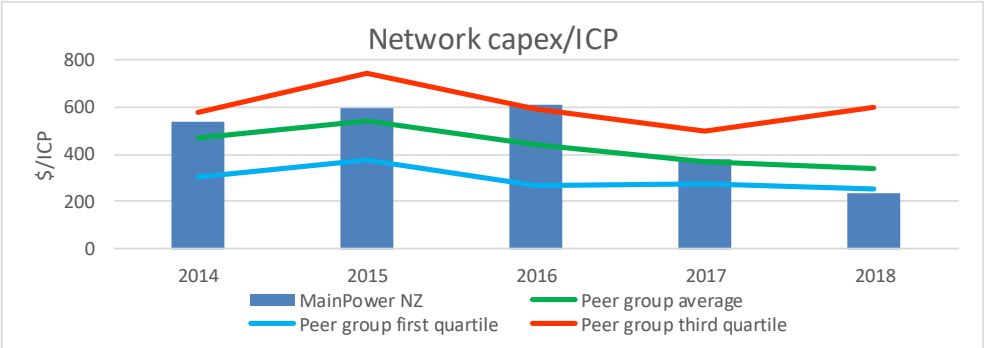


Figure 4 Benchmark – Network Capital Expenditure

8.5.3 Reliability

SAIFI and SAIDI are the disclosed "normalised" values where major event days, for example from earthquakes or severe storms, have been scaled so that the result reflects a more typical and comparable view of network performance.

- Normalised SAIFI represents the frequency of planned and unplanned customer outages. It is in line with the peer group first quartile. This is expected to increase as MainPower implements its revised asset management practices.
- Normalised SAIDI represents the average duration of planned and unplanned customer outages. It is in line with the peer group first quartile. This too is expected to increase as MainPower implements its revised asset management practices as line maintenance outages tend to be longer than fault outages.

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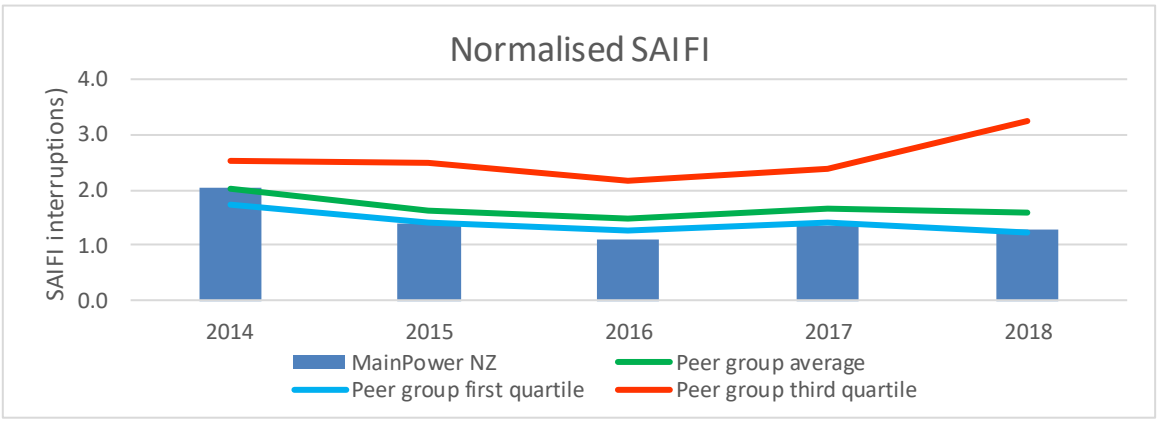

Figure 5 Benchmark – Reliability SAIFI

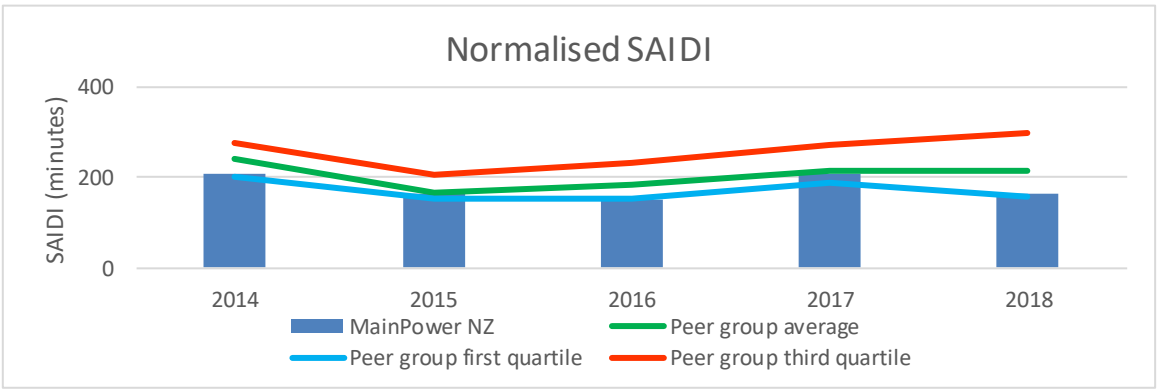

Figure 6 Benchmark – Reliability SAIDI

Asset Management Plan 2019 – 2029

Section 9 – Capability to Deliver

This section describes how MainPower will use a lifecycle approach to deliver on its asset management obligations.

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9. Capability to Deliver

MainPower has adopted a lifecycle asset management process structured on a total lifecycle cost of asset ownership. The framework has its foundation in the activities that occur over the lifetime of the physical asset. These activities are outlined in the figure below.

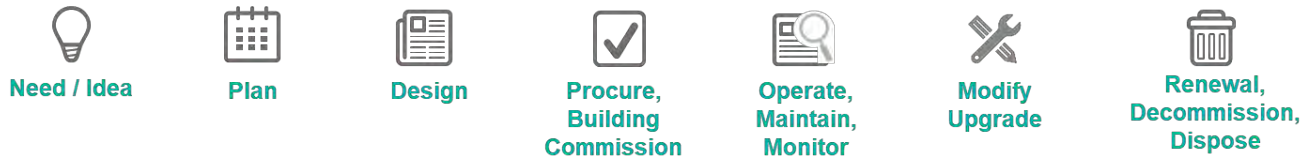

Figure 1 Asset Lifecycle Planning

Capability and competencies that support the asset lifecycle and the implementation of this Asset Management Plan are aligned with the asset lifecycle. The core competencies are:

- Program and Project Management
- Asset and Maintenance Management
- Engineering and Design
- Network Operations
- Field Operators
- Field Services – Service Delivery

The interaction of the roles throughout the Asset Lifecycle activities are detailed below. Clear definitions about the roles are translated into Position Descriptions for the individuals. Where gaps exist between the role requirements and the competencies of the individual, a personal development program is required to address the gap.

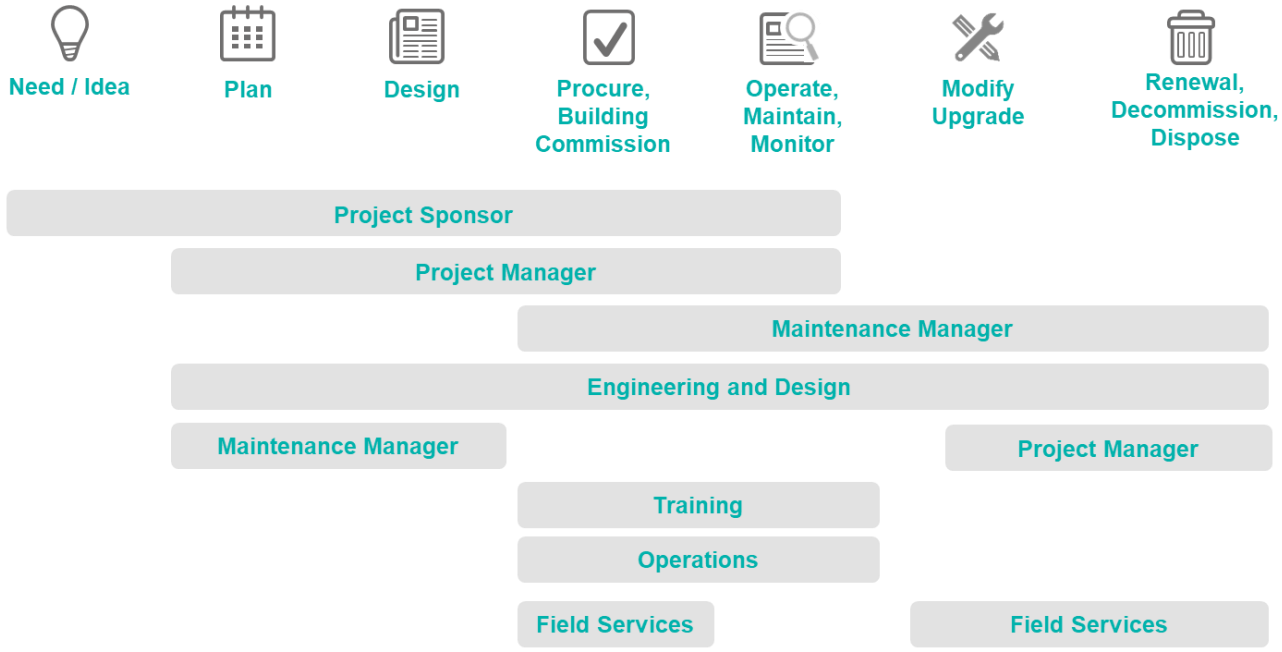

Figure 2 Alignment of Roles and Responsibilities Against Lifecycle Activities

9.1 Our People

MainPower's ability to deliver the Asset Management Plan and its success relies on our people having the capability and capacity to respond to the changing needs of our customers. To meet this rapid rate of change we must maintain a strong employer value proposition (EVP) that will allow us to attract and retain top talent in a competitive market.

9.1.1 Selecting People for Our Team

Our overarching position on selecting people for our team is that we will try our best to ensure that our people are competitive in attaining advancement within MainPower. Even so, we will ensure that all critical positions are also contestable. This practice meets our objective of employing the best person for each role. We are also committed to growing diversity in our workplace, and we support initiatives such as Girls with Hi-Vis. Our People and Culture Department oversees our robust selection process, with help from external search agencies as required.

9.1.2 Rewarding Our People

Our remuneration policy provides a clear and structured approach to managing remuneration for all employees. Our objective is that the policy is:

- fair and consistent
- simple and easy to understand
- affordable and recognises the environment in which we operate
- a transparent way to understand the value of positions within MainPower
- able to ensure we have internal relativity (i.e. similar roles are paid in a similar way) and external competitiveness.

9.1.3 Developing Our People through Training, Competency and Professional Development

Our People and Culture department is responsible for developing, coordinating and monitoring our yearly training and development plan for all MainPower staff. The department is also responsible for ensuring that internal and external training providers are fit for purpose.

Individual managers are responsible for identifying and addressing training needs within their respective work areas. Only employees assessed as competent can carry out a task unsupervised. The GM – People and Culture, in conjunction with executive management, is responsible for ensuring appropriate career path planning and appropriate succession planning is in place within MainPower.

Supervisors have completed a skills matrix for all field staff positions. The matrix determines:

- What skills and other competencies are required for each position;
- When a skill needs refreshing;
- When a skill will expire; and
- Whether an expired skill needs renewing.

9.1.4 Keeping Our People Well through Our Employee Wellness Programme

Our Employee Wellness Programme is designed to include initiatives that encourage and assist employees to maintain their overall personal wellbeing and fitness for work. The programme includes access to:

- First Aid training;
- Ergonomic assessments;
- Our Occupational Counselling Programme (OCP); and
- Our drug and alcohol testing programme.

9.2 Capability to Deliver

The Network team has accountability for asset management and overall network performance. The Network Team is structure on a 'Plan, Build, Operate' basis.

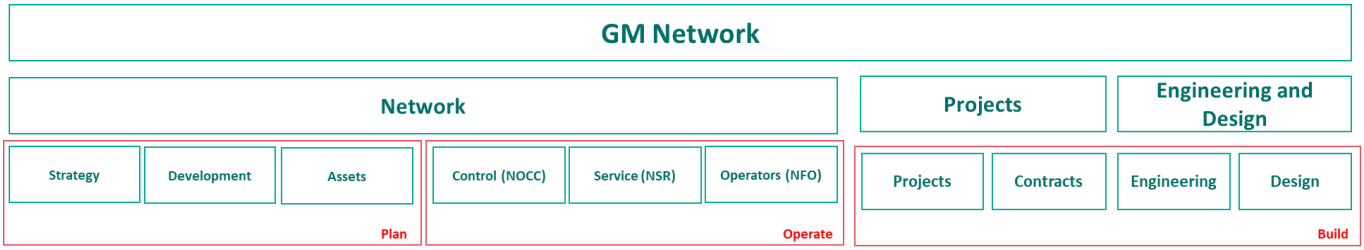

Figure 3 Our Assets and Capital Works

The proposed structure is designed to achieve a number of objectives:

- Expand our team capabilities by introducing new functions that are becoming essential for a best practice, modern asset manager;
- Create a stronger focus on our core activities, by splitting into more narrowly defined groups;
- Setting the asset management team up to be able to provide more effective guidance and support to our other business teams, including Engineering, Project Delivery, Commercial, Safety and Business Risk, and Contracting Operations;
- Setting the asset management team up to be able to provide effective guidance and support to our Network Operations team, especially through the migration to an Advanced Distribution Management System;
- Enhance the quality of our information sources and ability to use this for optimal decision making;
- Ensuring a focus on network-targeted research, development and pilot programs, leading to continually improving and expanding business-as-usual products and solutions;
- Expand, using the Plan Build Operate platform services offered by MainPower; and
- Extend beyond network management (our core), to energy management and possible Open Network Framework in the future.

9.2.1 Network Operations Team

The diagram below shows the tasks of our Network Management, Fault Response, Customer, Reporting, and Monitoring operations.

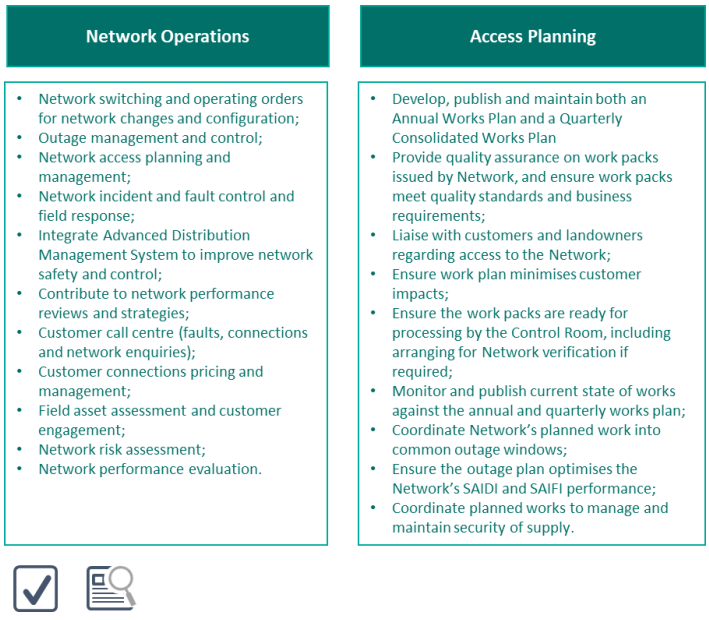

Figure 4 Our Network Operations

9.2.2 Build Team

The diagram below shows the tasks of each part of our project delivery cycle.

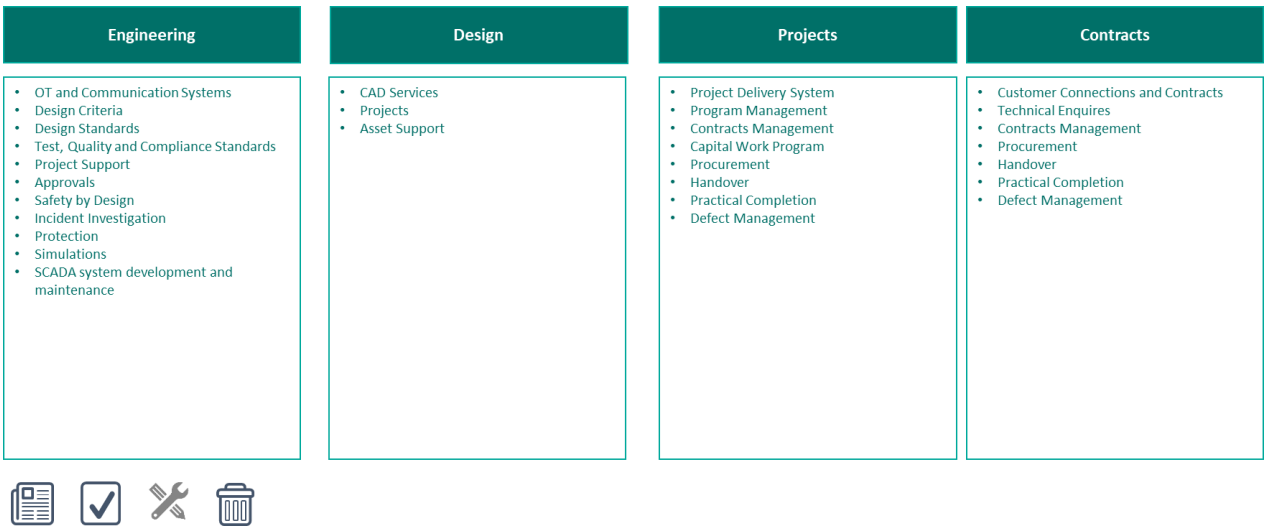

Figure 5 Our Build Team

9.2.3 Planning Team

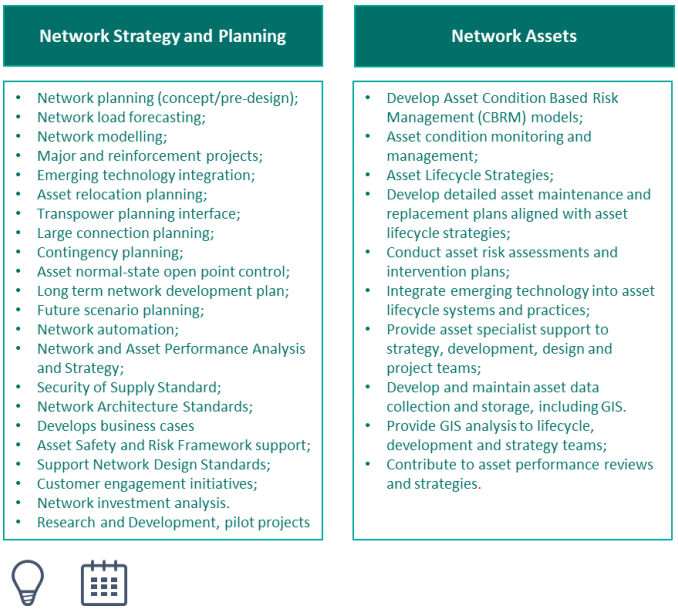

Figure 6 Our Planning Team

9.3 Field Services (Operations) Resourcing

Most field services resourcing is completed internally within MainPower. The way the works are contracted internally is changing, becoming more structured. This is achieved by:

- Having an internal contract and service level agreements between the internal and field service resources;
- The implementation of rate cards for all contracted activities that are pre-costed and updated regularly using supply change management; and
- Clearly defining what work is required, where it is required and what the outcomes need to be.

The main reason for reviewing the way works are contracted internally is primarily to improve productivity, efficiency and quality.

Where a gap in resourcing exists, procurement and contractor engagement processes are in place to secure external resource as required to achieve the objectives of the Asset Management Plan and the Business Plan.

9.4 Resourcing Requirements

Resourcing is defined for Network Development, Maintenance and Renewals based on typical project resourcing models and rate card information that defines Labour, Materials and Plant across all work streams.

'S' Curves are applied to work streams to show a distribution of expenditure throughout the year that models typical project expenditure.

Human resourcing is allocated across all aspects of the work system PM, AM, NOCC (WP, RP, NM), Records, SD, OH, UG, WS and third-party contractors. Works management resourcing is applied consistently.

Labour Resource (People)										
	PM	AM	Eng	NOCC (WP RP NM)	Records	SD	OH	UG	WS	Contract
Apr	9	5	9	8	6	4	26	7	6	6
May	9	5	9	8	6	4	26	7	6	6
Jun	9	5	9	8	6	4	26	9	7	6
Jul	9	5	9	8	6	4	27	13	7	7
Aug	9	5	9	8	6	4	29	21	9	8
Sep	9	5	9	8	6	4	31	30	10	9
Oct	9	5	9	8	6	4	31	30	10	9
Nov	9	5	9	8	6	4	29	21	9	8
Dec	9	5	9	8	6	4	27	13	7	7
Jan	9	5	9	8	6	4	26	9	7	6
Feb	9	5	9	8	6	4	26	7	6	6
Mar	9	5	9	8	6	4	26	7	6	6
Plan	9	5	9	8	6	6	27	14	8	NA
Actual	4	4	6	5	5	6	25+5	15	16	NA

Figure 7 Resourcing Model

Gaps have been identified within the resourcing model, however MainPower is confident that we can contract the extra resource in both the Network and Field Services teams as required.

Asset Management Plan 2019 – 2029

Appendices

This section provides additional information to support MainPower's Asset Management Plan, including our information disclosure schedules.

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Appendix 1 – Glossary of Terms and Abbreviations

TERM OR ABBREVIATION	DEFINITION
AHI	Asset Health Indicator
AMP	Asset Management Plan
CAPEX	Capital Expenditure
CDEM	Civil Defence Emergency Management
CIMS	Coordinated Incident Management System
CMMS	Computerised Maintenance Management System
CPG	Capital Planning Group
DG	Distributed Generation
Distribution Network	The power lines and underground cables that transport electricity from the national grid to homes and businesses.
EVP	employee value proposition
FY	Fiscal Year
GIS	Geographic Information System
GWH	**Giga-watt hour**
GXP	**Grid Exit Point.** A point at which MainPower's network connects to Transpower's transmission network.
HILP	High Impact Low Probability
HRIS	Human Resource Information System
HSEQ	Health, Environment, Safety and Quality
ICP	Installation Control Point
IIMM	International Infrastructure Management Manual
IoT	Internet of Things
IS system	Information Systems system
IT	Information Technology
KPI	Key Performance Indicator
kV	kilo-volt
Master Plan	Long term network capacity development plan
MP network	MainPower network
MVA	Mega Volt Ampere
MW	Megawatt. One megawatt = 1,000 kilowatts = 1,000,000 watts.
MWhr	Megawatt hour
n-1	An indication of power supply security that specifically means that when one circuit fails, another will be available to maintain an uninterrupted power supply
OCP	Occupational Counselling Programme
OGHV	Over Ground High Voltage
OGLV	Over Ground Low Voltage
PCM	Control Systems Automation
PDS	Project Delivery System

PMO	Project Management Office
RMA	Resource Management Act
ROCOF	Rate of Change of Frequency
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SAMP	Strategic Asset Management Plan (this document)
SCADA	Supervisory Control and Data Acquisition
SCI	**Statement of Corporate Intent.** An annual document that outlines the overall intentions of the company and the objectives which the Directors and Trustees have agreed.
SSR	Solution Study Report
Sub-transmission	An intermediate voltage used for connections between transmission connection points/bulk supply substations and zone substations. Sub-transmission is also used to connect between zone substations.
Transmission	**T**ranspower owns and operates the national grid. The high-voltage transmission network that connects areas of generation with towns and cities across New Zealand.
UGHV	**Under Ground High Voltage**
UGLV	**Under Ground Low Voltage**
VAR	**Volt Amps Reactive: a unit of the reactive component of electrical power.**
VoC	Voice of the Customer
Voltage	The amount of potential energy between two circuits. The greater the voltage, the greater the flow of electrical current.
WACC	Weighted Average Cost of Capital
Substation	A collection of equipment at one location, including any necessary housing, used to convert or transform electric energy and connect between two or more feeders.
Zone Substation	A substation that converts energy from transmission or sub-transmission voltages to distribution voltages.

Appendix 2 – Description of Asset Management Systems

System	Description
Accounting Systems	▪ The TechnologyOne software platform (an Enterprise Resource Planning system) is used to integrate financial, works and asset management information. ▪ Capital and maintenance expenditure is managed using a comprehensive financial system.
Asset Register	▪ The asset management suite within the TechnologyOne platform is the principal source of data related to MainPower assets.
GIS	▪ MainPower uses GE's Smallworld platform (a Geographic Information system) for the management of spatial asset information. ▪ The TechnologyOne software platform has been integrated with the GIS system.
Infrastructure	▪ MainPower's hardware and server software is continually updated consistent with modern high capacity hardware platforms. ▪ Information security management includes maintaining offsite backup facilities for stored information for protection from a security breach or disaster.
Works Management System	▪ The works management system issues and tracks jobs through the TechnologyOne software platform. It also maintains cost and quality information. ▪ A comprehensive job reporting system provides managers with detailed information progress of the work plan, work hours and cost against budget.
SCADA and Load Management Systems	▪ Invensys Wonderware "Intouch" SCADA (supervisory control and data acquisition) system: - displays voltage, current, & status information in real time from remote points on the network - receives instantaneous information on faults - remotely operates equipment from the control centre. ▪ We operate Landis and Gyr ripple injection plants and On Demand load management software to control: - customer water heaters to limit system peak loads and area loading constraints (mainly during winter months) - street lighting - electricity retailer tariffs.
AutoCAD	▪ Detailed substation plans, standard construction drawings and many subdivision plans are prepared and stored in AutoCAD ▪ Where applicable, these are linked to assets within TechnologyOne. ▪ Network details such as cable locations in trenches, boundary offsets, GPS location etc. are stored in AutoCAD to be viewed without complicating the GIS system.
Customer Information System ("CIS")	▪ This system is used to issue and maintain installation control points (ICPs) with retailers. ▪ It also manages customer information, lines tariff and consumption data. ▪ Outage information is imported from the Outage Management System and stored against each customer. ▪ The CIS is linked to the GIS for customer location information. ▪ The CIS is maintained daily from event changes notified by Retailers and new connections. ▪ The CIS is an important tool for MainPower's revenue protection.
Communication Systems	▪ Voice radio system for communication to field staff. ▪ Digital radio network for communicating with zone substations and other field equipment ▪ Sophisticated telephony system for general land based and mobile communication.
Human Resource Systems	▪ MainPower's human resource information will be transferred to the TechnologyOne platform using an iterative, incremental approach during 2016. This will include Employment Contracts, competency and skill set information and safety and training records. A succession plan exists within each section.
Inventory Systems	▪ All stock and supply chain details are managed through the TechnologyOne software platform as a single entity. ▪ MainPower maintains a separate storage facility for its own stock.
Outage Management System	▪ Traces across the GIS to identify all affected customers and switching points. ▪ For unplanned outages, all relevant fault information is entered into the GIS after the event. ▪ Reports are run from the GIS to generate outage statistics as required.

Appendix 3 – Directors' Certificate

mainpower

MainPower New Zealand Limited
172 Fernside Road, RD 1, Kaiapoi 7691
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T. +64 3 311 8300 F. +64 3 311 8301

CERTIFICATE FOR YEAR-BEGINNING DISCLOSURE
Pursuant to Clause 2.9.1 of Section 2.9

We, ANTHONY CHARLES KING and STEPHEN PAUL LEWIS, being Directors of MainPower New Zealand Limited, certify that, having made all reasonable enquiry; to the best of our knowledge:

a) The following attached information of MainPower New Zealand Limited prepared for the purposes of clause 2.4.1 of the Electricity Information Disclosure Determination 2012 in all material respects complies with that determination; and

b) The prospective financial or non-financial information included in the attached information has been measured on a basis consistent with regulatory requirements or recognised industry standards.

Anthony Charles King

21.3.2019
Date

Stephen Paul Lewis

21.3.2019
Date

www.mainpower.co.nz

Company Name	**MainPower New Zealand Ltd**
AMP Planning Period	**1 April 2019 – 31 March 2029**

SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

This schedule requires a breakdown of forecast expenditure on assets for the current disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms. Also required is a forecast of the value of commissioned assets (i.e., the value of RAB additions)
EDBs must provide explanatory comment on the difference between constant price and nominal dollar forecasts of expenditure on assets in Schedule 14a (Mandatory Explanatory Notes).
This information is not part of audited disclosure information.

sch ref

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
	for year ended	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**	**31 Mar 29**
	11a(i): Expenditure on Assets Forecast	**$000 (in nominal dollars)**										
	Consumer connection	3,586	6,800	6,936	7,075	7,216	7,361	7,508	7,658	7,811	7,967	8,127
	System growth	689	1,584	9,159	257	1,369	800	2,475	9,487	6,635	3,374	-
	Asset replacement and renewal	2,790	8,863	7,620	5,919	6,100	8,853	9,067	6,644	10,570	11,255	15,508
	Asset relocations	-	-	-	-	-	-	-	-	-	-	-
	Reliability, safety and environment:											
	Quality of supply	-	-	-	-	-	-	-	-	-	-	-
	Legislative and regulatory	-	917	-	-	-	-	-	-	-	-	-
	Other reliability, safety and environment	301	1,340	2,377	1,064	1,086	1,115	1,321	1,208	1,264	1,314	1,531
	Total reliability, safety and environment	301	2,256	2,377	1,064	1,086	1,115	1,321	1,208	1,264	1,314	1,531
	Expenditure on network assets	7,366	19,503	26,092	14,315	15,772	18,129	20,371	24,997	26,280	23,911	25,166
	Expenditure on non-network assets	2,250	4,069	3,366	3,433	3,502	3,572	3,643	3,716	3,791	3,866	3,944
	Expenditure on assets	9,616	23,572	29,458	17,748	19,274	21,701	24,014	28,713	30,071	27,778	29,110
plus	Cost of financing	-	-	-	-	-	-	-	-	-	-	-
less	Value of capital contributions	3,200	3,000	3,060	3,121	4,457	4,546	4,637	4,730	4,824	4,921	5,019
plus	Value of vested assets	-	-		-	-	-	-	-	-	-	-
	Capital expenditure forecast	6,416	20,572	26,398	14,627	14,817	17,155	19,377	23,983	25,246	22,857	24,090
	Assets commissioned	14,957	12,649	17,913	12,586	10,904	12,902	15,088	18,907	21,099	19,730	19,800

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
	for year ended	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**	**31 Mar 29**
		$000 (in constant prices)										
	Consumer connection	3,586	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800
	System growth	689	1,584	8,979	248	1,290	739	2,242	8,424	5,776	2,880	-
	Asset replacement and renewal	2,790	8,863	7,471	5,689	5,748	8,179	8,212	5,900	9,202	9,606	12,977
	Asset relocations	-	-	-	-	-	-	-	-	-	-	-
	Reliability, safety and environment:											
	Quality of supply	-	-	-	-	-	-	-	-	-	-	-
	Legislative and regulatory	-	917	-	-	-	-					
	Other reliability, safety and environment	301	1,340	2,330	1,023	1,023	1,030	1,196	1,072	1,101	1,122	1,281
	Total reliability, safety and environment	301	2,256	2,330	1,023	1,023	1,030	1,196	1,072	1,101	1,122	1,281
	Expenditure on network assets	7,366	19,503	25,580	13,759	14,862	16,748	18,451	22,196	22,879	20,408	21,058
	Expenditure on non-network assets	2,250	4,069	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300	3,300
	Expenditure on assets	9,616	23,572	28,880	17,059	18,162	20,048	21,751	25,496	26,179	23,708	24,358
	Subcomponents of expenditure on assets (where known)											
	Energy efficiency and demand side management, reduction of energy losses	-	-	-	-	-	-	-	-	-	-	-
	Overhead to underground conversion	859	550	550	450	450	450	450	450	450	450	450
	Research and development	-	-	-	-	-	-	-	-	-	-	-

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This information is not part of audited disclosure information.

sch ref			Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5	CY+6	CY+7	CY+8	CY+9	CY+10
		for year ended	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24	31 Mar 25	31 Mar 26	31 Mar 27	31 Mar 28	31 Mar 29
	Difference between nominal and constant price forecasts		**$000**										
	Consumer connection		0	-	136	275	416	561	708	858	1,011	1,167	1,327
	System growth		-	-	180	10	79	61	233	1,063	859	494	-
	Asset replacement and renewal		-	0	149	230	352	674	855	744	1,368	1,649	2,532
	Asset relocations		-	-	-	-	-	-	-	-	-	-	-
	Reliability, safety and environment:												
	Quality of supply		-	-	-	-	-	-	-	-	-	-	-
	Legislative and regulatory		-	0	-	-	-	-	-	-	-	-	-
	Other reliability, safety and environment		-	(0)	47	41	63	85	125	135	164	193	250
	Total reliability, safety and environment		-	(0)	47	41	63	85	125	135	164	193	250
	Expenditure on network assets		0	0	512	556	910	1,381	1,920	2,800	3,402	3,503	4,108
	Expenditure on non-network assets		-	-	66	133	202	272	343	416	491	566	644
	Expenditure on assets		0	0	578	689	1,112	1,653	2,264	3,217	3,892	4,070	4,752

			Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
		for year ended	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24
	11a(ii): Consumer Connection							
	*Consumer types defined by EDB**		**$000 (in constant prices)**					
	Residential		2,117	3,953	3,953	3,953	3,953	3,953
	Irrigation		885	1,678	1,678	1,678	1,678	1,678
	Large User		95	497	497	497	497	497
	Streelights		107	203	203	203	203	203
	Other		382	469	469	469	469	469
	*include additional rows if needed							
	Consumer connection expenditure		3,586	6,800	6,800	6,800	6,800	6,800
less	Capital contributions funding consumer connection		3,200	3,000	3,000	4,200	4,200	4,200
	Consumer connection less capital contributions		386	3,800	3,800	2,600	2,600	2,600
	11a(iii): System Growth							
	Subtransmission				3,480		1,241	739
	Zone substations			1,584	5,078	248	50	
	Distribution and LV lines		689					
	Distribution and LV cables							
	Distribution substations and transformers				200			
	Distribution switchgear				221			
	Other network assets							
	System growth expenditure		689	1,584	8,979	248	1,290	739
less	Capital contributions funding system growth							
	System growth less capital contributions		689	1,584	8,979	248	1,290	739

Company Name	**MainPower New Zealand Ltd**
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SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

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This information is not part of audited disclosure information.

sch ref

11a(iv): Asset Replacement and Renewal

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**
	$000 (in constant prices)						
	Subtransmission		48	39	21	21	21
	Zone substations						2,500
	Distribution and LV lines	2,474	5,474	3,914	2,191	2,188	2,086
	Distribution and LV cables	316	806	891	899	990	1,010
	Distribution substations and transformers		766	848	804	762	731
	Distribution switchgear		1,500	1,500	1,500	1,500	1,500
	Other network assets		270	280	273	287	331
	Asset replacement and renewal expenditure	2,790	8,863	7,471	5,689	5,748	8,179
less	Capital contributions funding asset replacement and renewal						
	Asset replacement and renewal less capital contributions	2,790	8,863	7,471	5,689	5,748	8,179

11a(v): Asset Relocations

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**
	*Project or programme**	**$000 (in constant prices)**					
	[Description of material project or programme]		-	-	-	-	-
	[Description of material project or programme]	-	-	-	-	-	-
	[Description of material project or programme]	-	-	-	-	-	-
	[Description of material project or programme]	-	-	-	-	-	-
	[Description of material project or programme]	-	-	-	-	-	-
	include additional rows if needed						
	All other project or programmes - asset relocations						
	Asset relocations expenditure	-	-	-	-	-	-
less	Capital contributions funding asset relocations						
	Asset relocations less capital contributions	-	-	-	-	-	-

11a(vi): Quality of Supply

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**
	*Project or programme**	**$000 (in constant prices)**					
	[Description of material project or programme]	-	-	-	-	-	-
	[Description of material project or programme]	-	-	-	-	-	-
	[Description of material project or programme]	-	-	-	-	-	-
	[Description of material project or programme]	-	-	-	-	-	-
	[Description of material project or programme]	-	-	-	-	-	-
	include additional rows if needed						
	All other projects or programmes - quality of supply	-	-	-	-	-	-
	Quality of supply expenditure	-	-	-	-	-	-
less	Capital contributions funding quality of supply	-	-	-	-	-	-
	Quality of supply less capital contributions	-	-	-	-	-	-

Company Name	**MainPower New Zealand Ltd**
AMP Planning Period	**1 April 2019 – 31 March 2029**

SCHEDULE 11a: REPORT ON FORECAST CAPITAL EXPENDITURE

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This information is not part of audited disclosure information.

sch ref

11a(vii): Legislative and Regulatory

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
	for year ended	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24
	*Project or programme**	$000 (in constant prices)					
	Compliance and Safety Replacement Project		917	-	-	-	-
	[Description of material project or programme]		-	-	-	-	-
	[Description of material project or programme]		-	-	-	-	-
	[Description of material project or programme]		-	-	-	-	-
	[Description of material project or programme]		-	-	-	-	-
	*include additional rows if needed						
	All other projects or programmes - legislative and regulatory						
	Legislative and regulatory expenditure	-	917	-	-	-	-
less	Capital contributions funding legislative and regulatory						
	Legislative and regulatory less capital contributions	-	917	-	-	-	-

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

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
	for year ended	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24
	*Project or programme**	$000 (in constant prices)					
	Conductor Upgrades	301	300	715	-	-	-
	Zone Substations		439	1,013	-	200	-
	Switchgear Upgrades		496	338	849	-	-
	Network Automation		105	124	123	123	130
	Network Reinforcement		-	141	51	700	900
	*include additional rows if needed						
	All other projects or programmes - other reliability, safety and environment						
	Other reliability, safety and environment expenditure	301	1,340	2,330	1,023	1,023	1,030
less	Capital contributions funding other reliability, safety and environment						
	Other reliability, safety and environment less capital contributions	301	1,340	2,330	1,023	1,023	1,030

11a(ix): Non-Network Assets

		Current Year CY	CY+1	CY+2	CY+3	CY+4	CY+5
	for year ended	31 Mar 19	31 Mar 20	31 Mar 21	31 Mar 22	31 Mar 23	31 Mar 24
	Routine expenditure						
	*Project or programme**	$000 (in constant prices)					
	Buildings	149	270	100	100	100	100
	Motor	30	54	-	-	-	-
	Plant	258	467	400	400	400	400
	Computers	469	848	800	800	800	800
	Technology projects	1,344	2,430	2,000	2,000	2,000	2,000
	*include additional rows if needed						
	All other projects or programmes - routine expenditure						
	Routine expenditure	2,250	4,069	3,300	3,300	3,300	3,300
	Atypical expenditure						
	*Project or programme**						
	[Description of material project or programme]						

Company Name	**MainPower New Zealand Ltd**
AMP Planning Period	**1 April 2019 – 31 March 2029**

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This information is not part of audited disclosure information.

sch ref							
180	[Description of material project or programme]						
181	[Description of material project or programme]						
182	[Description of material project or programme]						
183	[Description of material project or programme]						
184	**include additional rows if needed*						
185	All other projects or programmes - atypical expenditure						
186	**Atypical expenditure**	-	-	-	-	-	-
187							
188	**Expenditure on non-network assets**	2,250	4,069	3,300	3,300	3,300	3,300

Company Name	**MainPower New Zealand Ltd**
AMP Planning Period	**1 April 2019 – 31 March 2029**

SCHEDULE 11b: REPORT ON FORECAST OPERATIONAL EXPENDITURE

This schedule requires a breakdown of forecast operational expenditure for the disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms.
EDBs must provide explanatory comment on the difference between constant price and nominal dollar operational expenditure forecasts in Schedule 14a (Mandatory Explanatory Notes).
This information is not part of audited disclosure information.

sch ref												
7			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
8		for year ended	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**	**31 Mar 29**
9	**Operational Expenditure Forecast**		**$000 (in nominal dollars)**										
10	Service interruptions and emergencies		914	1,131	1,568	1,527	1,558	1,589	1,621	1,653	1,686	1,720	1,754
11	Vegetation management		646	675	1,020	1,040	1,061	1,082	1,104	1,126	1,149	1,172	1,195
12	Routine and corrective maintenance and inspection		1,764	1,131	1,568	1,527	1,558	1,589	1,621	1,653	1,686	1,720	1,754
13	Asset replacement and renewal		2,076	2,263	3,136	3,054	3,115	3,178	3,241	3,306	3,372	3,440	3,509
14	**Network Opex**		5,400	5,200	7,292	7,149	7,292	7,438	7,587	7,739	7,893	8,051	8,212
15	System operations and network support		3,924	3,910	4,072	4,245	4,329	4,416	4,504	4,594	4,686	4,780	4,876
16	Business support		9,156	9,122	9,500	9,904	10,102	10,304	10,510	10,720	10,935	11,153	11,376
17	**Non-network opex**		13,080	13,032	13,572	14,148	14,431	14,720	15,014	15,315	15,621	15,933	16,252
18	**Operational expenditure**		18,480	18,232	20,864	21,298	21,724	22,158	22,601	23,053	23,514	23,985	24,464
19			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
20		for year ended	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**	**31 Mar 29**
21			**$000 (in constant prices)**										
22	Service interruptions and emergencies		914	1,131	1,537	1,468	1,468	1,468	1,468	1,468	1,468	1,468	1,468
23	Vegetation management		646	675	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
24	Routine and corrective maintenance and inspection		1,764	1,131	1,537	1,468	1,468	1,468	1,468	1,468	1,468	1,468	1,468
25	Asset replacement and renewal		2,076	2,263	3,075	2,936	2,936	2,936	2,936	2,936	2,936	2,936	2,936
26	**Network Opex**		5,400	5,200	7,149	6,872	6,872	6,872	6,872	6,872	6,872	6,872	6,872
27	System operations and network support		3,924	3,910	3,992	4,080	4,080	4,080	4,080	4,080	4,080	4,080	4,080
28	Business support		9,156	9,122	9,314	9,519	9,519	9,519	9,519	9,519	9,519	9,519	9,519
29	**Non-network opex**		13,080	13,032	13,306	13,599	13,599	13,599	13,599	13,599	13,599	13,599	13,599
30	**Operational expenditure**		18,480	18,232	20,455	20,471	20,471	20,471	20,471	20,471	20,471	20,471	20,471
31	**Subcomponents of operational expenditure (where known)**												
32	Energy efficiency and demand side management, reduction of												
33	energy losses		-	-	-	-	-	-	-	-	-	-	-
34	Direct billing*		-	-	-	-	-	-	-	-	-	-	-
35	Research and Development		-	-	-	-	-	-	-	-	-	-	-
36	Insurance		700	735	735	735	735	735	735	735	735	735	735
37	** Direct billing expenditure by suppliers that direct bill the majority of their consumers*												
38													
39			*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*	*CY+6*	*CY+7*	*CY+8*	*CY+9*	*CY+10*
40		for year ended	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**	**31 Mar 25**	**31 Mar 26**	**31 Mar 27**	**31 Mar 28**	**31 Mar 29**
41	**Difference between nominal and real forecasts**		**$000**										
42	Service interruptions and emergencies		-	-	31	59	90	121	153	185	218	252	286
43	Vegetation management		-	-	20	40	61	82	104	126	149	172	195
44	Routine and corrective maintenance and inspection		-	-	31	59	90	121	153	185	218	252	286
45	Asset replacement and renewal		-	-	61	119	180	242	306	370	437	504	573
46	**Network Opex**		-	-	143	278	421	566	715	867	1,022	1,180	1,341
47	System operations and network support		-	-	80	165	250	336	425	515	607	700	796
48	Business support		-	-	186	385	583	785	991	1,201	1,415	1,634	1,857

Company Name	**MainPower New Zealand Ltd**
AMP Planning Period	**1 April 2019 – 31 March 2029**

SCHEDULE 11b: REPORT ON FORECAST OPERATIONAL EXPENDITURE

This schedule requires a breakdown of forecast operational expenditure for the disclosure year and a 10 year planning period. The forecasts should be consistent with the supporting information set out in the AMP. The forecast is to be expressed in both constant price and nominal dollar terms.
EDBs must provide explanatory comment on the difference between constant price and nominal dollar operational expenditure forecasts in Schedule 14a (Mandatory Explanatory Notes).
This information is not part of audited disclosure information.

sch ref												
49	**Non-network opex**	-	-	266	549	832	1,121	1,415	1,716	2,022	2,334	2,653
50	**Operational expenditure**	-	-	409	827	1,253	1,687	2,131	2,583	3,044	3,514	3,994

Company Name	**MainPower New Zealand Ltd**
AMP Planning Period	**1 April 2019 – 31 March 2029**

SCHEDULE 12a: REPORT ON ASSET CONDITION

This schedule requires a breakdown of asset condition by asset class as at the start of the forecast year. The data accuracy assessment relates to the percentage values disclosed in the asset condition columns. Also required is a forecast of the percentage of units to be replaced in the next 5 years. All information should be consistent with the information provided in the AMP and the expenditure on assets forecast in Schedule 11a. All units relating to cable and line assets, that are expressed in km, refer to circuit lengths.

sch ref

						Asset condition at start of planning period (percentage of units by grade)							
	Voltage	Asset category	Asset class	Units	H1	H2	H3	H4	H5	Grade unknown	Data accuracy (1–4)	% of asset forecast to be replaced in next 5 years
10	All	Overhead Line	Concrete poles / steel structure	No.	0.50%	-	-	8.50%	90.90%	0.10%	3	1.00%
11	All	Overhead Line	Wood poles	No.	1.50%	9.85%	18.81%	40.97%	28.63%	0.24%	3	9.80%
12	All	Overhead Line	Other pole types	No.							[Select one]	
13	HV	Subtransmission Line	Subtransmission OH up to 66kV conductor	km		-	35.75%	35.75%	28.50%	-	2	5.00%
14	HV	Subtransmission Line	Subtransmission OH 110kV+ conductor	km			-	-		-	[Select one]	
15	HV	Subtransmission Cable	Subtransmission UG up to 66kV (XLPE)	km		-	37.90%	37.90%	24.20%	-	2	10.00%
16	HV	Subtransmission Cable	Subtransmission UG up to 66kV (Oil pressurised)	km		-	-	-	-	-	[Select one]	
17	HV	Subtransmission Cable	Subtransmission UG up to 66kV (Gas pressurised)	km		-	-	-	-	-	[Select one]	
18	HV	Subtransmission Cable	Subtransmission UG up to 66kV (PILC)	km		-	-	-	-	-	[Select one]	
19	HV	Subtransmission Cable	Subtransmission UG 110kV+ (XLPE)	km		-	-	-	-	-	[Select one]	
20	HV	Subtransmission Cable	Subtransmission UG 110kV+ (Oil pressurised)	km		-	-	-	-	-	[Select one]	
21	HV	Subtransmission Cable	Subtransmission UG 110kV+ (Gas Pressurised)	km		-	-	-	-	-	[Select one]	
22	HV	Subtransmission Cable	Subtransmission UG 110kV+ (PILC)	km		-	-	-	-	-	[Select one]	
23	HV	Subtransmission Cable	Subtransmission submarine cable	km		-	-	-	-	-	[Select one]	
24	HV	Zone substation Buildings	Zone substations up to 66kV	No.		-	43.33%	43.33%	13.33%	-	4	6.00%
25	HV	Zone substation Buildings	Zone substations 110kV+	No.			-	-		-	[Select one]	
26	HV	Zone substation switchgear	22/33kV CB (Indoor)	No.		-	15.00%	15.00%	70.00%	-	3	-
27	HV	Zone substation switchgear	22/33kV CB (Outdoor)	No.		-	44.44%	44.44%	11.11%	-	3	-
28	HV	Zone substation switchgear	33kV Switch (Ground Mounted)	No.			-	-		-	[Select one]	
29	HV	Zone substation switchgear	33kV Switch (Pole Mounted)	No.		-	42.39%	42.39%	15.22%	-	3	10.00%
30	HV	Zone substation switchgear	33kV RMU	No.		-	-	-	-	-	[Select one]	-
31	HV	Zone substation switchgear	50/66/110kV CB (Indoor)	No.		-	-	-	-	-	[Select one]	-
32	HV	Zone substation switchgear	50/66/110kV CB (Outdoor)	No.		-	3.57%	3.57%	92.86%	-	3	-
33	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (ground mounted)	No.		-	50.00%	50.00%	-	-	3	5.00%
34	HV	Zone substation switchgear	3.3/6.6/11/22kV CB (pole mounted)	No.		-	10.87%	10.87%	78.26%	-	3	-

Company Name	**MainPower New Zealand Ltd**
AMP Planning Period	**1 April 2019 – 31 March 2029**

SCHEDULE 12a: REPORT ON ASSET CONDITION

This schedule requires a breakdown of asset condition by asset class as at the start of the forecast year. The data accuracy assessment relates to the percentage values disclosed in the asset condition columns. Also required is a forecast of the percentage of units to be replaced in the next 5 years. All information should be consistent with the information provided in the AMP and the expenditure on assets forecast in Schedule 11a. All units relating to cable and line assets, that are expressed in km, refer to circuit lengths.

sch ref

						Asset condition at start of planning period (percentage of units by grade)							
	Voltage	**Asset category**	**Asset class**	**Units**	**H1**	**H2**	**H3**	**H4**	**H5**	**Grade unknown**	**Data accuracy (1–4)**	**% of asset forecast to be replaced in next 5 years**
39	HV	Zone Substation Transformer	Zone Substation Transformers	No.	-	-	42.31%	42.31%	15.38%	-	3	5.00%
40	HV	Distribution Line	Distribution OH Open Wire Conductor	km	-	-	44.85%	44.85%	10.30%	-	1	1.00%
41	HV	Distribution Line	Distribution OH Aerial Cable Conductor	km			-	-		-	[Select one]	
42	HV	Distribution Line	SWER conductor	km	-	-	49.88%	49.88%	0.25%	-	1	-
43	HV	Distribution Cable	Distribution UG XLPE or PVC	km	-	-	21.80%	21.80%	56.40%	-	1	-
44	HV	Distribution Cable	Distribution UG PILC	km	-	-	48.80%	48.80%	2.40%	-	1	-
45	HV	Distribution Cable	Distribution Submarine Cable	km	-	-	-	-	-	-	[Select one]	
46	HV	Distribution switchgear	3.3/6.6/11/22kV CB (pole mounted) - reclosers and sectionalisers	No.	-	-	16.67%	16.67%	66.67%	-	3	5.00%
47	HV	Distribution switchgear	3.3/6.6/11/22kV CB (Indoor)	No.	-	-	27.78%	27.78%	44.44%	-	3	5.00%
48	HV	Distribution switchgear	3.3/6.6/11/22kV Switches and fuses (pole mounted)	No.	-	-	34.37%	34.37%	31.26%	-	3	5.00%
49	HV	Distribution switchgear	3.3/6.6/11/22kV Switch (ground mounted) - except RMU	No.			-	-		-	[Select one]	
50	HV	Distribution switchgear	3.3/6.6/11/22kV RMU	No.	-	-	32.01%	32.01%	35.98%	-	2	7.00%
51	HV	Distribution Transformer	Pole Mounted Transformer	No.	-	-	37.57%	37.57%	24.85%	-	1	4.00%
52	HV	Distribution Transformer	Ground Mounted Transformer	No.	-	-	31.47%	31.47%	37.06%	-	1	2.00%
53	HV	Distribution Transformer	Voltage regulators	No.	-	-	50.00%	50.00%	-	-	3	-
54	HV	Distribution Substations	Ground Mounted Substation Housing	No.	-	-	34.30%	34.30%	31.40%	-	3	5.00%
55	LV	LV Line	LV OH Conductor	km	-	-	48.15%	48.15%	3.70%	-	1	5.00%
56	LV	LV Cable	LV UG Cable	km	-	-	32.17%	32.17%	35.67%	-	2	-
57	LV	LV Streetlighting	LV OH/UG Streetlight circuit	km	-	-	34.86%	34.86%	30.28%	-	1	1.00%
58	LV	Connections	OH/UG consumer service connections	No.	-	-	33.14%	33.14%	33.73%	-	1	1.00%
59	All	Protection	Protection relays (electromechanical, solid state and numeric)	No.	-	31.41%	24.20%	24.20%	20.19%	-	3	10.00%
60	All	SCADA and communications	SCADA and communications equipment operating as a single system	Lot	-	2.00%	40.00%	40.00%	18.00%	-	2	15.00%
61	All	Capacitor Banks	Capacitors including controls	No.	-	-	-	-	-	-	[Select one]	
62	All	Load Control	Centralised plant	Lot	-	12.50%	25.00%	25.00%	37.50%	-	4	5.00%
63	All	Load Control	Relays	No.	-	-	40.63%	40.63%	18.75%	-	2	80.00%
64	All	Civils	Cable Tunnels	km			-	-		-	[Select one]	

Company Name	**MainPower New Zealand Ltd**
AMP Planning Period	**1 April 2019 – 31 March 2029**

SCHEDULE 12b: REPORT ON FORECAST CAPACITY

This schedule requires a breakdown of current and forecast capacity and utilisation for each zone substation and current distribution transformer capacity. The data provided should be consistent with the information provided in the AMP. Information provided in this table should relate to the operation of the network in its normal steady state configuration.

sch ref

12b(i): System Growth - Zone Substations

Existing Zone Substations	Current Peak Load (MVA)	Installed Firm Capacity (MVA)	Security of Supply Classification (type)	Transfer Capacity (MVA)	Utilisation of Installed Firm Capacity %	Installed Firm Capacity +5 years (MVA)	Utilisation of Installed Firm Capacity + 5yrs %	Installed Firm Capacity Constraint +5 years (cause)	Explanation
Southbrook	23	22	N-1 switched	2	104%	44	68%	No constraint within +5 years	Upgrade required within 5 years
Rangiora North	7	-	N-1 switched	6	-	-	N/A	Subtransmission circuit	Single cct 33kV
Burnt Hill	16	23	N-1 switched	6	68%	23	75%	No constraint within +5 years	
Swannanoa	16	23	N-1 switched	6	69%	23	80%	No constraint within +5 years	
Amberley	6	4	N-1 switched	2	140%	4	120%	Transformer	Single cct 33kV
MacKenzies Rd	3	-	N	2	-	-	N/A	Transformer	Peak load is from embeded generation
Greta	1	-	N	1	-	-	N/A	Transformer	
Cheviot	4	-	N	2	-	-	N/A	Transformer	
Hawarden	4	-	N-1 switched	3	-	-	N/A	Subtransmission circuit	Load reduction by emergency irrig load control
Ludstone	6	6	N-1 switched	-	97%	6	100%	Subtransmission circuit	
Leader	2	-	N		-	-	N/A	Transformer	Load reduction by emergency irrig load control
Oaro	0	-	N	-	-	-	N/A	Transformer	
Mouse Point	15	13	N	2	113%	13	140%	Transformer	Load reduction by emergency irrig load control
Hanmer	5	-	N	-	-	-	N/A	Subtransmission circuit	Single 33kV cct, standby 3 MVA transfromer.
Lochiel	0	-	N	-	-	-	N/A	Subtransmission circuit	
Marble Quarry	0	-	N	-	-	-	N/A	Subtransmission circuit	Single 33kV cct, standby 3 MVA transfromer.
[Zone Substation_17]					-				
[Zone Substation_18]					-				
[Zone Substation_19]					-			[Select one]	
[Zone Substation_20]					-			[Select one]	

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

Company Name	**MainPower New Zealand Ltd**
AMP Planning Period	**1 April 2019 – 31 March 2029**

SCHEDULE 12C: REPORT ON FORECAST NETWORK DEMAND

This schedule requires a forecast of new connections (by consumer type), peak demand and energy volumes for the disclosure year and a 5 year planning period. The forecasts should be consistent with the supporting information set out in the AMP as well as the assumptions used in developing the expenditure forecasts in Schedule 11a and Schedule 11b and the capacity and utilisation forecasts in Schedule 12b.

sch ref

12c(i): Consumer Connections

Number of ICPs connected in year by consumer type

Number of connections

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	for year ended	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**
	*Consumer types defined by EDB**						
	Residential	687	654	654	654	654	654
	Irrigation	71	68	68	68	68	68
	Large User	42	40	40	40	40	40
	Streelights	9	9	9	9	9	9
	Other	23	29	29	29	29	29
	Connections total	832	800	800	800	800	800

**include additional rows if needed*

Distributed generation

	Number of connections	184	200	240	270	300	450
	Capacity of distributed generation installed in year (MVA)	1	1	3	1	2	4

12c(ii) System Demand

		Current Year CY	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
	Maximum coincident system demand (MW) for year ended	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**
	GXP demand	112	112	113	113	114	115
plus	Distributed generation output at HV and above	2	2	4	4	6	6
	Maximum coincident system demand	114	114	117	117	120	121
less	Net transfers to (from) other EDBs at HV and above						
	Demand on system for supply to consumers' connection points	114	114	117	117	120	121
	Electricity volumes carried (GWh)						
	Electricity supplied from GXPs	632	634	636	640	646	650
less	Electricity exports to GXPs	-	-	-	-	-	-
plus	Electricity supplied from distributed generation	14	24	37	38	39	40
less	Net electricity supplied to (from) other EDBs	-	-	-	-	-	-
	Electricity entering system for supply to ICPs	646	658	673	678	685	690
less	Total energy delivered to ICPs	608	624	633	642	649	
	Losses	38	34	40	36	36	690
	Load factor	65%	66%	66%	66%	65%	65%
	Loss ratio	5.8%	5.2%	5.9%	5.3%	5.3%	100.0%

Company Name	**MainPower New Zealand Ltd**
AMP Planning Period	**1 April 2019 – 31 March 2029**
Network / Sub-network Name	

SCHEDULE 12d: REPORT FORECAST INTERRUPTIONS AND DURATION

This schedule requires a forecast of SAIFI and SAIDI for disclosure and a 5 year planning period. The forecasts should be consistent with the supporting information set out in the AMP as well as the assumed impact of planned and unplanned SAIFI and SAIDI on the expenditures forecast provided in Schedule 11a and Schedule 11b.

sch ref		*Current Year CY*	*CY+1*	*CY+2*	*CY+3*	*CY+4*	*CY+5*
9	for year ended	**31 Mar 19**	**31 Mar 20**	**31 Mar 21**	**31 Mar 22**	**31 Mar 23**	**31 Mar 24**
10	**SAIDI**						
11	Class B (planned interruptions on the network)	95.0	90.0	90.0	90.0	90.0	90.0
12	Class C (unplanned interruptions on the network)	67.0	80.0	80.0	80.0	80.0	80.0
13	**SAIFI**						
14	Class B (planned interruptions on the network)	0.40	0.40	0.40	0.40	0.40	0.40
15	Class C (unplanned interruptions on the network)	1.33	1.31	1.31	1.31	1.31	1.31

Company Name	**MainPower New Zealand Ltd**
AMP Planning Period	**1 April 2019 – 31 March 2029**
Asset Management Standard Applied	

SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices .

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
3	Asset management policy	To what extent has an asset management policy been documented, authorised and communicated?	3	MainPower has an asset management policy that is firmly part of MainPowers approach to asset management. Awareness of the policy is supported within eh business through training and regularly updates to the staff on Asset Management		Widely used AM practice standards require an organisation to document, authorise and communicate its asset management policy (eg, as required in PAS 55 para 4.2 i). A key pre-requisite of any robust policy is that the organisation's top management must be seen to endorse and fully support it. Also vital to the effective implementation of the policy, is to tell the appropriate people of its content and their obligations under it. Where an organisation outsources some of its asset-related activities, then these people and their organisations must equally be made aware of the policy's content. Also, there may be other stakeholders, such as regulatory authorities and shareholders who should be made aware of it.	Top management. The management team that has overall responsibility for asset management.	The organisation's asset management policy, its organisational strategic plan, documents indicating how the asset management policy was based upon the needs of the organisation and evidence of communication.
10	Asset management strategy	What has the organisation done to ensure that its asset management strategy is consistent with other appropriate organisational policies and strategies, and the needs of stakeholders?	2	As demonstrated in the Asset Management Policy there is clear line of sight between asset management polices to everything we do through to the statement of corporate intent		In setting an organisation's asset management strategy, it is important that it is consistent with any other policies and strategies that the organisation has and has taken into account the requirements of relevant stakeholders. This question examines to what extent the asset management strategy is consistent with other organisational policies and strategies (eg, as required by PAS 55 para 4.3.1 b) and has taken account of stakeholder requirements as required by PAS 55 para 4.3.1 c). Generally, this will take into account the same polices, strategies and stakeholder requirements as covered in drafting the asset management policy but at a greater level of detail.	Top management. The organisation's strategic planning team. The management team that has overall responsibility for asset management.	The organisation's asset management strategy document and other related organisational policies and strategies. Other than the organisation's strategic plan, these could include those relating to health and safety, environmental, etc. Results of stakeholder consultation.
11	Asset management strategy	In what way does the organisation's asset management strategy take account of the lifecycle of the assets, asset types and asset systems over which the organisation has stewardship?	3	The main focus of MainPowers approach to asset management is to inform asset lifecycle including total cost of ownership from Idea to Disposal.		Good asset stewardship is the hallmark of an organisation compliant with widely used AM standards. A key component of this is the need to take account of the lifecycle of the assets, asset types and asset systems. (For example, this requirement is recognised in 4.3.1 d) of PAS 55). This question explores what an organisation has done to take lifecycle into account in its asset management strategy.	Top management. People in the organisation with expert knowledge of the assets, asset types, asset systems and their associated life-cycles. The management team that has overall responsibility for asset management. Those responsible for developing and adopting methods and processes used in asset management	The organisation's documented asset management strategy and supporting working documents.
26	Asset management plan(s)	How does the organisation establish and document its asset management plan(s) across the life cycle activities of its assets and asset systems?	2	Asset management plans exit for all assets. Work remains linking Asset Management plans to polices and enabling asset life cycle.		The asset management strategy need to be translated into practical plan(s) so that all parties know how the objectives will be achieved. The development of plan(s) will need to identify the specific tasks and activities required to optimize costs, risks and performance of the assets and/or asset system(s), when they are to be carried out and the resources required.	The management team with overall responsibility for the asset management system. Operations, maintenance and engineering managers.	The organisation's asset management plan(s).

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices .

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
27	Asset management plan(s)	How has the organisation communicated its plan(s) to all relevant parties to a level of detail appropriate to the receiver's role in their delivery?	**3**	Asset Managers have full responsibility for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s). They have been given the necessary authority to achieve this. An Asset Management Steering group is attended by Line and Executive Managers, the CE and		Plans will be ineffective unless they are communicated to all those, including contracted suppliers and those who undertake enabling function(s). The plan(s) need to be communicated in a way that is relevant to those who need to use them.	The management team with overall responsibility for the asset management system. Delivery functions and suppliers.	Distribution lists for plan(s). Documents derived from plan(s) which detail the receivers role in plan delivery. Evidence of communication.
29	Asset management plan(s)	How are designated responsibilities for delivery of asset plan actions documented?	**1**	Currently resources, systems and reporting is in place that demonstrates MainPower is completing asset management effectively on its core assets. This remains to be applied to all assets.		The implementation of asset management plan(s) relies on (1) actions being clearly identified, (2) an owner allocated and (3) that owner having sufficient delegated responsibility and authority to carry out the work required. It also requires alignment of actions across the organisation. This question explores how well the plan(s) set out responsibility for delivery of asset plan actions.	The management team with overall responsibility for the asset management system. Operations, maintenance and engineering managers. If appropriate, the performance management team.	The organisation's asset management plan(s). Documentation defining roles and responsibilities of individuals and organisational departments.
31	Asset management plan(s)	What has the organisation done to ensure that appropriate arrangements are made available for the efficient and cost effective implementation of the plan(s)? (Note this is about resources and enabling support)	**2**	Asset Management and its importance is reported to all staff on an irregular bases through general company updates / staff engagement meetings.		It is essential that the plan(s) are realistic and can be implemented, which requires appropriate resources to be available and enabling mechanisms in place. This question explores how well this is achieved. The plan(s) not only need to consider the resources directly required and timescales, but also the enabling activities, including for example, training requirements, supply chain capability and procurement timescales.	The management team with overall responsibility for the asset management system. Operations, maintenance and engineering managers. If appropriate, the performance management team. If appropriate, the performance management team. Where appropriate the procurement team and service providers working on the organisation's asset-related activities.	The organisation's asset management plan(s). Documented processes and procedures for the delivery of the asset management plan.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices .

33	Contingency planning	What plan(s) and procedure(s) does the organisation have for identifying and responding to incidents and emergency situations and ensuring continuity of critical asset management activities?	**2**	On the most part (Work Remains) Asset Management activities are well define and assurance, in the form of data collection points are used to detail Maintenance outcomes. Work remains to audit the outcomes; this requirement is agnostic to outsourcing or insourcing.	The Construction Specifications and the Standard Construction Drawing Set have been examined (which form a key control mechanism).	Widely used AM practice standards require that an organisation has plan(s) to identify and respond to emergency situations. Emergency plan(s) should outline the actions to be taken to respond to specified emergency situations and ensure continuity of critical asset management activities including the communication to, and involvement of, external agencies. This question assesses if, and how well, these plan(s) triggered, implemented and resolved in the event of an incident. The plan(s) should be appropriate to the level of risk as determined by the organisation's risk assessment methodology. It is also a requirement that relevant personnel are competent and trained.	The manager with responsibility for developing emergency plan(s). The organisation's risk assessment team. People with designated duties within the plan(s) and procedure(s) for dealing with incidents and emergency situations.	The organisation's plan(s) and procedure(s) for dealing with emergencies. The organisation's risk assessments and risk registers.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
27	Asset management plan(s)	How has the organisation communicated its plan(s) to all relevant parties to a level of detail appropriate to the receiver's role in their delivery?	The organisation does not have plan(s) or their distribution is limited to the authors.	The plan(s) are communicated to some of those responsible for delivery of the plan(s). OR Communicated to those responsible for delivery is either irregular or ad-hoc.	The plan(s) are communicated to most of those responsible for delivery but there are weaknesses in identifying relevant parties resulting in incomplete or inappropriate communication. The organisation recognises improvement is needed as is working towards resolution.	The plan(s) are communicated to all relevant employees, stakeholders and contracted service providers to a level of detail appropriate to their participation or business interests in the delivery of the plan(s) and there is confirmation that they are being used effectively.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
29	Asset management plan(s)	How are designated responsibilities for delivery of asset plan actions documented?	The organisation has not documented responsibilities for delivery of asset plan actions.	Asset management plan(s) inconsistently document responsibilities for delivery of plan actions and activities and/or responsibilities and authorities for implementation inadequate and/or delegation level inadequate to ensure effective delivery and/or contain misalignments with organisational accountability.	Asset management plan(s) consistently document responsibilities for the delivery of actions but responsibility/authority levels are inappropriate/ inadequate, and/or there are misalignments within the organisation.	Asset management plan(s) consistently document responsibilities for the delivery actions and there is adequate detail to enable delivery of actions. Designated responsibility and authority for achievement of asset plan actions is appropriate.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
31	Asset management plan(s)	What has the organisation done to ensure that appropriate arrangements are made available for the efficient and cost effective implementation of the plan(s)? (Note this is about resources and enabling support)	The organisation has not considered the arrangements needed for the effective implementation of plan(s).	The organisation recognises the need to ensure appropriate arrangements are in place for implementation of asset management plan(s) and is in the process of determining an appropriate approach for achieving this.	The organisation has arrangements in place for the implementation of asset management plan(s) but the arrangements are not yet adequately efficient and/or effective. The organisation is working to resolve existing weaknesses.	The organisation's arrangements fully cover all the requirements for the efficient and cost effective implementation of asset management plan(s) and realistically address the resources and timescales required, and any changes needed to functional policies, standards, processes and the asset management information system.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

33	Contingency planning	What plan(s) and procedure(s) does the organisation have for identifying and responding to incidents and emergency situations and ensuring continuity of critical asset management activities?	The organisation has not considered the need to establish plan(s) and procedure(s) to identify and respond to incidents and emergency situations.	The organisation has some ad-hoc arrangements to deal with incidents and emergency situations, but these have been developed on a reactive basis in response to specific events that have occurred in the past.	Most credible incidents and emergency situations are identified. Either appropriate plan(s) and procedure(s) are incomplete for critical activities or they are inadequate. Training/ external alignment may be incomplete.	Appropriate emergency plan(s) and procedure(s) are in place to respond to credible incidents and manage continuity of critical asset management activities consistent with policies and asset management objectives. Training and external agency alignment is in place.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
37	Structure, authority and responsibilities	What has the organisation done to appoint member(s) of its management team to be responsible for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s)?	3	Asset Managers have full responsibility for ensuring that the organisation's assets deliver the requirements of the asset management strategy, objectives and plan(s). They have been given the necessary authority to achieve this. An Asset Management Steering group exists, meets monthly and is attended by Line and Executive Manager, the CE and	An organisation structure (Jan 2019) has been examined. This shows a split of field services from engineering, and a realignment of skills within commercial and regulatory.	In order to ensure that the organisation's assets and asset systems deliver the requirements of the asset management policy, strategy and objectives responsibilities need to be allocated to appropriate people who have the necessary authority to fulfil their responsibilities. (This question, relates to the organisation's assets eg, para b), s 4.4.1 of PAS 55, making it therefore distinct from the requirement contained in para a), s 4.4.1 of PAS 55).	Top management. People with management responsibility for the delivery of asset management policy, strategy, objectives and plan(s). People working on asset-related activities.	Evidence that managers with responsibility for the delivery of asset management policy, strategy, objectives and plan(s) have been appointed and have assumed their responsibilities. Evidence may include the organisation's documents relating to its asset management system, organisational charts, job descriptions of post-holders, annual targets/objectives and personal development plan(s) of post-holders as appropriate.
40	Structure, authority and responsibilities	What evidence can the organisation's top management provide to demonstrate that sufficient resources are available for asset management?	2	Currently resources, systems and reporting is in place that demonstrates MainPower is completing asset management effectively on its core assets. This remains to be applied to all assets.	Budget spreadsheets, Strategic Plan & Business Plan	Optimal asset management requires top management to ensure sufficient resources are available. In this context the term 'resources' includes manpower, materials, funding and service provider support.	Top management. The management team that has overall responsibility for asset management. Risk management team. The organisation's managers involved in day-to-day supervision of asset-related activities, such as frontline managers, engineers, foremen and chargehands as appropriate.	Evidence demonstrating that asset management plan(s) and/or the process(es) for asset management plan implementation consider the provision of adequate resources in both the short and long term. Resources include funding, materials, equipment, services provided by third parties and personnel (internal and service providers) with appropriate skills competencies and knowledge.
42	Structure, authority and responsibilities	To what degree does the organisation's top management communicate the importance of meeting its asset management requirements?	3	Asset Management and its important is reported to all staff on an irregular bases through general company updates / staff engagement meetings.	The revised organisation chart (Jan 2019) has been examined. Updates are available to all staff by way of email and Power Press.	Widely used AM practice standards require an organisation to communicate the importance of meeting its asset management requirements such that personnel fully understand, take ownership of, and are fully engaged in the delivery of the asset management requirements (eg, PAS 55 s 4.4.1 g).	Top management. The management team that has overall responsibility for asset management. People involved in the delivery of the asset management requirements.	Evidence of such activities as road shows, written bulletins, workshops, team talks and management walk-abouts would assist an organisation to demonstrate it is meeting this requirement of PAS 55.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices .

45	Outsourcing of asset management activities	Where the organisation has outsourced some of its asset management activities, how has it ensured that appropriate controls are in place to ensure the compliant delivery of its organisational strategic plan, and its asset management policy and strategy?	**2**	Asset Management activities are well defined. Assurance in the form of data collection points are used to detail Maintenance outcomes. Work remains to audit the outcomes; this requirement is agnostic to outsourcing or insourcing.	The Construction Specifications and the Standard Construction Drawing Set have been examined (which form a key control mechanism).	Where an organisation chooses to outsource some of its asset management activities, the organisation must ensure that these outsourced process(es) are under appropriate control to ensure that all the requirements of widely used AM standards (eg, PAS 55) are in place, and the asset management policy, strategy objectives and plan(s) are delivered. This includes ensuring capabilities and resources across a time span aligned to life cycle management. The organisation must put arrangements in place to control the outsourced activities, whether it be to external providers or to other in-house departments. This question explores what the organisation does in this regard.	Top management. The management team that has overall responsibility for asset management. The manager(s) responsible for the monitoring and management of the outsourced activities. People involved with the procurement of outsourced activities. The people within the organisations that are performing the outsourced activities. The people impacted by the outsourced activity.	The organisation's arrangements that detail the compliance required of the outsourced activities. For example, this this could form part of a contract or service level agreement between the organisation and the suppliers of its outsourced activities. Evidence that the organisation has demonstrated to itself that it has assurance of compliance of outsourced activities.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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

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45	Outsourcing of asset management activities	Where the organisation has outsourced some of its asset management activities, how has it ensured that appropriate controls are in place to ensure the compliant delivery of its organisational strategic plan, and its asset management policy and strategy?	The organisation has not considered the need to put controls in place.	The organisation controls its outsourced activities on an ad-hoc basis, with little regard for ensuring for the compliant delivery of the organisational strategic plan and/or its asset management policy and strategy.	Controls systematically considered but currently only provide for the compliant delivery of some, but not all, aspects of the organisational strategic plan and/or its asset management policy and strategy. Gaps exist.	Evidence exists to demonstrate that outsourced activities are appropriately controlled to provide for the compliant delivery of the organisational strategic plan, asset management policy and strategy, and that these controls are integrated into the asset management system	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
48	Training, awareness and competence	How does the organisation develop plan(s) for the human resources required to undertake asset management activities - including the development and delivery of asset management strategy, process(es), objectives and plan(s)?	**2**	Training for the completion of asset management activities that deliver the required outcomes are in place for some assets. Work remains detailing the training requirements, enabling the requirements on the team skills matrix and ensuring that competent people exist informed by the forward work program.		There is a need for an organisation to demonstrate that it has considered what resources are required to develop and implement its asset management system. There is also a need for the organisation to demonstrate that it has assessed what development plan(s) are required to provide its human resources with the skills and competencies to develop and implement its asset management systems. The timescales over which the plan(s) are relevant should be commensurate with the planning horizons within the asset management strategy considers e.g. if the asset management strategy considers 5, 10 and 15 year time scales then the human resources development plan(s) should align with these. Resources include both 'in house' and external resources who undertake asset management activities.	Senior management responsible for agreement of plan(s). Managers responsible for developing asset management strategy and plan(s). Managers with responsibility for development and recruitment of staff (including HR functions). Staff responsible for training. Procurement officers. Contracted service providers.	Evidence of analysis of future work load plan(s) in terms of human resources. Document(s) containing analysis of the organisation's own direct resources and contractors resource capability over suitable timescales. Evidence, such as minutes of meetings, that suitable management forums are monitoring human resource development plan(s). Training plan(s), personal development plan(s), contract and service level agreements.
49	Training, awareness and competence	How does the organisation identify competency requirements and then plan, provide and record the training necessary to achieve the competencies?	**3**	Competency requirement for the completion of maintenance activities exist within the Asset Management plans. All maintenance activities are risk assessed and controls developed based on the risk appetite of the business. Work remains to be completed developing a clear link between activities required, competency to complete the work and work authorisation.		Widely used AM standards require that organisations to undertake a systematic identification of the asset management awareness and competencies required at each level and function within the organisation. Once identified the training required to provide the necessary competencies should be planned for delivery in a timely and systematic way. Any training provided must be recorded and maintained in a suitable format. Where an organisation has contracted service providers in place then it should have a means to demonstrate that this requirement is being met for their employees. (eg, PAS 55 refers to frameworks suitable for identifying competency requirements).	Senior management responsible for agreement of plan(s). Managers responsible for developing asset management strategy and plan(s). Managers with responsibility for development and recruitment of staff (including HR functions). Staff responsible for training. Procurement officers. Contracted service providers.	Evidence of an established and applied competency requirements assessment process and plan(s) in place to deliver the required training. Evidence that the training programme is part of a wider, co-ordinated asset management activities training and competency programme. Evidence that training activities are recorded and that records are readily available (for both direct and contracted service provider staff) e.g. via organisation wide information system or local records database.

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This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices .

50	Training, awareness and competence	How does the organization ensure that persons under its direct control undertaking asset management related activities have an appropriate level of competence in terms of education, training or experience?	**3**	All maintenance activities are risk assessed and controls developed based on the risk appetite of the business. Work remains to be completed developing a clear link between activities required, competency to complete the work and work authorisation. - see section on Risk within the AMP.		A critical success factor for the effective development and implementation of an asset management system is the competence of persons undertaking these activities. organisations should have effective means in place for ensuring the competence of employees to carry out their designated asset management function(s). Where an organisation has contracted service providers undertaking elements of its asset management system then the organisation shall assure itself that the outsourced service provider also has suitable arrangements in place to manage the competencies of its employees. The organisation should ensure that the individual and corporate competencies it requires are in place and actively monitor, develop and maintain an appropriate balance of these competencies.	Managers, supervisors, persons responsible for developing training programmes. Staff responsible for procurement and service agreements. HR staff and those responsible for recruitment.	Evidence of a competency assessment framework that aligns with established frameworks such as the asset management Competencies Requirements Framework (Version 2.0); National Occupational Standards for Management and Leadership; UK Standard for Professional Engineering Competence, Engineering Council, 2005.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
48	Training, awareness and competence	How does the organisation develop plan(s) for the human resources required to undertake asset management activities - including the development and delivery of asset management strategy, process(es), objectives and plan(s)?	The organisation has not recognised the need for assessing human resources requirements to develop and implement its asset management system.	The organisation has recognised the need to assess its human resources requirements and to develop a plan(s). There is limited recognition of the need to align these with the development and implementation of its asset management system.	The organisation has developed a strategic approach to aligning competencies and human resources to the asset management system including the asset management plan but the work is incomplete or has not been consistently implemented.	The organisation can demonstrate that plan(s) are in place and effective in matching competencies and capabilities to the asset management system including the plan for both internal and contracted activities. Plans are reviewed integral to asset management system process(es).	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
49	Training, awareness and competence	How does the organisation identify competency requirements and then plan, provide and record the training necessary to achieve the competencies?	The organisation does not have any means in place to identify competency requirements.	The organisation has recognised the need to identify competency requirements and then plan, provide and record the training necessary to achieve the competencies.	The organisation is the process of identifying competency requirements aligned to the asset management plan(s) and then plan, provide and record appropriate training. It is incomplete or inconsistently applied.	Competency requirements are in place and aligned with asset management plan(s). Plans are in place and effective in providing the training necessary to achieve the competencies. A structured means of recording the competencies achieved is in place.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

50	Training, awareness and competence	How does the organization ensure that persons under its direct control undertaking asset management related activities have an appropriate level of competence in terms of education, training or experience?	The organization has not recognised the need to assess the competence of person(s) undertaking asset management related activities.	Competency of staff undertaking asset management related activities is not managed or assessed in a structured way, other than formal requirements for legal compliance and safety management.	The organization is in the process of putting in place a means for assessing the competence of person(s) involved in asset management activities including contractors. There are gaps and inconsistencies.	Competency requirements are identified and assessed for all persons carrying out asset management related activities - internal and contracted. Requirements are reviewed and staff reassessed at appropriate intervals aligned to asset management requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices .

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
53	Communication, participation and consultation	How does the organisation ensure that pertinent asset management information is effectively communicated to and from employees and other stakeholders, including contracted service providers?	3	Pertinent asset management information is communicated to necessary parties to effectively deliver the asset management plan for most assets. Work remains to be completed to extend this to all assets.		Widely used AM practice standards require that pertinent asset management information is effectively communicated to and from employees and other stakeholders including contracted service providers. Pertinent information refers to information required in order to effectively and efficiently comply with and deliver asset management strategy, plan(s) and objectives. This will include for example the communication of the asset management policy, asset performance information, and planning information as appropriate to contractors.	Top management and senior management representative(s), employee's representative(s), employee's trade union representative(s); contracted service provider management and employee representative(s); representative(s) from the organisation's Health, Safety and Environmental team. Key stakeholder representative(s).	Asset management policy statement prominently displayed on notice boards, intranet and internet; use of organisation's website for displaying asset performance data; evidence of formal briefings to employees, stakeholders and contracted service providers; evidence of inclusion of asset management issues in team meetings and contracted service provider contract meetings; newsletters, etc.
59	Asset Management System documentation	What documentation has the organisation established to describe the main elements of its asset management system and interactions between them?	2	Currently MainPower, through process maps describing its approach to asset management, including who is responsible and for what part of the process they are responsible.		Widely used AM practice standards require an organisation maintain up to date documentation that ensures that its asset management systems (ie, the systems the organisation has in place to meet the standards) can be understood, communicated and operated. (eg, s 4.5 of PAS 55 requires the maintenance of up to date documentation of the asset management system requirements specified throughout s 4 of PAS 55).	The management team that has overall responsibility for asset management. Managers engaged in asset management activities.	The documented information describing the main elements of the asset management system (process(es)) and their interaction.
62	Information management	What has the organisation done to determine what its asset management information system(s) should contain in order to support its asset management system?	1	Asset Management Information systems are currently being reviewed by the organisation so that the organisation can achieved its approach to Asset Management.		Effective asset management requires appropriate information to be available. Widely used AM standards therefore require the organisation to identify the asset management information it requires in order to support its asset management system. Some of the information required may be held by suppliers. The maintenance and development of asset management information systems is a poorly understood specialist activity that is akin to IT management but different from IT management. This group of questions provides some indications as to whether the capability is available and applied. Note: To be effective, an asset information management system requires the mobilisation of technology, people and process(es) that create, secure, make available and destroy the information required to support the asset management system.	The organisation's strategic planning team. The management team that has overall responsibility for asset management. Information management team. Operations, maintenance and engineering managers	Details of the process the organisation has employed to determine what its asset information system should contain in order to support its asset management system. Evidence that this has been effectively implemented.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices .

63	Information management	How does the organisation maintain its asset management information system(s) and ensure that the data held within it (them) is of the requisite quality and accuracy and is consistent?	**2**	This is achieved via the as building process, system audits, incidents corrective actions and through maintenance inspections.		The response to the questions is progressive. A higher scale cannot be awarded without achieving the requirements of the lower scale. This question explores how the organisation ensures that information management meets widely used AM practice requirements (eg, s 4.4.6 (a), (c) and (d) of PAS 55).	The management team that has overall responsibility for asset management. Users of the organisational information systems.	The asset management information system, together with the policies, procedure(s), improvement initiatives and audits regarding information controls.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
53	Communication, participation and consultation	How does the organisation ensure that pertinent asset management information is effectively communicated to and from employees and other stakeholders, including contracted service providers?	The organisation has not recognised the need to formally communicate any asset management information.	There is evidence that the pertinent asset management information to be shared along with those to share it with is being determined.	The organisation has determined pertinent information and relevant parties. Some effective two way communication is in place but as yet not all relevant parties are clear on their roles and responsibilities with respect to asset management information.	Two way communication is in place between all relevant parties, ensuring that information is effectively communicated to match the requirements of asset management strategy, plan(s) and process(es). Pertinent asset information requirements are regularly reviewed.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
59	Asset Management System documentation	What documentation has the organisation established to describe the main elements of its asset management system and interactions between them?	The organisation has not established documentation that describes the main elements of the asset management system.	The organisation is aware of the need to put documentation in place and is in the process of determining how to document the main elements of its asset management system.	The organisation in the process of documenting its asset management system and has documentation in place that describes some, but not all, of the main elements of its asset management system and their interaction.	The organisation has established documentation that comprehensively describes all the main elements of its asset management system and the interactions between them. The documentation is kept up to date.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
62	Information management	What has the organisation done to determine what its asset management information system(s) should contain in order to support its asset management system?	The organisation has not considered what asset management information is required.	The organisation is aware of the need to determine in a structured manner what its asset information system should contain in order to support its asset management system and is in the process of deciding how to do this.	The organisation has developed a structured process to determine what its asset information system should contain in order to support its asset management system and has commenced implementation of the process.	The organisation has determined what its asset information system should contain in order to support its asset management system. The requirements relate to the whole life cycle and cover information originating from both internal and external sources.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

63	Information management	How does the organisation maintain its asset management information system(s) and ensure that the data held within it (them) is of the requisite quality and accuracy and is consistent?	There are no formal controls in place or controls are extremely limited in scope and/or effectiveness.	The organisation is aware of the need for effective controls and is in the process of developing an appropriate control process(es).	The organisation has developed a controls that will ensure the data held is of the requisite quality and accuracy and is consistent and is in the process of implementing them.	The organisation has effective controls in place that ensure the data held is of the requisite quality and accuracy and is consistent. The controls are regularly reviewed and improved where necessary.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
64	Information management	How has the organisation's ensured its asset management information system is relevant to its needs?	2	Information requirements are informed by the Asset Management Plan, financial and operational requirements.		Widely used AM standards need not be prescriptive about the form of the asset management information system, but simply require that the asset management information system is appropriate to the organisations needs, can be effectively used and can supply information which is consistent and of the requisite quality and accuracy.	The organisation's strategic planning team. The management team that has overall responsibility for asset management. Information management team. Users of the organisational information systems.	The documented process the organisation employs to ensure its asset management information system aligns with its asset management requirements. Minutes of information systems review meetings involving users.
69	Risk management process(es)	How has the organisation documented process(es) and/or procedure(s) for the identification and assessment of asset and asset management related risks throughout the asset life cycle?	2	Activity risk assessment for all maintenance activities have been assessed, documented and controls identified. Work remains to be completed detailing the operational risk of all assets (Plant and Equipment Risk Assessments).	Corporate Risk Register	Risk management is an important foundation for proactive asset management. Its overall purpose is to understand the cause, effect and likelihood of adverse events occurring, to optimally manage such risks to an acceptable level, and to provide an audit trail for the management of risks. Widely used standards require the organisation to have process(es) and/or procedure(s) in place that set out how the organisation identifies and assesses asset and asset management related risks. The risks have to be considered across the four phases of the asset lifecycle (eg, para 4.3.3 of PAS 55).	The top management team in conjunction with the organisation's senior risk management representatives. There may also be input from the organisation's Safety, Health and Environment team. Staff who carry out risk identification and assessment.	The organisation's risk management framework and/or evidence of specific process(es) and/ or procedure(s) that deal with risk control mechanisms. Evidence that the process(es) and/or procedure(s) are implemented across the business and maintained. Evidence of agendas and minutes from risk management meetings. Evidence of feedback in to process(es) and/or procedure(s) as a result of incident investigation(s). Risk registers and assessments.
79	Use and maintenance of asset risk information	How does the organisation ensure that the results of risk assessments provide input into the identification of adequate resources and training and competency needs?	1	Risk assessments are completed and controls identified that inform competency requirements and controls for works. Controls identified for the completion of works forms part of the contractor management framework and network access requirements. The end to end process detailing the		Widely used AM standards require that the output from risk assessments are considered and that adequate resource (including staff) and training is identified to match the requirements. It is a further requirement that the effects of the control measures are considered, as there may be implications in resources and training required to achieve other objectives.	Staff responsible for risk assessment and those responsible for developing and approving resource and training plan(s). There may also be input from the organisation's Safety, Health and Environment team.	The organisations risk management framework. The organisation's resourcing plan(s) and training and competency plan(s). The organisation should be able to demonstrate appropriate linkages between the content of resource plan(s) and training and competency plan(s) to the risk assessments and risk control measures that have been developed.

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This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices .

82	Legal and other requirements	What procedure does the organisation have to identify and provide access to its legal, regulatory, statutory and other asset management requirements, and how is requirements incorporated into the asset management system?	**2**	Legal statutory risk forms part of the MainPower corporate risk management framework. Controls identified are included in Asset Management plans and are implemented within the organisations CMMS.		In order for an organisation to comply with its legal, regulatory, statutory and other asset management requirements, the organisation first needs to ensure that it knows what they are (eg, PAS 55 specifies this in s 4.4.8). It is necessary to have systematic and auditable mechanisms in place to identify new and changing requirements. Widely used AM standards also require that requirements are incorporated into the asset management system (e.g. procedure(s) and process(es))	Top management. The organisations regulatory team. The organisation's legal team or advisors. The management team with overall responsibility for the asset management system. The organisation's health and safety team or advisors. The organisation's policy making team.	The organisational processes and procedures for ensuring information of this type is identified, made accessible to those requiring the information and is incorporated into asset management strategy and objectives

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

82	Legal and other requirements	What procedure does the organisation have to identify and provide access to its legal, regulatory, statutory and other asset management requirements, and how is requirements incorporated into the asset management system?	The organisation has not considered the need to identify its legal, regulatory, statutory and other asset management requirements.	The organisation identifies some its legal, regulatory, statutory and other asset management requirements, but this is done in an ad-hoc manner in the absence of a procedure.	The organisation has procedure(s) to identify its legal, regulatory, statutory and other asset management requirements, but the information is not kept up to date, inadequate or inconsistently managed.	Evidence exists to demonstrate that the organisation's legal, regulatory, statutory and other asset management requirements are identified and kept up to date. Systematic mechanisms for identifying relevant legal and statutory requirements.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
88	Life Cycle Activities	How does the organisation establish implement and maintain process(es) for the implementation of its asset management plan(s) and control of activities across the creation, acquisition or enhancement of assets. This includes design, modification, procurement, construction and commissioning activities?	2	Process are currently being developed to fully document the addition, acquisition or enhancements made to assets. This will including Asset Creation, Schedules assigned, asbuilts updated prior to energisation.		Life cycle activities are about the implementation of asset management plan(s) i.e. they are the "doing" phase. They need to be done effectively and well in order for asset management to have any practical meaning. As a consequence, widely used standards (eg, PAS 55 s 4.5.1) require organisations to have in place appropriate process(es) and procedure(s) for the implementation of asset management plan(s) and control of lifecycle activities. This question explores those aspects relevant to asset creation.	Asset managers, design staff, construction staff and project managers from other impacted areas of the business, e.g. Procurement	Documented process(es) and procedure(s) which are relevant to demonstrating the effective management and control of life cycle activities during asset creation, acquisition, enhancement including design, modification, procurement, construction and commissioning.
91	Life Cycle Activities	How does the organisation ensure that process(es) and/or procedure(s) for the implementation of asset management plan(s) and control of activities during maintenance (and inspection) of assets are sufficient to ensure activities are carried out under specified conditions, are consistent with asset management strategy and control cost, risk and performance?	1	Process and procedures are currently being documented that detail how Asset Management plans are implemented. Individual asset management plans detail inspections, activities and the required standard. Cost, risk and performance is measured against pre-populated and agreed rate cards. The implementation of rate cards area also form part of the CMMS upgrade.		Having documented process(es) which ensure the asset management plan(s) are implemented in accordance with any specified conditions, in a manner consistent with the asset management policy, strategy and objectives and in such a way that cost, risk and asset system performance are appropriately controlled is critical. They are an essential part of turning intention into action (eg, as required by PAS 55 s 4.5.1).	Asset managers, operations managers, maintenance managers and project managers from other impacted areas of the business	Documented procedure for review. Documented procedure for audit of process delivery. Records of previous audits, improvement actions and documented confirmation that actions have been carried out.
95	Performance and condition monitoring	How does the organisation measure the performance and condition of its assets?	1	Overall performance of the system is measured via SAIDI, SAIFI and other performance metric documented in the regulatory AMP. The performance of the approach to asset management remains to be monitored through condition assessments made against criticality.	The Control Room was observed measuring the real-time performance of assets. Field staff use cellular based data capture of asset condition.	Widely used AM standards require that organisations establish implement and maintain procedure(s) to monitor and measure the performance and/or condition of assets and asset systems. They further set out requirements in some detail for reactive and proactive monitoring, and leading/lagging performance indicators together with the monitoring or results to provide input to corrective actions and continual improvement. There is an expectation that performance and condition monitoring will provide input to improving asset management strategy, objectives and plan(s).	A broad cross-section of the people involved in the organisation's asset-related activities from data input to decision-makers, i.e. an end-to end assessment. This should include contactors and other relevant third parties as appropriate.	Functional policy and/or strategy documents for performance or condition monitoring and measurement. The organisation's performance monitoring frameworks, balanced scorecards etc. Evidence of the reviews of any appropriate performance indicators and the action lists resulting from these reviews. Reports and trend analysis using performance and condition information. Evidence of the use of performance and condition information shaping improvements and supporting asset management strategy, objectives and plan(s).

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices .

99	Investigation of asset-related failures, incidents and nonconformities	How does the organisation ensure responsibility and the authority for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non conformances is clear, unambiguous, understood and communicated?	**3**	Asset failures are investigated depending on criticality including operational incidents. Roles and responsibilities are defined including the implementation of an organisational wide incident reporting, management and investigation system		Widely used AM standards require that the organisation establishes implements and maintains process(es) for the handling and investigation of failures incidents and non-conformities for assets and sets down a number of expectations. Specifically this question examines the requirement to define clearly responsibilities and authorities for these activities, and communicate these unambiguously to relevant people including external stakeholders if appropriate.	The organisation's safety and environment management team. The team with overall responsibility for the management of the assets. People who have appointed roles within the asset-related investigation procedure, from those who carry out the investigations to senior management who review the recommendations. Operational controllers responsible for managing the asset base under fault conditions and maintaining services to consumers. Contractors and other third parties as appropriate.	Process(es) and procedure(s) for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non conformances. Documentation of assigned responsibilities and authority to employees. Job Descriptions, Audit reports. Common communication systems i.e. all Job Descriptions on Internet etc.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
88	Life Cycle Activities	How does the organisation establish implement and maintain process(es) for the implementation of its asset management plan(s) and control of activities across the creation, acquisition or enhancement of assets. This includes design, modification, procurement, construction and commissioning activities?	The organisation does not have process(es) in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning.	The organisation is aware of the need to have process(es) and procedure(s) in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning but currently do not have these in place (note: procedure(s) may exist but they are inconsistent/incomplete).	The organisation is in the process of putting in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning. Gaps and inconsistencies are being addressed.	Effective process(es) and procedure(s) are in place to manage and control the implementation of asset management plan(s) during activities related to asset creation including design, modification, procurement, construction and commissioning.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
91	Life Cycle Activities	How does the organisation ensure that process(es) and/or procedure(s) for the implementation of asset management plan(s) and control of activities during maintenance (and inspection) of assets are sufficient to ensure activities are carried out under specified conditions, are consistent with asset management strategy and control cost, risk and performance?	The organisation does not have process(es)/procedure(s) in place to control or manage the implementation of asset management plan(s) during this life cycle phase.	The organisation is aware of the need to have process(es) and procedure(s) in place to manage and control the implementation of asset management plan(s) during this life cycle phase but currently do not have these in place and/or there is no mechanism for confirming they are effective and where needed modifying them.	The organisation is in the process of putting in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during this life cycle phase. They include a process for confirming the process(es)/procedure(s) are effective and if necessary carrying out modifications.	The organisation has in place process(es) and procedure(s) to manage and control the implementation of asset management plan(s) during this life cycle phase. They include a process, which is itself regularly reviewed to ensure it is effective, for confirming the process(es)/ procedure(s) are effective and if necessary carrying out modifications.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
95	Performance and condition monitoring	How does the organisation measure the performance and condition of its assets?	The organisation has not considered how to monitor the performance and condition of its assets.	The organisation recognises the need for monitoring asset performance but has not developed a coherent approach. Measures are incomplete, predominantly reactive and lagging. There is no linkage to asset management objectives.	The organisation is developing coherent asset performance monitoring linked to asset management objectives. Reactive and proactive measures are in place. Use is being made of leading indicators and analysis. Gaps and inconsistencies remain.	Consistent asset performance monitoring linked to asset management objectives is in place and universally used including reactive and proactive measures. Data quality management and review process are appropriate. Evidence of leading indicators and analysis.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

99	Investigation of asset-related failures, incidents and nonconformities	How does the organisation ensure responsibility and the authority for the handling, investigation and mitigation of asset-related failures, incidents and emergency situations and non conformances is clear, unambiguous, understood and communicated?	The organisation has not considered the need to define the appropriate responsibilities and the authorities.	The organisation understands the requirements and is in the process of determining how to define them.	The organisation are in the process of defining the responsibilities and authorities with evidence. Alternatively there are some gaps or inconsistencies in the identified responsibilities/authorities.	The organisation have defined the appropriate responsibilities and authorities and evidence is available to show that these are applied across the business and kept up to date.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Score	Evidence—Summary	User Guidance	Why	Who	Record/documented Information
105	Audit	What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))?	2	There is no system in place that actively audits asset management process for efficacy and implementation.		This question seeks to explore what the organisation has done to comply with the standard practice AM audit requirements (eg, the associated requirements of PAS 55 s 4.6.4 and its linkages to s 4.7).	The management team responsible for its asset management procedure(s). The team with overall responsibility for the management of the assets. Audit teams, together with key staff responsible for asset management. For example, Asset Management Director, Engineering Director. People with responsibility for carrying out risk assessments	The organisation's asset-related audit procedure(s). The organisation's methodology(s) by which it determined the scope and frequency of the audits and the criteria by which it identified the appropriate audit personnel. Audit schedules, reports etc. Evidence of the procedure(s) by which the audit results are presented, together with any subsequent communications. The risk assessment schedule or risk registers.
109	Corrective & Preventative action	How does the organisation instigate appropriate corrective and/or preventive actions to eliminate or prevent the causes of identified poor performance and non conformance?	2	Incident investigations and corrective actions are undertaken in accordance with the Incident Reporting and Management operating standard.		Having investigated asset related failures, incidents and non-conformances, and taken action to mitigate their consequences, an organisation is required to implement preventative and corrective actions to address root causes. Incident and failure investigations are only useful if appropriate actions are taken as a result to assess changes to a businesses risk profile and ensure that appropriate arrangements are in place should a recurrence of the incident happen. Widely used AM standards also require that necessary changes arising from preventive or corrective action are made to the asset management system.	The management team responsible for its asset management procedure(s). The team with overall responsibility for the management of the assets. Audit and incident investigation teams. Staff responsible for planning and managing corrective and preventive actions.	Analysis records, meeting notes and minutes, modification records. Asset management plan(s), investigation reports, audit reports, improvement programmes and projects. Recorded changes to asset management procedure(s) and process(es). Condition and performance reviews. Maintenance reviews
113	Continual Improvement	How does the organisation achieve continual improvement in the optimal combination of costs, asset related risks and the performance and condition of assets and asset systems across the whole life cycle?	2	All maintenance activities are documented, risk assessed and costed in terms of time, materials, plant and equipment (Rate cards). Rate cards are benchmarked against perceived industry standards. All works are pre-costed using the rate card and maintenance activities are assessed against planned and actual costs		Widely used AM standards have requirements to establish, implement and maintain process(es)/procedure(s) for identifying, assessing, prioritising and implementing actions to achieve continual improvement. Specifically there is a requirement to demonstrate continual improvement in optimisation of cost risk and performance/condition of assets across the life cycle. This question explores an organisation's capabilities in this area—looking for systematic improvement mechanisms rather that reviews and audit (which are separately examined).	The top management of the organisation. The manager/team responsible for managing the organisation's asset management system, including its continual improvement. Managers responsible for policy development and implementation.	Records showing systematic exploration of improvement. Evidence of new techniques being explored and implemented. Changes in procedure(s) and process(es) reflecting improved use of optimisation tools/techniques and available information. Evidence of working parties and research.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY

This schedule requires information on the EDB'S self-assessment of the maturity of its asset management practices .

115	Continual Improvement	How does the organisation seek and acquire knowledge about new asset management related technology and practices, and evaluate their potential benefit to the organisation?	**2**	By way of industry forums, conferences and technology presentations and collaboration with other EDBs.		One important aspect of continual improvement is where an organisation looks beyond its existing boundaries and knowledge base to look at what 'new things are on the market'. These new things can include equipment, process(es), tools, etc. An organisation which does this (eg, by the PAS 55 s 4.6 standards) will be able to demonstrate that it continually seeks to expand its knowledge of all things affecting its asset management approach and capabilities. The organisation will be able to demonstrate that it identifies any such opportunities to improve, evaluates them for suitability to its own organisation and implements them as appropriate. This question explores an organisation's approach to this activity.	The top management of the organisation. The manager/team responsible for managing the organisation's asset management system, including its continual improvement. People who monitor the various items that require monitoring for 'change'. People that implement changes to the organisation's policy, strategy, etc. People within an organisation with responsibility for investigating, evaluating, recommending and implementing new tools and techniques, etc.	Research and development projects and records, benchmarking and participation knowledge exchange professional forums. Evidence of correspondence relating to knowledge acquisition. Examples of change implementation and evaluation of new tools, and techniques linked to asset management strategy and objectives.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

Question No.	Function	Question	Maturity Level 0	Maturity Level 1	Maturity Level 2	Maturity Level 3	Maturity Level 4
105	Audit	What has the organisation done to establish procedure(s) for the audit of its asset management system (process(es))?	The organisation has not recognised the need to establish procedure(s) for the audit of its asset management system.	The organisation understands the need for audit procedure(s) and is determining the appropriate scope, frequency and methodology(s).	The organisation is establishing its audit procedure(s) but they do not yet cover all the appropriate asset-related activities.	The organisation can demonstrate that its audit procedure(s) cover all the appropriate asset-related activities and the associated reporting of audit results. Audits are to an appropriate level of detail and consistently managed.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
109	Corrective & Preventative action	How does the organisation instigate appropriate corrective and/or preventive actions to eliminate or prevent the causes of identified poor performance and non conformance?	The organisation does not recognise the need to have systematic approaches to instigating corrective or preventive actions.	The organisation recognises the need to have systematic approaches to instigating corrective or preventive actions. There is ad-hoc implementation for corrective actions to address failures of assets but not the asset management system.	The need is recognized for systematic instigation of preventive and corrective actions to address root causes of non compliance or incidents identified by investigations, compliance evaluation or audit. It is only partially or inconsistently in place.	Mechanisms are consistently in place and effective for the systematic instigation of preventive and corrective actions to address root causes of non compliance or incidents identified by investigations, compliance evaluation or audit.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.
113	Continual Improvement	How does the organisation achieve continual improvement in the optimal combination of costs, asset related risks and the performance and condition of assets and asset systems across the whole life cycle?	The organisation does not consider continual improvement of these factors to be a requirement, or has not considered the issue.	A Continual Improvement ethos is recognised as beneficial, however it has just been started, and or covers partially the asset drivers.	Continuous improvement process(es) are set out and include consideration of cost risk, performance and condition for assets managed across the whole life cycle but it is not yet being systematically applied.	There is evidence to show that continuous improvement process(es) which include consideration of cost risk, performance and condition for assets managed across the whole life cycle are being systematically applied.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.

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SCHEDULE 13: REPORT ON ASSET MANAGEMENT MATURITY (cont)

115	Continual Improvement	How does the organisation seek and acquire knowledge about new asset management related technology and practices, and evaluate their potential benefit to the organisation?	The organisation makes no attempt to seek knowledge about new asset management related technology or practices.	The organisation is inward looking, however it recognises that asset management is not sector specific and other sectors have developed good practice and new ideas that could apply. Ad-hoc approach.	The organisation has initiated asset management communication within sector to share and, or identify 'new' to sector asset management practices and seeks to evaluate them.	The organisation actively engages internally and externally with other asset management practitioners, professional bodies and relevant conferences. Actively investigates and evaluates new practices and evolves its asset management activities using appropriate developments.	The organisation's process(es) surpass the standard required to comply with requirements set out in a recognised standard. The assessor is advised to note in the Evidence section why this is the case and the evidence seen.