

Power Services Strategic Asset Management Plan

Plan

CONTROLLED DOCUMENT

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THIS PLAN IS UNCONTROLLED WHEN PRINTED

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1 Executive summary

This Strategic Asset Management Plan (SAMP) provides the approach for implementing the asset management policy and outlines the asset management system to achieve organisational objectives. The asset management system supports the Power and Water Corporation (Power and Water) vision of being a proud, trusted, modern multi-utility delivering value now and into the future. It has been developed to be consistent with:

- Our legislative and regulatory obligations
- The international ISO 55001 standard for an asset management systems
- The existing management systems and frameworks of Power and Water, including our safety management system, environmental management system and emergency management framework

We aim to understand the requirements of our customers and stakeholders, and to operate our power networks to deliver the required functionality and efficiently meet customer service standards and compliance requirements in a sustainable manner.

Our asset management system consists of a set of interrelated documents, systems and processes that provide the essential information enabling our business practices. Our asset management system and asset management capability combine to enable effective asset management practices that contribute to achieving Power and Water's organisational objectives.

2 Purpose

The purpose of this SAMP is to describe how Power Services plans to manage its asset portfolio to achieve Power and Water's organisational objectives.

3 Scope

The asset management system is focused primarily on the management of the physical network assets. Other asset types (e.g. financial assets, information assets and human assets) are only considered as far as they affect the optimal management of the physical network assets. The physical assets (including supporting systems and processes) covered by this SAMP include:

- **Regulated networks:** transmission and distribution assets in the Darwin-Katherine, Tennant Creek and Alice Spring networks
- **Minor centres:** non-regulated generation plant and/or networks in eight minor centres in addition to the plant in the remote communities
- **Indigenous Essential Services (IES):** non-regulated generation and/or distribution assets used to provide electricity services for 72 indigenous communities and 65 outstations through Power and Water's not-for-profit subsidiary, Indigenous Essential Services Pty Ltd

The assets not managed by Power Services, and are outside of the scope of this SAMP, include corporate facilities, depots, ICT infrastructure for business systems, vehicles and specialised plant.

This SAMP aligns with the requirements of the ISO 55000 series of asset management standards. Key documents that provide more detailed information on our investment plans and strategies are:

- Statement of Corporate Intent
- Annual Purchasing Plan (IES only)
- Transmission and Distribution Annual Planning Report

4 Context of the Organisation

4.1 Power and Water overview

Power and Water is a government-owned corporation (GOC) under the Government Owned Corporations Act 2001. In accordance with the Act, Power and Water's objectives are to:

- Operate at least as efficiently as any comparable business
- Maximise the Northern Territory's sustainable return on its investment in Power and Water

It has responsibility for electricity transmission and distribution network services and water and sewerage services across the Northern Territory; an area of more than 1.3 million square kilometres. Power and Water also provides electricity, water and sewerage services for 72 remote communities through its not-for-profit subsidiary, Indigenous Essential Services Pty Ltd.

4.2 Power Services scope of services

The Power Services line of business is responsible for planning, designing, constructing, operating and maintaining electricity networks to transport electricity between generators and consumers in the Northern Territory. Power Services infrastructure connects domestic and commercial customers throughout the Territory, providing services to network users, including electricity retailers, generators and end use customers.

Power Services also provides power generation services for minor centres and remote communities across the Territory.

4.3 Strategic business context

This section sets out the strategic context that Power Services operates within, including macro trends impacting Power Services, our stakeholders, the legislative requirements and corporate strategy. This sets the context for the asset management system that is explained in Section 6.

4.3.1 Operating environment

Over the coming years key global and local change factors will impact our operations and traditional power system operation. Key change factors include:

A Shift to renewables

There has been a significant shift to renewable generation in our energy system and the trend is expected to accelerate markedly under the Northern Territory Government's policy to achieve 50 per cent renewable energy by 2030.

We expect that the focus on renewable energy will continue beyond 2030, with our energy system supplied by 100 per cent renewables by 2040. The volume of residential solar PV is also forecast to continue to grow, which will require Power Services to develop new methods for managing any network impacts, as described in our Future Networks Strategy. With the development of the Renewable Hub, we also expect significant commercial scale renewable energy to connect to our network.

We will provide a vital service for delivering renewable energy to customers.

B Integration of IES functions

The delivery of generation and network services to remote indigenous communities and outstations was historically managed by teams in a separate business unit within Power and Water. In 2019, these teams were integrated into the business.

The asset management and maintenance delivery functions for electricity networks and generation were integrated into Power Services.

C Public safety

Maintaining the safety of our customers and the general public is core to our business. As emerging risks are identified we develop appropriate strategies to manage or mitigate these risks in balance with the cost of delivering services at an affordable level.

In November 2020, at a remote community, a member of the public was tragically electrocuted. A Power and Water asset was the root cause. The coronial inquest identified gaps in the management of maintenance activities and connection compliance, including the requirement for more robust auditing to ensure the effectiveness of our maintenance strategies and ensuring compliance to these strategies. There have been several other safety incidents related to assets that are accessible to the public in recent years, highlighting that improvement is required to our practices across risk management, connection processes, maintenance and design.

Our strategic and asset objectives will drive a clear focus on public safety in the development of our plans.

D Electrification of transport and business

The growing uptake of electric vehicles in the NT is likely to also have a significant impact on consumption and demand. Our customers' charging patterns will have a considerable impact on the level of new investment we need to make.

E Financial uncertainty

Higher inflation and interest rates will impact our borrowing costs, which influences the revenue we recover from customers for our services.

F Ageing asset base

Over the next two decades, a large cohort of assets built after Cyclone Tracy in 1974 and periods of network growth in the early 1980's will reach or exceed their expected asset life. We will need to prudently manage these assets and ensure that we do not face a spike in our replacement levels.

G Refreshing ageing ICT system

Some of our existing fleet of ICT systems have not been refreshed for a generation, with the exception of our metering and billing systems. Significant renewal of ICT systems is required to ensure we can continue to provide effective asset management and adapt and respond to changes to provide the services expected by our customers.

H Growing the NT

The Northern Territory Government has set an ambitious target of creating a \$40 billion economy by 2030. Several major infrastructure projects have already been announced and we anticipate increased connections from large users over the coming years as well as a growing population. This is also occurring at a time of significant investment in the renewables transition across Australia, creating high demand on resources required to meet investment targets.

4.3.2 Stakeholders

Stakeholders are individuals, groups or organisations who are influenced by or have influence over Power and Water. Power Services engagement with stakeholders and the wider Northern Territory community continues to be a priority to build productive working relationships. We aim to understand their needs and points of view, identify opportunities for continual improvement, and address the issues identified as being most important.

Power and Water established the Power and Water Reset Advisory Committee (RAC) which is made up of a broad range of participants, consisting of major energy users, retailers, generators and residential customers. Engagements were undertaken through a series of forums and workshops to understand

how our business impacts the lives of our customers and the services they expect Power Services to provide. Engagement with our stakeholders will continue, led by Power and Water's corporate team.

Appendix 1 summarises the expectations of the various stakeholders that we have determined from our engagement activities.

4.3.3 Regulatory framework

There are several key legislative drivers and electricity codes and regulations that guide the operation of Power Services. The most critical legislative drivers related to technology standards, workplace health and safety (WHS) and economic regulation include:

- *Power and Water Corporation Act*
- *Government Owned Corporations Act*
- *Competition and Consumer Act*
- *Electricity Reform Act*
- *Utilities Commission Act*
- *Work Health and Safety Act*
- Network Technical Code and Network Planning Criteria
- System Control Technical Code
- Network Technical Code
- Electricity Industry Performance Code
- Electricity (Network Safety) Regulations
- National Electricity Rules (Northern Territory) (NT NER)

4.3.4 Corporate strategy

Power and Water's strategic direction is documented in its Statement of Corporate Intent (SCI). Power and Water Corporation was established under the Power and Water Corporation Act 2002 and is a Northern Territory government owned corporation under the Government Owned Corporations Act 2001.

The Board of Directors is responsible to the shareholding minister for the corporation's operational and financial performance and is required to provide an agreed SCI each fiscal year.

The SCI sets out our vision, strategies, strategic objectives, goals, KPI's, targets, and key risks over a five-year period, and extending to a six-year horizon from the 2023-24 financial year. The content of the SCI is derived from the Board's Strategic Directions 2021-2025 with further refinement and detail at a business unit level. Within the SCI, the goals and strategies are described in terms of five Strategic Pillars, as shown in Figure 1.

Priorities are determined through the identification of key risks and the application of the Corporate Risk Framework.

The Power and Water Our Plan document outlines the vision for the multi-utility. It provides the strategic direction, guiding principles of change, long-term goals, and performance expectations. The organisational Key Result Areas are identified along with the strategies by which they will be improved. As a summary of the SCI, the Power and Water Our Plan document provides an opportunity for employees to understand where and how their contributions help achieve corporate goals.

The Asset Management Policy Statement reflects Power and Water's intentions and direction expressed by the executive management team and applied at every stage of the asset management process, from the development of plans to their execution. It applies to all levels of the organisation including the Asset Owner, and all staff.



Figure 1 - Power and Water's Strategic Pillars

4.4 Infrastructure overview

Power and Water owns and operates electricity networks and generating plant across the Northern Territory as shown in Figure 2. The infrastructure is categorised into three distinct groups based on the regulations applicable, ownership and funding arrangements. These arrangements are outlined in more detail below.

Power Services operates under network and generation licences issued by the Utilities Commission that authorises us to own and operate these systems. The Network Licence defines our network assets into two distinct groups being Regulated and Non-Regulated, in alignment with the National Electricity (Northern Territory) Act 2015.



Figure 2 - Urban and Remote Centres Serviced by Power Services

4.4.1 Regulated networks

Power Services infrastructure provides transmission and distribution services in networks are subject to regulation by both the Utilities Commission and the Australian Energy Regulator (AER). For clarity, only those networks regulated by the Australian Energy Regulator (AER) are referred to as the 'Regulated' network.

There are three regulated networks which are Darwin-Katherine, Alice Springs and Tennant Creek in order of network size. An overview of the assets that make up the regulated networks is shown in Figure 3.

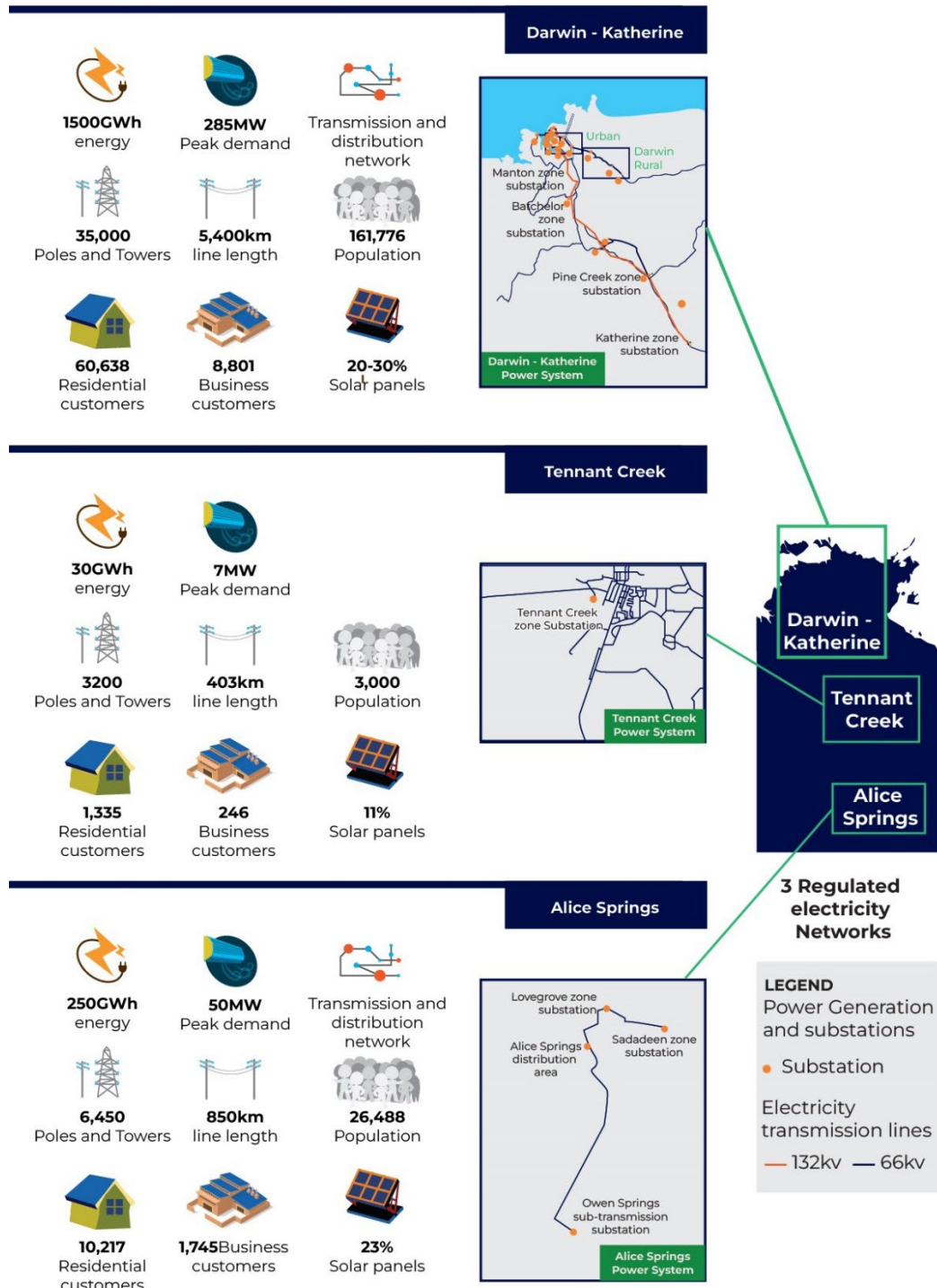


Figure 3 – Power and Water's three regulated transmission and distribution assets

The System Control function is separate from the Power Services business unit and is managed under the Core Operations business unit of the corporation. Power Services has an agreement with System Control to provide network operation functions for transmission and distribution networks, including outage management and fault dispatch, network switching coordination and recording defects on network infrastructure where it impacts operability of the network.

The communications network and SCADA infrastructure that support monitoring and control of the power systems is also managed by the Core Operations business unit, however, Power Services remains the accountable business unit for asset management functions for these asset classes.

4.4.2 Non-regulated infrastructure

Infrastructure that is not subject to regulations under the National Electricity Rules (Northern Territory) or the Electricity Industry Performance Code is referred to as non-regulated. These networks are typically located in remote townships and communities and are termed Minor Centres or Indigenous Essential Services according to ownership arrangements.

Power Services has a generation licence which allows us to own and operate the electricity generation at these locations. Most of the minor centres and IES communities rely on diesel generation, however some locations have solar PV with batteries and diesel generation back-up.

An overview of assets on the non-regulated networks is provided in Table 1.

Asset description	Value
Overhead Distribution (Poles)	16,499
Overhead Distribution (km)	1,100
Underground cables Distribution (km)	29
Distribution substations	903
Number of Diesel Generators	170
Diesel Generators Capacity (MW)	79.8
Number of Gas Generators	6
Gas Generators (MW)	7.85
Number of BESS	2
BESS (MW)	0.9
Number of Solar Stations	27
Solar Stations (MW)	10.6
Diesel Storage (ML)	11.4
2021-22 Diesel Consumption (ML)	27.5
2021-22 Diesel Generation Energy Output (GWh)	95.8

Table 1 – Summary of non-regulated network assets and generation

A Minor Centres

Power Services performs the management and operation of the networks, and in most cases the generation plant, within the following townships (and surrounding areas):

- Jabiru (Network only)
- Borroloola (Network and Generation)
- Timber Creek (Network and Generation)
- Daly Waters (Network and Generation)
- Newcastle Waters (Network only)
- Elliott (Network and Generation)
- Yulara (Network only)
- Ti Tree (Network only)
- Kings Canyon (Network only)

B Indigenous Essential Services

Power and Water manages the provision of electricity, water and sewerage services to remote Aboriginal communities and outstations on behalf of the Department of Territory Families, Housing and Communities (DTFHC). These arrangements are through a not-for-profit subsidiary of Power and Water, Indigenous Essential Services Pty Ltd (IES), under agreement with the Northern Territory Government (NTG).

Power infrastructure includes non-regulated network assets and generating plant across 72 communities and 65 outstations. Of these communities, 20 are connected to either Regulated or Non-Regulated networks, and the remainder are supplied through local generating plant ranging in size from 55kW to 2MW, and solar arrays of 50kW to 1200kW.

5 Asset management policy and objectives

5.1 Asset management policy

PWC's Asset Management Policy Statement was approved on the 23 August 2021. To affect its commitment to achieving effective systematic asset management, the Policy Statement states that Power and Water will establish an effective asset management system and manage its assets in accordance with the following principles:

- Strategic alignment and integration of the ISO5500x suite of asset management standards with our other management systems, values and objectives.
- Demonstrate auditable compliance with legislative, regulatory and commercial obligations, or industry best practice.
- Decision making based on robust data analysis and taking a 'whole of life cost' approach to balance risk, cost and performance.
- Effective integration of management standards.
- Sustainability through developing asset management capability, and supporting emerging technologies and the transition to renewable energy.
- Engage with customers and stakeholders to determine service level expectations.
- Deliver appropriate asset performance and services in line with comparable businesses.
- Continuous improvement.

In 2021, an audit of Power and Water's asset management systems was completed, and a variety of actions identified to ensure consistency of Asset Management practices across the different lines of business, and address gaps in our alignment to the ISO55000 suite of asset management standards.

These actions are managed at an enterprise level through our compliance management process. It also drives some specific actions in our Asset Management Improvement Plan in Section 6.9.

5.2 Asset management objectives

The Power Services asset management objectives and their alignment to the Strategic Pillars and Big Rocks (organisational objectives) are listed in Table 2. Asset management objectives support the ongoing alignment between asset management decisions and the strategic objectives and strategies of the organisation. This ensures initiatives, investments and improvement plans support achieving business objectives and are appropriately prioritised based on the context of our current operating environment and stakeholder requirements.

Strategic Pillars	Big Rocks	Power Services Asset Management Objectives
One Power and Water	<ul style="list-style-type: none"> Embed our Future Operating model Agile and Capable Workforce Multi-utility efficiencies and constructive culture 	<p>Ensure appropriately skilled and qualified staff are employed to meet the current and future needs of the network.</p> <p>Embed a fit for purpose Asset Management System across the business that is consistent across Regulated, Non-Regulated and IES.</p>
Always Safe	<ul style="list-style-type: none"> Embed a Proactive Safety Culture Improve Public Health and safety Zero Harm 	<p>Maintain the safety of customers, community and staff demonstrated by reducing worker and public safety incidents and implementing public incident reporting metrics into asset plans.</p>
Customer and Community at Centre	<ul style="list-style-type: none"> Enhance Customer Experience and Engagement Trusted Partner Customer and community trust 	<p>Reduce by 50% the number of feeders and communities exceeding performance targets by more than 100% by 2025.</p> <p>Enable greater visibility of planned and unplanned interruptions to customers and improve accuracy and transparency of causes of reliability performance for urban, rural and remote communities.</p>
Living Within Our Means	<ul style="list-style-type: none"> Cost Prudence Optimise Revenue Commercial sustainability 	<p>Implement risk quantification for all regulated network (system) capital investment decisions in 2023 and extend to remote generation and networks by 2025.</p> <p>Implement asset criticality process to support granular prioritisation of corrective works based on public safety, reliability, security and other factors, and implement in the AMS and supporting systems by 2025</p>
Sustainable Solutions for the Future	<ul style="list-style-type: none"> Renewables Enablement Sustainable Energy and Water Services Future ready 	<p>Prepare our network and systems to be ready for the future, including building in flexibility for future uncertainty, maximising hosting capacity for customer DERs and enabling the energy transition to reviewable energy according to the governments targets.</p>

Table 2 - Alignment of the asset management objectives with the organisational objectives

These objectives are delivered through the strategies provided in Appendix 2.

6 Asset management system

6.1 Asset management system overview

An overview of the Power Services Asset Management system is provided in Figure 4 showing the relationship between key elements of the system as defined in the Asset Management Standard.

An Asset Management System (AMS) Manual is proposed to be developed in conjunction with the Core Operations Business Unit to further detail the AMS and its implementation.

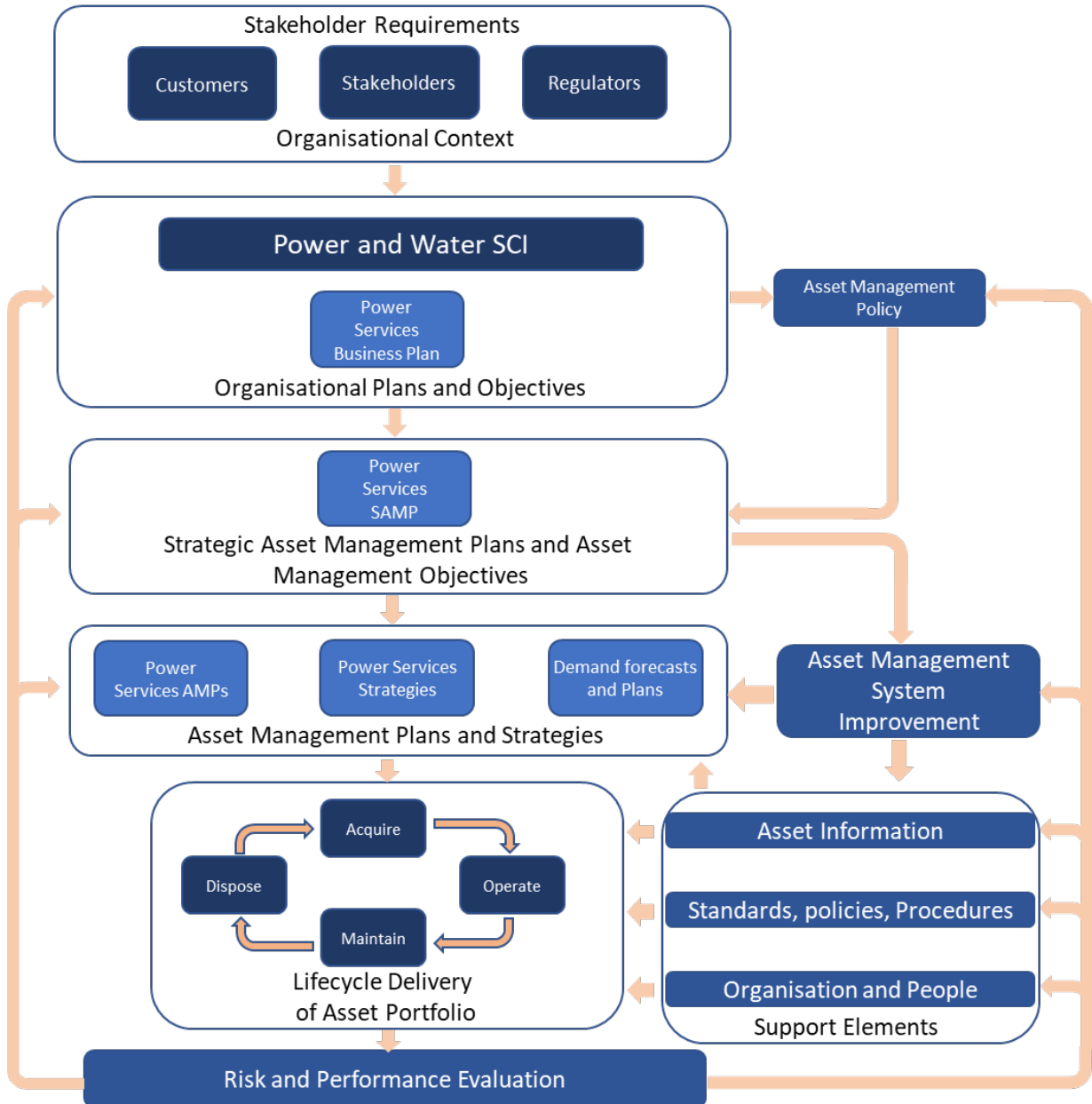


Figure 4 Power and Water Asset Management System

6.2 Asset management planning process

The purpose of the asset management planning process is to achieve the asset management objectives and obtain whole-of-life value from our assets through optimised decision-making. The outcomes of our planning process are documented in the following artefacts:

- **Statement of Corporate Intent (SCI):** is a whole of Power and Water statement to our shareholders and key stakeholders that provides an update of the corporation's strategic

direction and objectives, in the context of operating environment changes, risks and opportunities. It also drives the annual update of all expenditure forecasts.

- **Annual Purchasing Plan (APP):** the annual statement and agreement between TFHC and IES that set out the objectives and expenditure forecast for all IES networks.
- **Power Services Business Plan July 2022 – June 2026:** documents the strategic initiatives that Power Services will implement to deliver against Power and Water’s Strategic Pillars and manage its risks.
- **Demand Forecasts:** establish whether any element of our network will face a capacity limitation under normal operating conditions or under credible contingencies and scenarios. The demand forecast is undertaken at a system level for each network as well as a spatial basis for each zone substation. The IES Community Traffic Light Report (TLR)¹ provides a high-level overview of the current capacity constraints, infrastructure condition, issues and risks that need to be addressed as part of development planning. Forecasting minimum demand is becoming as critical as forecasting maximum demand and is critical for optimising investment in renewable generation sources. Full details of the forecasting approach are available in the demand forecasting reports².
- **Asset Strategies:** support achievement of Asset Objectives and manage significant changes to operating context. Our asset strategies are outlined in Appendix 2.
- **Transmission and Distribution Annual Planning Report (TDAPR):** describes identified network issues and investment plans for the next ten years in relation to network development, reliability, capacity, and security and quality of supply. It also provides insight into the important challenges Power Services faces and how Power Services will respond. The scope of the TDAPR is limited to the three regulated power systems of Darwin-Katherine, Alice Springs and Tennant Creek.
- **Asset Management Plans (AMPs):** are the consolidation of plans developed for key asset classes that outline the Asset Life-Cycle Management strategy and investment plans for each asset class based on current business drivers, asset performance, new requirements, demand forecasts, emerging issues and risks.
- **Business and Asset Performance Reporting:** as business as usual practice, we report our performance against KPIs to inform progress against specific strategic objectives, operating performance, asset performance and risk. The KPIs also provide our shareholders, customers and regulators assurance that our plans are successful in achieving expected outcomes. Reporting is undertaken for business performance (i.e. financial) as well as network performance (i.e. safety and reliability). Improving asset performance reporting is a key focus to support and measure our performance against asset objectives.

6.3 Risk identification and management

Power and Water is committed to implementing an integrated risk management approach across the whole organisation that supports the realisation of our strategic objectives, while effectively managing our strategic and operational risks. This commitment is underpinned by our Risk Appetite Statement, Values, Statement of Corporate Intent, Management Governance and Assurance Framework, and Code of Conduct.

¹ 2022 Traffic Light Report

² PWC Spatial Demand Forecasting Report, D2022/512262 and the PWC System Minimum and Maximum Forecast Report D2022/512412

6.3.1 Enterprise risk management standard

Power and Water has an Enterprise Risk Management Standard (ERMS) that describes how risk management will be undertaken across the business. The ERMS is consistent with AS/NZS ISO 31000:2018 — Risk management principles and guidelines and applies a matrix style analysis to assess risk. It also sets out Power and Water's risk appetite across the key reporting areas of the SCI.

The ERMS sets out the principles for risk identification and management, as well as the reporting and escalation requirements, responsibilities and accountabilities. There are seven procedures defined by the ERMS that form the core elements of the Enterprise Risk Management Framework:

- Procedure 1: Establish the Risk Context Procedure
- Procedure 2: Identify the Risk Procedure
- Procedure 3: Analyse the Risk Procedure
- Procedure 4: Evaluate the Risk Procedure
- Procedure 5A: Treat the Risk Procedure
- Procedure 5B: Prioritise the Risk Procedure
- Procedure 6: Monitor, Review and Report Risk Procedure

Applying these procedures enables consistent analysis of risk across Power and Water for reporting purposes. The ERMS requires Power and Water to maintain a risk register of all risks on the network and to report against these risks according to a defined schedule.

6.3.2 Asset risk management

Under the current regulatory framework, the AER expects detailed analysis to assess and quantify risks so that the risk-cost can be applied in an economic cost benefit analysis. The AER has published guidelines that set out methods and analysis techniques to complete the required analysis.

Power Services has therefore extended the depth of analysis by developing the Risk Quantification Procedure for Investment Decision Making (CONTROL0932). This procedure is aligned to, and is intended to complement, existing corporate frameworks including the ERMS and the Project Investment Delivery Framework (PIDF), which includes the approach to cost benefit analysis.

In particular, the Risk Quantification Procedure assesses risk against consequence categories that are consistent with those defined in the ERMS. However, rather than developing a matrix style output, the Risk Quantification Procedure calculates the expected cost of the risk as a dollar value. This is achieved through allocating a monetary value to each of the severity levels within consequence category and weighting the value by the probability of each outcome occurring. The values applied have been developed based on experience from Power and Water's network, publications from regulatory or other government bodies, and peer electricity businesses.

The procedure sets out the consequence categories that must be considered and defines methods to calculate parameters, such as the probability of an asset failure, that drive risk on the network.

The procedure is used to quantify both the risk of the base case, often a 'do nothing' option, as well as the risk for each of the proposed mitigation options. The risk and the costs for each option are inputs to a cost benefit analysis that will identify the most economic option.

6.4 Investment decision-making

Power Services' general criterion for decision-making is based on the optimisation of cost, risk and performance. The level of analysis undertaken is appropriate for the importance and complexity of the issue being assessed. Our approach to decision making is consistent with the Project Investment Delivery Framework (PIDF).

The Risk Quantification Procedure is applied to calculate a forecast for the risk-cost of an identified network issue. Other potential benefits of an option are also identified and quantified. Together, these inputs are used in economic analysis to identify the least cost or highest value option.

As far as practicable, Power Services quantifies all risk and other project benefits as dollar values and uses these in economic analysis. Typically, the investment options are assessed compared to the base case (either a 'do nothing' / business as usual or counterfactual assessment). The reduction in risk-cost compared to the base case and any additional benefits are benefits attributed to the investment option are used to calculate the Net Present Value and Benefit Cost Ratio. The highest NPV or BCR indicate the economically preferred option. This is then assessed against the asset objectives and alignment to our strategic plans.

Where a risk-cost cannot be calculated, for example for communications assets, risk is assessed on a qualitative basis according to the ERMS and the economic analysis is undertaken on a Net Present Cost basis. That is, the option that mitigates the risk with the least cost in present terms across its life cycle.

We strive to continually improve our approach to risk identification and management and how it informs our investment decision making. Table 3 outlines the current inputs used to inform the decision-making process and future development outcomes.

Current	Future Development
Cost	
<ul style="list-style-type: none"> • Cost of the project • Cost model breakdown considerations • Cost benefit or options (where appropriate) 	<ul style="list-style-type: none"> • Best whole life cost options • Long-term value to the organisation and customers
Risk	
<ul style="list-style-type: none"> • Condition assessment of the asset • Asset criticality • Value and/or consequence of the risk 	<ul style="list-style-type: none"> • Business and asset risks quantified using consistent value framework. • Prioritisation across the organisation to optimise resources allocated and activities
Performance	
<ul style="list-style-type: none"> • Data supported decisions where possible. • Qualitative assessments applying risk management procedures. 	<ul style="list-style-type: none"> • Comprehensive data on asset and business performance to support decisions.

Table 3 - Decision making inputs

6.5 Leadership, culture and commitment

In 2021, a Strategic Asset Management role was established within the Core Operations line of business within Power and Water. A Management Standard has been developed (approved in August 2022) to enable the wider business to develop a more consistent approach to asset management, including definition of a consistent Asset Management System model which aligns the elements of ISO 55001 to the 39 Asset Management Landscape subjects as published by the Global Forum on Maintenance and Asset Management (GFMAM).

An Asset Management Steering Committee (AMSC) was also established and consists of Senior Leadership membership from Power Services, Water Services, Gas Services and Core Operations to prioritise and drive development of key initiatives.

The next steps are to increase awareness and capability across the business and develop a strong asset management culture.

6.6 Organisation and people

Developing asset management capability is critical to achieving our objectives. Key focus areas relevant to asset management are:

- Leadership (within organisation)
- Culture (of organisation)
- Capability (of staff)
- Enablers (to help staff do their job well)

Developing and maintaining a strong asset management culture is currently a key priority. While many business initiatives will support this, the specific focus areas for Power Services and the AMSC are the development of:

- An Asset Management Competency Framework that will support the ongoing building of capability for all employees as well as key asset management and leadership roles
- A communication strategy to build wider awareness and understanding of asset management within Power and Water
- An ongoing audit system for tracking progress on improvements and gaps, aligning with the GFMAM framework

To support this, Power Services has a strong focus on communicating our strategies and plans to all levels of the business unit. This is achieved through:

- Regular team meetings to share information and to support awareness of business strategies, objectives, plans, risks and achievements across both Power and Water and Power Services.
- Bi-annual presentations to all Power Services personnel by senior management, providing a detailed review of recent achievements against both strategic and operational plans, and provide a detailed outlook of key initiatives, investments and challenges.

These mechanisms will support the ongoing development of our people and organisational asset management and provide measurable progress in the maturity journey.

6.6.1 Roles and responsibilities

Power and Water operates using an Asset Owner/Asset Manager/Service Provider business model. Table 4 presents an overview of the roles and responsibilities. Although there is extensive collaboration and interfacing between the roles, generally:

- The Asset Owner establishes the overall objectives for the assets.
- The Asset Manager develops the strategies and plans to achieve the objectives.
- The Service Provider performs activities on the ground to deliver the plans.

Power and Water has recently established a new role of Asset Management System Owner to support ongoing development of consistent and robust asset management processes across all lines of business.

Role	Description	Responsibilities
Asset Owner	Executive General Manager Power Services (EGMPS) The primary responsibility for driving asset management and coordinating its links with service delivery objectives and cost lies with each Executive General Manager, or as delegated from the Chief Executive.	<ul style="list-style-type: none"> Approval of the SAMP and Asset Objectives Endorsing all expenditure (capex and opex) in relation to assets Delivery of strategic initiatives and projects
Asset Management System Owner	Senior Manager Strategic Asset Management Responsible for strategic asset management approach of the organisation that is consistent across lines of business and provide assurance that the Asset Management System is continuously improved to support the business strategic objectives.	<ul style="list-style-type: none"> Establish and maintain a governance strategy to direct and control the asset management system activities and continuous improvement. Coordinate the development of strategic asset management objectives that are aligned with Power and Water's strategic business objectives. Provide strategic direction on the development of strategic asset management plans and asset management plans including budgeting, asset portfolio management and implementation. Lead and collaborate on the design and implementation of supporting procedures and processes within asset management. Provide strategic direction in the application of a standardised risk management methodology in asset management practices.
Asset Manager	Senior Manager Asset Management – Power Services Responsible for the management of assets at a strategic and tactical level, to develop and implement the directions of the Power Services SAMP and coordinate activities among the asset management practitioners Power Services.	<ul style="list-style-type: none"> Development of the Power Services SAMP and approval of the AMPs Manage, implement, and control the asset management programs, plans and budgets, including asset management improvements. Play an active role as a member of the Asset Management Steering Committee in asset management system improvements. Monitor and report on asset capital, operating and maintenance expenditure against annual allocations, to review the effectiveness of programs and identify any cost benefit improvements. Review and disseminate information on asset management

Role	Description	Responsibilities
Internal Service Delivery and External Service Providers	<p>Power Services Operations and Maintenance Field Staff</p> <p>Field staff are distributed at depots throughout Power and Water's network footprint and perform manual work (e.g. operations, maintenance, construction, monitoring and inspections) in relation to the assets as detailed within the asset plans.</p> <p>Contractors</p> <p>Engaged to undertake construction (build new, and replace/renew), support operations and conduct maintenance specialised activities.</p>	<ul style="list-style-type: none"> ▪ Deliver against annual plans according to the COWP to operate, maintain and build network and generation assets. ▪ Develop and maintain capacity and capability for delivery against the COWP, including internal and external workforce strategy, other than for major projects. ▪ Supervision of personnel and contractors to ensure work is performed safely and efficiently within available budgets. ▪ Development and compliance with work management processes and associated information management requirements. ▪ Fuel supply and logistics management for power stations.

Table 4 - Asset management roles and responsibilities

6.7 Resource management

6.7.1 Internal workforce

Recent reviews of Power Services' capital delivery performance have identified a number of areas for improvement. To address these, a Network Capital Delivery Plan has been developed to support our 2024-29 Regulatory Proposal, outlining key areas of focus and actions. These are summarized as follows:

A Governance

Governance committees in line with Power and Waters PIDF have been re-established with new focused terms of reference to improve monitoring and management of program and project issues and impacts to the total capital and operational works portfolio.

B Data & reporting

Improved reporting of project performance has been initiated. This includes improved accuracy of the data as well as making the data available more quickly. Improved reporting will enable more effective decision making by our executive management and identification of issues before they cause significant impacts to our project delivery plans.

Management scorecards providing a summary view of the performance of our capital delivery program have been developed and a broader suite of management of performance reports are in development.

C Delivery strategy

Power and Water is developing an integrated long-term delivery strategy and plan, covering the needs for internal and external labour (i.e. recruitment plan) as well as material and services (i.e. procurement plan).

This will leverage the resource requirement forecast determined by the Capital and Operational Works Plan (COWP) and enable Power and Water to identify gaps between current resourcing capability and capacity and future needs. This will enable advance planning to ensure the required skills are available and is a key step to enable sustained delivery performance.

Targeted improvements to works management have been implemented to provide a greater focus on project development, design and project management disciplines. In particular, new resources have been engaged to address immediate challenges with resourcing the engineering and project management functions.

D Work and resource plan

The forward works and resource plan is currently being extended to 10 years, via a Power and Water wide Integrated Work Management initiative. This will provide Power and Water the ability to develop and implement suitable long-term deliverability strategies, particularly for resourcing risks related to specialist skills and capabilities.

The output of this forecast is the COWP. It will be updated as part of the annual maintenance and capital planning process. An example of the output of this process is shown in Figure 5, demonstrating the focus on resources needed to deliver the 10-year capital and operational forecast.

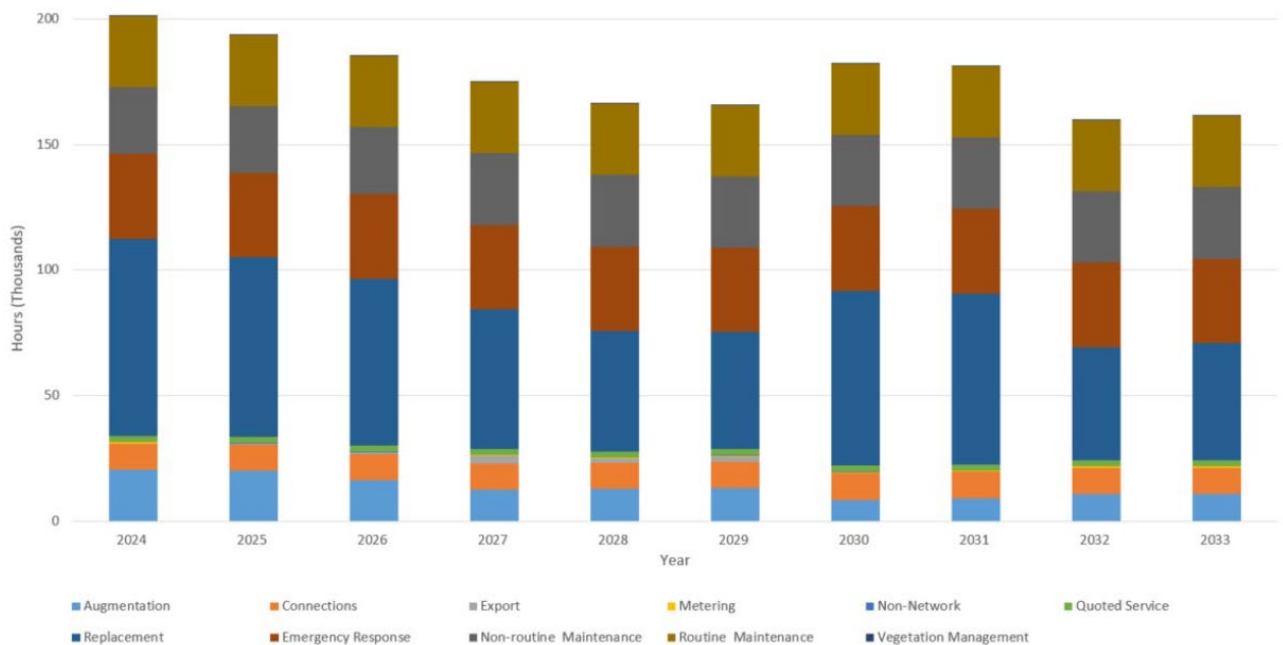


Figure 5 Conceptual 10 year work and resource forecast

6.7.2 External service providers

Resource management is critical to the delivery of maintenance and capital works. It is important for Power and Water to have flexibility in its workforce to ensure the right skills and capacities are available based on the portfolio of projects and programs in both the short term and long term.

The Delivery Strategy will guide Power and Water on when full time staff should be recruited and when it is more efficient to engage external service providers to undertake specific ongoing tasks, such as civil construction works and vegetation management services, to manage short term peaks in workload or for specialist skills.

Power and Water's procurement framework is closely aligned with the Northern Territory governments procurement frameworks and Buy Local strategy to support development of local capacity and capability. Key focus areas for external resource management are:

- Development of our 10 year capital and maintenance plan to support longer term contract engagements and provide certainty to suppliers to invest in capability.
- Development of the Delivery Strategy
- Applying contemporary procurement strategies and a category management approach to ensure fit-for-purpose contracts are established with appropriate scalability and flexibility to meet future peaks in delivery requirements.

6.8 Information management

Evidence-based decision making is a key element of effective asset management. This requires reliable, accurate and timely information that is accessible across Power and Water.

- **Information management systems:** A range of information systems are used by Power and Water to support its asset management activities. The current information management system focus areas for Power Services are to improve the accuracy and completeness of asset master data, establishing a consistent asset hierarchy and attribution, and consolidation of available condition and asset performance data into fit-for-purpose systems to support more efficient analysis and decision making.
- **Technology:** Asset information is supported by technology systems that allow for storage, control and analysis of asset data. Adoption of new technologies over time will enable Power

Services to provide cost effective, more efficient and more automated service outcomes as well as improving asset and customer knowledge. Power Services is currently focused on technology related to:

- The Energy Management System which will enable Power and Water to manage transmission system power flows, contingencies and renewable energy source management.
- Systems that will leverage smart meter data for management of Dynamic Operating Envelopes and other network analytics to maximise the dispatch of DER from our customers, particularly residential solar.
- Suitable platforms for storage, access and utilisation of aerial imagery, drone inspection data, LiDAR, and various other information sources that can assist in inspection, design, operational support and risk analysis activities
- **Documentation:** Power and Water manages its documentation (e.g. plans, reports, manuals, procedures, etc) through its Content Management System. Infrastructure drawings are managed through the Northern Territory Governments Drawing Database.

Key focus areas for improvement in asset management related documentation are establishment of internal library of asset management related documentation for ease of access and knowledge sharing, including key procedures, training material, plans and bulletins related to asset risks and controls.

An overview of all asset information systems is provided in Appendix 3.

6.9 Asset management improvement plan

Our strategic asset management improvement plans are focussed on building our capability and achieving consistency across the business to ensure we achieve our asset objectives and deliver the required levels of service to our customers.

Power Services has a vision that building asset management capabilities will enable us to make well-informed decisions matched to the financial needs based on asset information that provides the full value of outputs of the assets. Our road map for improving our approach to asset management is summarised in Figure 6 below.

The detailed improvement plan is described in the Asset Management System Guideline³.

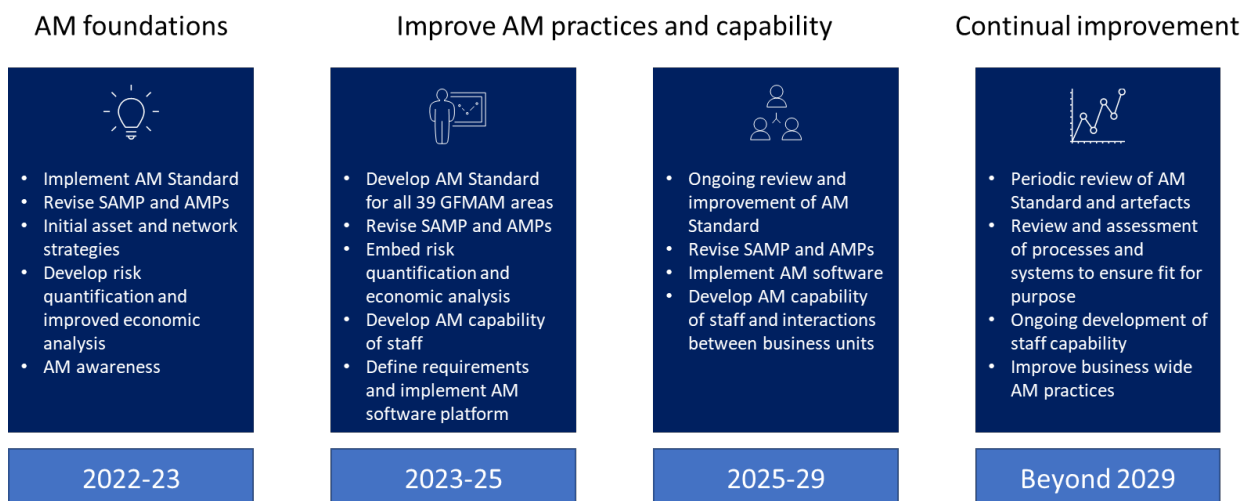


Figure 6 Power Services asset management improvement roadmap

³ This is currently a draft document and will be published as a Controlled document

7 Meeting service standards

The Electricity Industry Performance Code⁴ sets out the performance measures and targets that Power and Water must report against for regulated and non-regulated networks.

7.1 Regulated networks

The measures specified for regulated networks include network reliability performance reported as SAIDI and SAIFI, worst performing feeders and Guaranteed Services Levels (GSL).

Performance against service standards is reported through Regulatory Information Notices (RIN), annual performance reports that are submitted to the Utilities Commission (UC) and in our Transmission and Distribution Annual Planning Report (TDAPR).

7.1.1 Reliability performance

The most important metric related to service outcomes for our customers are SAIDI and SAIFI which indicate the average duration and average number of outages, respectively, experienced by our customers. The Utilities Commission (UC) approved performance targets for SAIDI and SAIFI are provided in Table 5. Proposed targets for 2024-29 are also shown, however are yet to be approved by the Utilities Commission.

Details of the other measures are available in the Electricity Industry Performance Code and on the Utilities Commission's website.

	2019-24		2024-29	
	SAIDI	SAIFI	SAIDI	SAIFI
CBD	4.00	0.1	4.00	0.1
Urban	140	2.0	80	1.4
Rural short	190	3.0	190	3.0
Rural long	1,500	19.0	1,260	15.0

Table 5 - Commission's approved performance targets (2019-24) and proposed targets (2024-29)

In the regulated networks of Darwin-Katherine, Alice Springs and Tennant Creek, reliability has been consistently improving over the last 3-5 years. Figure 7 shows performance against an NT wide target derived from feeder category targets.

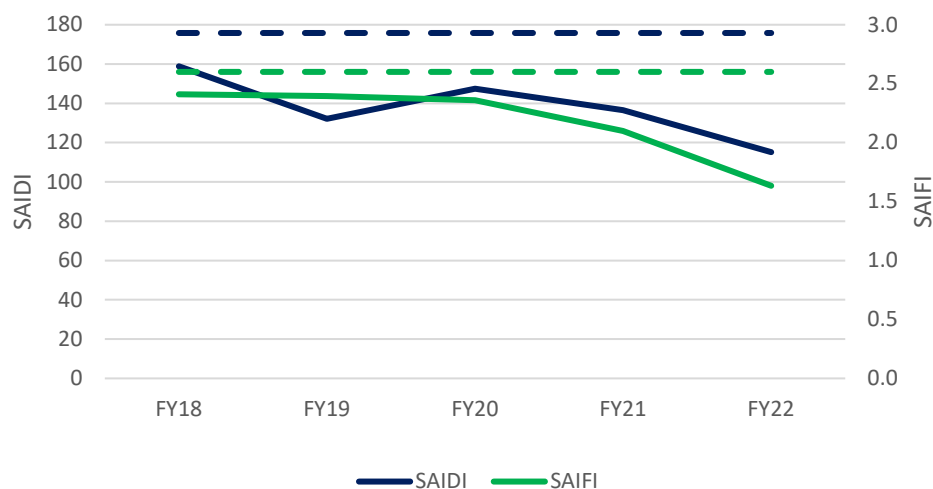


Figure 7 Recent Regulated Network Performance all NT

⁴ UC website EIPC

While this trend demonstrates an overall improvement in network performance, there are customers that are still experiencing poor or deteriorating reliability, particularly those supplied by long rural feeders that are exposed to extensive weather, wildlife and vegetation impacts. Power and Water is required to annually report the five worst performing feeders per feeder category and identify the actions being taken to address the causes.

Table 6 below shows the number of feeders in the regulated network that have experienced reliability performance at more than double that of their relevant category target. Asset failure and vegetation impacts are the two factors driving the poor performance. These feeders and communities will be the focus of ongoing reliability improvement actions.

	FY18	FY19	FY20	FY21	FY22
Regulated Networks (195 feeders)	23	19	24	23	18

Table 6 – Regulated network feeders exceeding target by greater than 100%

We have set out a Customer Reliability Strategy that aims to improve the performance of the poor performing feeders by addressing the root causes that are driving outages. This will ensure we meet our customers' expectations of levels of service while maintaining compliance with our regulatory obligations under the EIPC and NT NER.

For further information on network performance against reliability metrics, poorly performing feeders and actions to improve performance refer to our latest TDAPR.

7.1.2 Guaranteed service levels

The Electricity Industry Performance Code sets out Guaranteed Service Levels (GSL) for customers in the regulated network. The GSLs provide financial compensation for our customers that are adversely affected by poor service outcomes, including:

- Individual customers that experience outage durations above specified thresholds.
- Individual customers that experience a number of outages above a specified threshold.
- Delays for connection to the network.
- Inadequate notification of planned outages.
- Late attendance to appointments.

Power Services performance has generally been improving over time as shown in Table 5. There are no targets set for GSL, only financial penalties payable to affected customers.

GSL Metric	FY18	FY19	FY20	FY21	FY22
Keeping Appointments	1	0	-	-	-
Time for establishing a new connection	17	2	5	20	86
Reconnection of an existing premises - within 24 hours	27	12	13	5	5
Single outage greater than 12 hours	139	5	65	4	18
Single outage greater than 20 hours	0	1	4	-	4
Frequency of Interruptions > 12 interruptions	1,225	2,734	3,988	1,594	1,460

Cumulative Duration of Interruptions > 20 hours	578	633	1,068	762	425
Time for giving notice of a planned interruption	472	159	178	18	54
Number of complaints	282	305	326	301	211

Table 7 – Summary of GSL performance

7.1.3 Power quality

We monitor power quality issues by analysing customer complaints and actively monitoring voltage levels at our substations. We have permanently installed monitoring equipment in all zone substations and use portable equipment to undertake cyclic monitoring of distribution substations.

Our power quality performance for customers has improved during the past few years, however, there has been an increase in voltage variations recorded at zone substation. Our Power Quality Strategy will focus on identifying the root cause of these variations and identifying and corrective actions that are economic to implement.

For further information on performance against power quality metrics refer to our latest TDAPR.

Power quality measure	FY18	FY19	FY20	FY21	FY22
Customers receiving over-voltage	6	21	17	5	-
Voltage variations at zone substation	524	783	928	2,659	962

Table 8 – Number of reportable voltage events

7.2 Non-regulated networks

The minor centres and IES networks have only recently come under the management of Power Services. Since they are not declared regulated networks, the performance requirements are not covered by either the EIPC or the NT NER.

The service levels required are specified in Schedule 2 of the Agreement for Provision of Essential Services to Nominated Indigenous Communities which is the contract between the NT government department and IES.

The agreement is currently being renegotiated and therefore the service levels specified are subject to change. The current service levels set out by the agreement are separated by utility. The service levels applicable to Power Services are:

- Respond to queries and complaints within 5 working days
- Provide advance notice of at least 2 days for planned interruptions
- Respond to unplanned interruption within 24 hrs from notification
- Limited planned interruptions to 6 hours
- Power quality measures are:
 - Maintain LV between +6% and -10% of the nominal voltage
 - Maintain frequency within $\pm 5\%$ of the nominal frequency of 50 Hz
- The number of interruptions is not to significantly differ from other similar sized rural communities. Power Services has interpreted this to mean performance is required to be at a similar level of service to Rural Short feeders on the regulated network.

Power Services plans to improve monitoring and reporting against the service levels and will establish an improvement initiative once the revised service agreement with updated service level requirements has been finalised.

We note that due to the small size of the non-regulated networks, the reliability performance is very volatile on an individual feeder or community basis. We plan to develop a statistic to summarise the non-regulated networks to provide a more useful measure of performance, however, this has not yet been developed.

We also monitor the poor performing feeders as shown in Table 6, summarised by Minor Centres and IES Communities. Asset failure and vegetation impacts are the two factors driving the poor performance. These feeders and communities will be the focus of ongoing reliability improvement actions, noting that some small communities have poor data quality due to limitations of communications systems.

	FY18	FY19	FY20	FY21	FY22
IES Communities (60 Communities)	16	15	16	16	12
Minor Centres (5 Centres)	3	3	2	1	1

Table 9 – Minor centre feeders/IES communities exceeding target by greater than 100%

7.3 Maintaining affordable service levels

The Strategic Pillar *Living Within Our Means* and the aligned asset management objective *Efficient and sustainable service delivery* requires Power Services to maintain affordable service levels. This is achieved through:

- Optimising between risk, cost, performance and opportunities in asset decision-making
- Prudent and efficient capital and operational investments
- Long-term financial modelling and optimisation
- Operational efficiency benchmarking
- Improving understanding of operational and maintenance costs
- Optimising maintenance and renewal investment
- Maximising the utilisation of existing assets

Analysis of our performance to identify the root causes of poor performance, enables us to ensure investment in our network is effective and the cost to our customers is minimised.

7.3.1 Network benchmarking

The Australian Energy Regulator (AER) collects information from regulated businesses including Power and Water via Regulatory Information Notices (RIN). This information enables the AER to undertake benchmarking analysis of network businesses. The AER does not currently publish PWC's benchmarking performance in its annual benchmarking reviews.

To support improved benchmarking in relation to network asset augmentation and replacement cost performance, Power Services has developed a cost estimation methodology⁵. This includes comparative analysis of unit rates for common asset categories. The analysis outcomes demonstrate a variety of reasons for differences to other networks, including unique asset designs for operation in the Northern Territory's challenging environment, very low volumes of activities limiting efficiency opportunities (no economies of scale), and market limitations due to our remote and isolated systems.

⁵ Cost estimation methodology and approach, December 2022

Internal benchmarking across our distribution feeders and communities ensures areas of poor performance are identified and investigated. This supports optimising investment for reliability improvements, in particular the worst performing feeders, minor centres and IES communities.

7.3.2 Generation benchmarking

Power Services key focus in the shorter term is to benchmark performance across our fleet of generation assets to drive improvements in reliability, operating efficiency and maintenance costs. Specific focus has been given to performance of our solar PV fleet installed as part of the Solar Energy Transformation Program (SETuP) which was co-funded by the Australian Government through the Australian Renewable Energy Agency. As part of our obligations, we have published annual reports⁶ on the performance of these assets. Figure 8 shows typical benchmarking of performance and is available publicly through our SETuP reports available on our website.

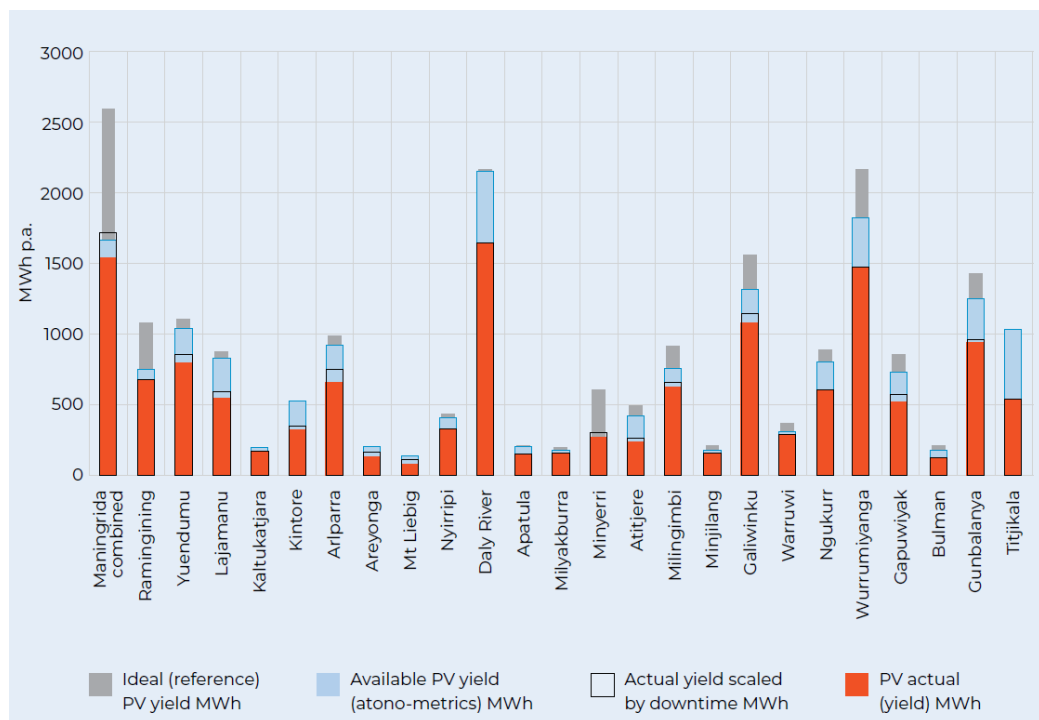


Figure 8 - Yield estimate comparisons for all communities 2021/22

⁶ Solar Energy Transformation Program Performance Report

7.4 Network risk

By implementing our risk quantification approach described in section 6.3, we have been able to assess the risk cost to our network with and without the portfolio of capital projects over a 10 year horizon. The result is presented in Figure 9.

We note that this forecast excludes the risk incurred by the communications, SCADA and protection assets that we are currently only able to assess on a qualitative basis. It also excludes the minor centres and IES networks.

The forecast is informative as it demonstrates that by implementing our portfolio of capital works, we would expect to moderately reduce the level of risk and then maintain it at the reduced level. This is consistent with the requirement of the NT NER to maintain network safety and reliability.

The majority of the risk reduction is achieved through managing power transformers, implementing a new program to manage the services asset fleet, and the replacement of the defective northern suburbs cables.

This is the first time that Power Services has undertaken this type of analysis and will continue to refine the inputs and approach as well as expand it across the remaining other asset classes and non-regulated networks.

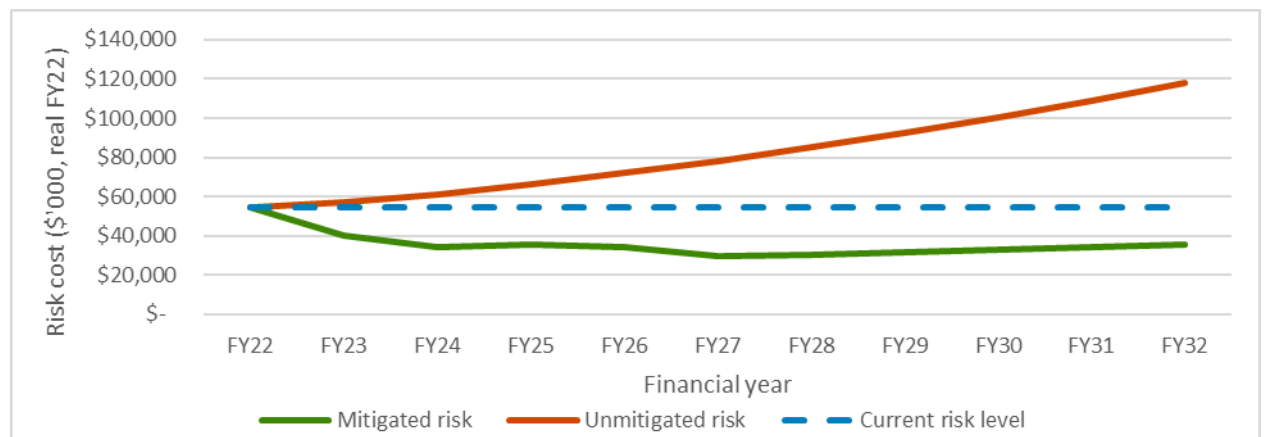


Figure 9 – Forecast risk cost with and without implementation of our planned portfolio of capital works

8 Lifecycle management

Power Services' approach to asset lifecycle management to achieve its asset management objectives is summarised in Table 10. Power and Water are working through a consistent approach to project delivery across Power, Water and Gas Services.

Lifecycle components	Power and Water approach
Planning	<p>Demand forecasting is undertaken annually on both a system and spatial basis to identify long-term trends that may require network augmentation or other non-network solutions. The annual review also assesses credible contingencies and operational scenarios.</p> <p>The details of the forecast, including the expected change in system demand from a regional level, down to individual feeders for the next 10 years, and outcome of the scenario analysis are published in the TDAPR.</p> <p>In addition, the need for augmentation or modification of the network is assessed throughout the year in response to network connection applications.</p> <p>The Network Technical Code and Network Planning Criteria prescribes planning assumptions and compliance requirements.</p>
Design	<p>Design is undertaken both in-house and through external consultants/developers.</p> <p>Developers undertake design of new subdivisions or infill development based on our published construction standards and design guidelines.</p> <p>Within Zone Substations, design is primarily performed through consultants based on our Substation Design Manual.</p>
Operations	<p>Operations are monitored and controlled via SCADA by PWC. A 24/7 service is provided with on-call operations and maintenance staff available to respond to priority alarms after hours.</p> <p>Power Services Operational and Maintenance organisational structure is a decentralised model. Small operational and maintenance groups/staff are in each major centre within each region. Resources can be shared across regions to manage short term peaks in project or maintenance activity.</p> <p>Power and Water has agreements with various service providers and councils to provide Essential Services Operators (ESOs). ESO's are based in most</p>

Lifecycle components	Power and Water approach
	<p>communities and are responsible for delivery of general system operations and monitoring, along with undertaking minor maintenance tasks for power assets. In some areas, remote area Contractor's (who are not based in the community) are engaged to carry out ESO duties.</p> <p>ESO's are guided by key operating manuals and procedures, and are supported by Technical Coordinators in major centres for fault response and daily operational tasks.</p>
Maintenance	<p>The maintenance plan and Asset Strategies Procedure outlays the maintenance strategy for individual assets.</p> <p>Maintenance for urban and remote communities is managed through the Maximo maintenance management.</p> <p>For urban centres, maintenance is typically managed by PWC.</p> <p>For remote assets, maintenance and repair activities are delivered through external service providers with technical advice provided by Technical Coordinators based in major centres.</p>
Renewal	Condition assessment report, asset type, asset quantity, asset value and risk of failure determine the scope of asset renewals.
Disposal	Asset disposal is tracked through procedures for recording asset decommissioning in GIS, MAXIMO and FAR. Procedures exist for management of disposed assets, particularly where potentially hazardous products are used (asbestos, PCBs) or created through asset operation or failure (SF6 by-products).
Project Investment Development, Planning, Delivery and Reporting	Project Investment and Delivery Framework (PIDF) outlines the requirements for all investment in infrastructure that is delivered through projects. The Enterprise Project Management Office provides PIDF assurance to the wider business. Portfolio and Project management committees within Power Services provide oversight and assurance within the PIDF to manage business unit risks. Strategic risks are escalated to the Enterprise Portfolio Management Committee (EPMC) which is made of the executive and chaired by the Chief Executive.

Table 10 - Asset lifecycle management

9 Asset management challenges and opportunities

The most significant strategic challenges and opportunities across the entire portfolio of assets managed by Power Services are outlined in Table 11. For details of specific asset class and business management items, the following documents are relevant:

- Asset Management Plans
- Power Services Business Plan
- Future Networks Strategy

Challenge / Opportunity	Details of challenge or opportunity	Response, strategies and/or plans
Strategic		
Resource management	<ul style="list-style-type: none"> • Ability to respond to short term spikes in resource requirements for capital and maintenance limited by internal and external NT workforce capacity. • Availability of service providers to provide maintenance services in remote communities decreased during Covid and 're-building' of the workforce capacity is ongoing. • Need specialised staff (knowledge of regulations) that are not available in the NT as it is a new regulatory framework. • Specialist resources and expertise are a particular issue: to manage energy transition; SCADA, comms and protection; regulation; network modelling. 	<ul style="list-style-type: none"> • Development of long-term contracts to support delivery of large projects, allowing internal workforce to deliver critical routine maintenance and asset replacement activities. • Development of 10-year resource plan aligned with capital and operational forecasts, and address gaps before they impact on delivery performance. • Changes required to approach for long-term engagement of service providers for remote communities, providing clarity on long-term work pipeline that builds business confidence to invest in capacity / capability.
Global supply chain and cost escalation	<ul style="list-style-type: none"> • Increase in power station operating costs due to rise in diesel prices. • Lead times for new equipment remain well above typical assumptions used in project planning. Impacting multiple replacement, connection and augmentation projects and programs. • Escalations in commodities and labour costs are putting key local service providers and suppliers under significant pressure to maintain agreed pricing in existing supply contracts. 	<ul style="list-style-type: none"> • Negotiation with suppliers and service providers to mitigate impacts where possible, balancing cost impacts against the risks associated with potential loss of suppliers in a small market. • Capital Delivery uplift initiative has a significant focus on capital delivery planning process improvement, which must include clear requirements to manage lead time risks in planning stages. • Ongoing review of equipment storage and procurement strategies to mitigate short term supply chain risks and avoid delays to delivery of capital or maintenance works. • Improved capital reporting and data governance.

Challenge / Opportunity	Details of challenge or opportunity	Response, strategies and/or plans
Development of remote communities	<ul style="list-style-type: none"> The NT is committed to delivering housing to communities. Forecasting growth and meeting this demand with existing power generation infrastructure will be challenging based on ability to expand on existing sites, anticipating and enabling renewables, and global supply chain challenges. 	<ul style="list-style-type: none"> Develop more robust modelling to support decision making for least risk investment in power station augmentation. Longer term forecasting of generator replacement and renewable/battery investment to manage long lead times and land access approvals. Build capability for integration of renewables and managing performance impacts on diesel engines at low loads.
Replacement wall	<ul style="list-style-type: none"> Current replacement volumes result in a significant proportion of network assets operating beyond expected technical life by 2035, with the potential for deteriorating reliability and safety without investment. Power stations and networks in remote regions face similar replacement volume challenges in the 2030's. Legacy construction standards and land availability are significant constraints on efficient power station expansion and replacements. Available asset management capacity for power stations is operationally focused, limiting planning effectiveness. 	<ul style="list-style-type: none"> Investment in optimization tools for replacement planning Research and engineering development to enable robust quantitative analysis of asset condition and risk – essential for leveraging optimisation tools. Improve management of assets to extend serviceable lives for asset classes driving the replacement wall challenge, particularly overhead and underground distribution assets. Additional asset planning capacity to develop robust long term asset management plans and strategies and provide certainty of investment requirements over the short- and long-term horizons. Engagement with community stakeholders, land councils and authorities for long term land access strategy for power station development.
Condition information management	<ul style="list-style-type: none"> Current ICT systems are outdated and do not support efficient management of condition information. Accessibility and communications infrastructure limitations prevent typical monitoring systems from being effective in remote communities. 	<ul style="list-style-type: none"> Invest in development of condition information management in available core systems including OSIsoft PI, leveraging key support contracts and industry expertise.

THIS PLAN IS UNCONTROLLED WHEN PRINTED

Challenge / Opportunity	Details of challenge or opportunity	Response, strategies and/or plans
	<ul style="list-style-type: none"> Expanded use of drone and imagery technology to assist in risk management and monitoring of remote assets. 	<ul style="list-style-type: none"> Engage with market service providers to assess benefits of proprietary “Asset Performance” software that could enable improvements. Investigate emerging satellite communications, and IoT devices for use in remote locations.
Cyber security	<ul style="list-style-type: none"> Aged assets/ obsolete technology creating vulnerabilities and the need to secure them Build capability in OT to meet cyber security requirements and/or mitigate risks, and avoid direct delays to delivery of asset replacement, augmentation and connections. Cyber risks require more robust analysis of service providers and data management prior to implementing technology improvements and additional SCADA opportunities. 	<ul style="list-style-type: none"> Investment in growing OT team capacity and capability. Expand scope of upgrades of core Operational Technology systems including Energy Management System to include critical cyber security needs. Establish standards and procedures to support efficient design and delivery of OT assets while managing risk.
Renewable transition and Renewables Hub	<ul style="list-style-type: none"> The Northern Territory is uniquely placed to achieve considerable proportion of renewable generation in a short period of time in both regulated power systems and remote centres and communities. PWC is a key enabler but is also responsible for managing the associated risks in all power systems and isolated networks. Scale of ‘behind the meter’ solar fundamentally changing network operation risks Timing of change within different isolated systems. Management of DER is not within the capability of current OT or ICT systems. Potential for ongoing investment in PV for remote communities to offset rising energy (Diesel) costs and mitigate diesel delivery risks 	<ul style="list-style-type: none"> DER investment proposal Future networks strategy Development processes for implementing new technology needed to support rollout and testing in required timeframes. Protection strategy development to ensure reducing system fault levels do not create network risks. Asset planning and development of connection standards and system operation codes or guidelines that are fit-for-purpose to enable the safe and reliable integration of solar with existing generators and control systems in remote isolated power systems.

Challenge / Opportunity	Details of challenge or opportunity	Response, strategies and/or plans
	<ul style="list-style-type: none"> Integration of innovative technology (grid cube, BESS, smart meters, etc.) 	<ul style="list-style-type: none"> Leverage experience from SETuP to drive further responsible and efficient development of solar resources in remote communities.
Economic outlook	<ul style="list-style-type: none"> Growth targets for the Northern Territory require substantial investment in network infrastructure in relatively short timeframes. The pressure on available resources will exacerbate risks in project development and delivery. Planned growth in remote communities is challenging for generation planning due to land constraints, diesel delivery and storage limitations and legacy designs. 	<ul style="list-style-type: none"> Development of flexible fit-for-purpose procurement strategies for specialist support, equipment and construction resources to meet the growth needs. Detailed ongoing consultation with government and agencies to ensure clarity of development timeframes, realistic goals and cohesive delivery strategies. Improve transparency of development limitations and opportunities in remote centers to support planning decisions by external agencies and investors.
Climate change and resilience to natural disasters	<ul style="list-style-type: none"> More severe weather could result in higher frequency or more intense cyclones. This may impact the assets specification requirements to be able to withstand the weather. Limited ICT system capability to support emergency management processes and planning during response and recovery phases 	<ul style="list-style-type: none"> Critical review of construction standards and replacement strategies, particularly overhead assets, to increase resilience. Support government funded undergrounding or similar programs. Continuously improve emergency response processes, support infrastructure and systems, including assessment of a fit-for-purpose system to support response and recovery phases.
Public safety	<ul style="list-style-type: none"> Mitigation of community risks identified in asset analysis, particularly where risk treatment requires asset replacement of extended periods, including Norther Suburbs cables, Alice Springs Corroded Poles, Service Wire Replacement. Raising customer awareness of electricity risks associated with network assets, reporting of 	<ul style="list-style-type: none"> Significant uplift required to asset inspection management and defect prioritisation based on public risk and criticality drivers. Implementation of formal maintenance compliance and quality auditing to provide assurance of critical activities and public risk mitigation.

Challenge / Opportunity	Details of challenge or opportunity	Response, strategies and/or plans
	electric shocks, and storm season hazards associated with damaged assets, particularly overhead lines.	<ul style="list-style-type: none"> • Support ongoing development of improved public awareness campaigns through contemporary communication strategies and media. • Ongoing engagement with NT Worksafe in the investigation of electricity related incidents and improve data analysis of incidents and near misses. • Maturing of safe design processes to focus on the elimination or mitigation of risks through asset design for new assets, and scheduled design reviews for existing assets.
Operational		
Network visibility	<ul style="list-style-type: none"> • No network monitoring devices in remote communities to monitor performance, safety and support fault response. • Network operation and switching remains managed via manual systems and drawings, limiting analysis of operational performance, post-event response reviews. • Reliance on operator experience to manage power flows, voltage issues and overloads in all distribution networks which is not sufficient in a highly renewable grid. 	<ul style="list-style-type: none"> • Planned replacement of the Energy Management system will enable future development of distribution SCADA capability, and potentially networks analytics applications to support network operation. • Development of OT capability and capacity will enable development of fit-for-purpose solutions that meet the critical needs of network operation and visibility, particularly for DER.
Power station environmental management	<ul style="list-style-type: none"> • Limited detection systems for fuel leaks leading to significant fuel spills over the last 5 years. • Remoteness, age and legacy design of fuel infrastructure across minor centers and IES communities limits options for improving environmental risk mitigation. • Low maturity of regulations and associated limits for emissions from power stations 	<ul style="list-style-type: none"> • Innovative designs to improve fuel leak detection and response within power station buildings. • Develop fuel infrastructure asset management capability to support planning of investment and develop solutions for risk mitigation. • Consultation with stakeholders to quantify risks and agreed response and investment plans to manage emissions.

Challenge / Opportunity	Details of challenge or opportunity	Response, strategies and/or plans
Inspection and maintenance management	<ul style="list-style-type: none"> • Limitation of ICT systems for asset information and condition information capture, quality management and availability to field crews. • Guidance material and training for asset inspectors immature compared to other network businesses. • Limited development of technology to support inspection capture and high volume of imagery data. Local government restrictions on drones, filming, etc. to support efficient inspection and condition capture. • Capacity to audit quality of maintenance documentation, repair effectiveness and supporting procedure development. 	<ul style="list-style-type: none"> • Program to develop inspection manuals and defect prioritisation guidelines that align with industry practice, including training and assessment of asset inspectors. • ICT investment plans to uplift core systems and implement contemporary solutions for inspection management. • Engagement with stakeholders to plan for future use of drones, imagery, etc. particularly in urban overhead areas. • Formalised auditing and structured business performance reporting for maintenance documentation, inspection completion, and defect management.
Remoteness of assets	<ul style="list-style-type: none"> • Mobilisation increasingly challenging due to availability of services and declining condition of access roads as a result of significant weather events. • Accessibility of some communities being disrupted more frequently, drivers include Covid and unrest. • Reducing communications availability and bandwidth impacting data transfer for operational management. 	<ul style="list-style-type: none"> • Development of longer-term asset plans for remote assets will enable more consistent forecasting of requirements and support optimization of works. • Limited ability to influence availability of some key resources for fault response, which requires small aircraft to reach communities, particularly in the wet season. • Engagement with similar service providers to share knowledge and strategies.
Asset management capacity	<ul style="list-style-type: none"> • Workforce size limits number of Subject Matter Experts that can be maintained as part of internal work force. High dependence on consulting services for providing expertise. • Resources in the Northern Territory with appropriate subject matter expertise, particularly in specialised areas such as 	<ul style="list-style-type: none"> • Develop capability and competency plans for asset management related functions across Power and Water, identify gaps and embed a structured approach for both internal and external solutions to address gaps. • Explore more structured longer-term partnership models with external service providers, reducing

Challenge / Opportunity	Details of challenge or opportunity	Response, strategies and/or plans
	<p>regulations, transmission, protection and control systems for power systems.</p> <ul style="list-style-type: none"> Implementing improvements requires effective change management or risks deterioration of asset management culture. 	<p>inefficiencies associated with business and operation familiarisation.</p> <ul style="list-style-type: none"> Increase engagement with maintenance teams to build asset management capability in trade technical based teams and develop leaders, increasing overall capacity in the organisation.

Table 11 – Asset management challenges and opportunities

10 Forecast expenditure

The outcome of our planning processes is a portfolio of projects and programs that align with our strategies will ensure we maintain our performance where we are achieving our required levels of service and resolve any issues that are causing our performance to be below the required levels.

The expenditure forecast provides is summarised by asset category in the tables below and is current as of January 2023. The latest forecast is available in the Capital and Operational Works Plan.

10.1 Regulated capex

Asset Class	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2030-32	2030-33
Buildings	1.84	1.62	0.41	0.46	0.26	0.26	0.01	0.01	0.20	0.15
Cables	13.03	8.52	11.16	7.55	7.56	7.57	11.12	15.53	8.37	8.36
ZSS Other	0.89	2.34	1.88	0.41	0.17	0.22	0.13	0.13	0.21	0.17
Grounds	2.42	3.09	1.10	-	-	-	-	-	-	-
SCADA and Comms	6.90	6.31	5.11	8.86	5.32	4.88	1.80	2.06	4.58	3.73
Conductors	1.43	3.10	3.30	2.99	2.97	2.97	2.93	2.93	2.96	2.95
Poles and towers	10.46	5.24	7.46	5.19	3.58	3.63	3.57	3.52	3.90	3.64
Distribution Substations	2.78	3.29	3.38	3.49	3.59	3.70	3.75	3.86	3.68	3.71
Distribution Switchgear	2.71	3.93	4.00	4.06	4.13	4.19	3.31	3.37	3.81	3.76
HV Circuit Breakers	1.55	2.40	1.11	0.36	0.36	0.36	2.92	2.41	1.28	1.46
Poletops	1.88	1.33	2.15	2.23	1.28	1.33	1.04	1.10	1.40	1.23
Power Transformers	5.79	3.84	0.57	-	-	-	4.10	2.05	1.23	1.48
Protection	3.54	6.53	3.36	2.45	2.15	1.83	1.65	1.44	1.91	1.80
Contingent projects	-	40.00	68.00	18.00	15.00	22.50	12.00	12.00	-	-
Total	55.24	91.53	113.00	56.05	46.38	53.44	48.33	50.41	33.52	32.44

Table 12 – Regulated capex forecast (real FY2021-22, \$'million)

10.2 Regulated opex

Table 13 shows a summary of the operational expenditure incurred for FY2021-22. Operational expenditure is typically fairly constant from year to year as it is largely comprised of staff salary and therefore the opex for FY2021-22 is indicative of the level of expenditure that is expected. The workforce does not fluctuate significantly from year to year however, step changes do occur and are included in the forecast as part of our 2024-29 regulatory submission as necessary. Where external staff are engaged for project work, the time is generally capitalised and therefore appears in the capex forecast in section 10.1.

AMP Asset Class	Non Routine	Routine	Emergency	Total
Buildings	0.35	0.19	0.00	0.54
Cables	0.34	0.04	1.10	1.48
ZSS Other	0.53	0.57	0.11	1.22
Grounds	0.07	0.23	0.00	0.29
SCADA & Comms	0.74	1.43	0.03	2.20
Conductors	0.33	0.22	0.49	1.04
Poles and Towers	0.69	0.25	0.49	1.43
Distribution Substations	1.64	0.35	1.11	3.09
Distribution Switchgear	1.17	0.57	1.11	2.84
HV Circuit Breakers	0.49	1.03	0.21	1.73
Poletops	0.16	0.24	2.46	2.86
Power Transformers	0.91	0.68	0.10	1.69
Protection	0.26	1.24	0.39	1.89
Total	7.65	7.03	7.61	22.29

Table 13 – Regulated opex forecast (real FY2021-22, \$'million)

10.3 Minor centres capex

The minor centres are significantly smaller than the regulated network. Table 14 shows a summary of the forecast expenditure. It shows that approximately half the expenditure is for asset replacement across all asset classes and approximately half the expenditure is related to managing the fleet of generation assets.

The high expenditure in FY2023-24 through to FY2025-26 is related to major system and facility upgrades and the network augmentation expenditure in FY2023-24 and FY2024-25 is for the Jabiru Distribution Network Upgrade which is funded separately by the NT government.

Asset Class	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2030-32	2030-33
Generation	4.00	8.20	8.70	1.90	1.40	1.90	1.30	2.00	1.20	2.10
Asset Replacement	0.60	1.80	2.40	2.50	1.90	2.00	2.00	2.10	2.10	2.20
Customer Connections -	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Network Augmentation	3.80	3.90	-	-	-	-	-	-	-	-
Total	8.50	14.00	11.20	4.50	3.40	4.00	3.40	4.20	3.40	4.40

Table 14 – Minor centres capex forecast (real FY2021-22, \$'million)

10.4 Minor centres opex

Table 15 shows a summary of the operational expenditure forecast for FY2022-23. Operational expenditure is typically fairly constant from year to year as it is largely comprised of staff salary and therefore the opex for FY2022-23 is indicative of the level of expenditure that is expected. The workforce does not fluctuate significantly from year to year however, step changes do occur and are included in the forecast as part of the annual purchasing plan as necessary. Where external staff are engaged for project work, the time is generally capitalised and therefore appears in the capex forecast in section 10.3.

Minor centre	Non Routine	Routine	Emergency	Total
Borroloola	0.17	0.11	0.02	0.31
Daly Waters	0.08	0.08	0.01	0.18
Elliot	0.06	0.12	0.02	0.20
Timber Creek	0.05	0.05	0.02	0.12
Ti Tree	0.08	0.06	0.00	0.14
Total	0.17	0.11	0.02	0.31

Table 15 – Minor centres opex forecast (real FY2021-22, \$'million)

10.5 IES capex

Table 14 shows the forecast expenditure for the IES networks, highlighting the impact of generation assets on expenditure requirements. The forecast for network asset replacement and augmentation are expected to remain relatively constant, and there is an additional area of expenditure that is required to accommodate fly in fly out workers, which are required to obtain the required skills to manage the network.

The forecast expenditure for the generation assets includes all projects that are expected to be required; however, the forecast has not yet been subject to detailed needs analysis, economic modelling and prioritisation. The key drivers of the expenditure are:

- Replacement of assets, which is typically undertaken, based on the number of hours of operation and accounts for approximately 20% of the expenditure forecast.
- Augmentation of generation to meet increasing demand. We note that demand growth has a disproportionate impact on these networks as additional generation has a number of consequential impacts that increase costs:

- The need to relocate all the generation away from the community.
- Increase in fuel storage capacity and delivery infrastructure to service the larger generation fleet.
- Environmental protection measures (such as bunding, power station and fuel storage relocation).

Improvement of the expenditure forecast for IES is a new focus for Power Services as we plan to start applying the same rigour to the non-regulated networks as applied to the regulated networks. We expect that detail analysis of the current forecast will enable a reduction of the forecast expenditure.

Asset Class	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2030-32	2030-33
Generation	\$16.86	\$17.25	\$16.02	\$18.61	\$18.58	\$14.84	\$21.20	\$17.83	\$6.26	\$10.80
Network asset replacement	\$1.80	\$1.80	\$2.37	\$1.96	\$1.96	\$1.96	\$1.96	\$1.96	\$1.96	\$1.96
Network augmentation	\$2.13	\$2.14	\$1.89	\$1.94	\$2.17	\$1.78	\$1.82	\$1.82	\$1.82	\$1.82
Worker facilities	\$0.83	\$1.54	\$1.18	\$1.35	\$1.29	\$0.28	\$0.41	\$0.38	\$0.69	\$0.86
Total	\$21.60	\$22.72	\$21.45	\$23.85	\$24.00	\$18.85	\$25.38	\$21.98	\$10.72	\$15.44

Table 16 – IES capex forecast (real FY2021-22, \$'million)

10.6 IES opex

Table 17 shows a summary of the operational expenditure forecast for FY2022-23. Operational expenditure is typically fairly constant from year to year as it is largely comprised of staff salary. Therefore the opex for FY2022-23 is indicative of the level of expenditure that is expected. The workforce does not fluctuate significantly from year to year however, step changes do occur and are included in the annual purchasing plan as necessary. Where external staff are engaged for project work, the time is generally capitalised and therefore appears in the capex forecast in section 10.5.

Asset Class	Non Routine	Routine	Emergency	Total
Power networks	1.46	1.12	1.33	3.90
Generation	3.00	0.96	1.42	5.38
Solar	0.01	0.08	0.02	0.12
SCADA	0.01	0.17	0.13	0.31
Total	4.48	2.33	2.91	9.71

Table 17 – IES opex forecast (real FY2021-22, \$'million)

11 Acronyms and abbreviations

Acronym	Definition
ABS	Australian Bureau of Statistics
AER	Australian Energy Regulator
AM	Asset Management
AMP	Asset Management Plan
AMS	Asset Management System
AMSC	Asset Management Steering Committee
APP	Annual Purchasing Plan
CAC	Customer Advisory Council
CM	Content Manager - Power and Water Records Management System
COWP	Capital and Operational Works Plan
DER	Distributed Energy Resources
DTFHC	Department of Territory Families, Housing and Communities
EIPC	Electricity Industry Performance Code
ERMS	Enterprise Risk Management Standard
EGMPS	Executive General Manager Power Services
EPMC	Enterprise Portfolio Management Committee
ESO	Essential Services Operators
FAR	Fixed Asset Register
GFMAM	Global Forum on Maintenance and Asset Management
GIS	Geographic Information System
GLS	Guaranteed Services Levels
GOC	Government-Owned Corporation
GSL	Guaranteed Services Levels
HERCS	Health, Environment, Risk, Compliance and Safety system
IES	Indigenous Essential Services
KPI	Key Performance Indicator
NT	Northern Territory
NTG	Northern Territory Government
O&M	Operating and Maintenance
PIDF	Project Investment Delivery Framework
PWC	Power and Water Corporation
RAC	Reset Advisory Committee
RIN	Regulatory Information Notices
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SAMP	Strategic Asset Management Plan
SCADA	Supervisory Control and Data Acquisition
SCI	Statement of Corporate Intent
SETuP	Solar Energy Transformation Program
SMAM	Senior Manager Strategic Asset Management
TDAPR	Transmission and Distribution Annual Planning Report
TLR	Traffic Light Report
UC	Utilities Commission
WHS	Workplace Health and Safety

Table 18 – Acronyms and abbreviations

12 Change management and continuous improvement

12.1 Consultation, approval and communication

This plan must be endorsed by the Responsible Manager and approved by the Accountable Manager.

Role / title	Requirement
Executive General Manager Power Service	Accountable - approve this document
Senior Manager Asset Management Power Services	Responsible - endorse this document
Senior Manager Strategic Asset Management	Consult for changes and support implementation
Power Services Operations and Maintenance Field Staff Asset Management Steering Committee	Communicate – inform of any changes

12.2 Review

The requirements of this plan are mandatory and shall be reviewed and updated periodically for its ongoing effectiveness. This plan will be reviewed, at a minimum, every three years or in the event of any significant change in our vision, values, long-term goals, risk appetite, policy statement business model or organisational structure, or related systems or processes.

12.3 Internal references and related documents

Document Title	Record Number
Asset Management Policy Statement	CONTROL0292
Strategic Asset Management System	CONTROL0548
Enterprise Risk Management (ERM) Standard	CONTROL0013
ERM Procedure 1: Establish the Risk Context Procedure	CONTROL0480
ERM Procedure 2: Identify the Risk Procedure	CONTROL0479
ERM Procedure 3: Analyse the Risk Procedure	CONTROL0478
ERM Procedure 4: Evaluate the Risk Procedure	CONTROL0477
ERM Procedure 5A: Treat the Risk Procedure	CONTROL0487
ERM Procedure 5B: Prioritise the Risk Procedure	CONTROL0488
ERM Procedure 6: Monitor, Review and Report Risk Procedure	CONTROL0489
Risk Quantification Procedure for Investment Decision Making	CONTROL0932
Project Investment and Delivery Management Standard	CONTROL0383

12.4 External references, legislative and regulatory obligations

- ISO 55001:2024 – Asset Management – Management Systems
- Government Owned Corporations Act (NT) 2001
- Power and Water Corporation Act (NT) 1987
- Government Owned Corporations Act (NT) 2001
- Competition and Consumer Act (Cth) 2010
- Electricity Reform Act (NT) 2000
- Utilities Commission Act (NT) 2000
- Work Health and Safety (National Uniform Legislation) Act 2011

- Network Technical Code and Network Planning Criteria
- System Control Technical Code
- Network Technical Code
- Electricity Industry Performance Code
- Electricity (Network Safety) Regulations 2011
- National Electricity Rules (Northern Territory) (NT NER)
- Agreement for Provision of Essential Services to Nominated Indigenous Communities

12.5 Records management

This plan and all related documents, are captured, stored and managed in our Electronic Document and Records Management System and controlled in the Controlled Document Register.

12.6 Improvement suggestions



Have an improvement suggestion? Feedback and improvement suggestions for this document can be lodged by completing the online form on your browser or using the QR code from your mobile device.

URL: <https://forms.office.com/r/gxsQ1v1grd>

12.7 Document history

Date of issue	Version	Prepared by	Description of changes
17/01/2023	6.0	M Van Doornik	Document migrated from business unit format and updated.
18/01/2023	6.0	C Hanlon	Document reviewed for quality and alignment with the organisation's strategy, objectives and management governance and assurance framework. Minor updates to formatting inline with organisational style guide and correction of errors where identified. Section 12 populated based on draft provided. CONTROL0947 record number created and assigned. Document finalised for endorsement and approval.
30/01/2023	7.0	S Vlahovic	Approved

Appendix 1 Stakeholder expectations

Stakeholder	Expectations
Customers	
Residential and small business customers	<p>Fast, easy and convenient connection to and disconnection from the network</p> <p>Reliable and safe power supply</p> <p>Efficient response to the power interruptions, enquiries and complaints</p> <p>Transparent billing and processes to support customers in financial stress (where Power and Water provides retail services)</p> <p>Information on power interruptions and expected restoration times.</p> <p>Affordable costs, with no surprises</p> <p>Enable higher penetration of solar and ability to export excess energy.</p> <p>Minimum invasion of customers' property or goods in repair processes</p> <p>Environmental impacts are minimised</p>
Medium to large business customers	<p>As for residential customers.</p> <p>Options to minimise operational costs associated with electricity and flexibility to invest in distributed energy resources.</p>
Community members	<p>As for residential customers</p> <p>Cultural and political imperatives to provide adequate services for remote Aboriginal community members to continue to live 'on country'</p> <p>Increasing expectations for improved services.</p>
Regional Councils and road owners	<p>As for community members</p> <p>Consultation and approval for infrastructure on alignments and ongoing maintenance</p> <p>Vegetation management for overhead lines in road alignments</p> <p>Access to infrastructure for maintenance and emergency response activities.</p>
Territory Families, Housing and Communities	<p>As for relevant Regional Councils and community members</p> <p>Requirements of the Indigenous Essential Services Agreement are met including:</p> <p>Provision of reliable services to the nominated communities</p> <p>Effective management of assets</p> <p>Efficient financial managements</p>

Stakeholder	Expectations
	Support regional development To support Aboriginal employment and training.
Department of Infrastructure, Planning and Logistics	Plan and deliver infrastructure capacity to meet growth and development demand. Engage in strategic projects including proposed new subdivisions, Middle Arm development and Renewable Hub.
Department of Industry, Tourism and Trade	Support development of strategies, plans and projects to meet the Northern Territory's renewable targets.
Developers	Adequate infrastructure capacity to service developments Efficient processing of development submissions and connections to the network
Future customers	Future generations of customers will expect inter-generational equity and sustainability to be considered in current decision making
Business owner	
Northern Territory Government	Efficient operation Maximise a sustainable investment in Power and Water Achievement of service standards Regulatory compliance Sustainable service to urban and remote towns and communities. Support Buy Local Plan to grow local capability and capacity
Regulators	
Australian Energy Regulator (AER)	Compliance with National Electricity Rules and associated guidelines Engagement with our customers and alignment of our plans with customer expectations. Annual reporting of expenditure, activities, performance.
Utilities Commission	Compliance with regulations detailed in section 7. Operation and maintenance expenditure to be prudent and efficient. Capital expenditure to be prudent and efficient. Service levels can be sustained.
Department of Environment, Parks and Water Security	Minimisation of environmental impacts Reporting of environmental incidents

Stakeholder	Expectations
WorkSafe NT	Compliance with Work Health and Safety (National Uniform legislation) Act 2016 Compliance with relevant and applicable Codes of Practice, Guidelines and Australian Standards Reporting of health and safety related incidents
Major project stakeholders	
Aboriginal Areas Protection Authority (AAPA)	Due diligence with respect to sacred site avoidance surveys. Compliance with AAPA Certificate conditions when undertaking work in or near protected areas.
Regional Councils	Consultation with respect to projects and infrastructure developments. Compliance with by-laws, permits and subdivision development guidelines.
Land Councils	Consultation on projects and infrastructure developments with respect to administration of land rights.
Traditional Owners	Community consultation with respect to projects and developments.
Contractors / Suppliers	Buy Local Plan Procurement practices and transparency Forward works pipeline to provide certainty for local investment in capability
Third party renewable suppliers	Facilitate connection process Compliance to connection agreements and relevant jurisdictional codes
Electrical system participants	
Other electrical system participants (generators, retailers)	Collaboration and communication between network participants to ensure customers receive seamless service and other participants are effectively made aware of any infrastructure issues that may impact on them
NTESMO / System Control	Manage network assets in compliance with System Control Technical Code, Network Technical Code and Planning Criteria to achieve reliable and secure operation of the regulated power systems. Comply with processes for planning of outages and manage risks associated with critical transmission elements. Provide infrastructure to support the operation of the regulated power systems including OT systems, both in the current operating context and for a future renewable based power system.

Appendix 2 Asset strategies

We manage our assets through inspections, condition-based monitoring and refurbishment with different strategies applied according to the value and criticality of the asset class. In addition, we have a number of strategies to ensure we achieve our asset objectives that cover multiple asset classes or other aspects of our network, such as vegetation management.

Ongoing asset strategy development is based on assessment of actual asset performance, identified failure modes, condition information, industry insights and direct feedback from maintenance teams. Improvements are typically driven by a change in one of these areas, and may result in additional tasks, variations in the frequency of maintenance intervention or changes to thresholds for repair versus replace decisions.

Continued maturing of our approach, and in particular the development of our risk quantification approach to decision making, will ensure our asset and network strategies are optimised to manage known risks efficiently and identify emerging or declining risks as our asset population changes over time.

Our asset strategies are summarised in Table 19. They will be developed into full asset and network strategies as part of our ongoing asset management improvement and capability uplift plans.

Asset management strategy	Objective	Description
Asset management system strategy	<p>Improve Power and Water's asset management systems, processes, practices and capability.</p> <p>Senior leadership engagement and support for improving asset management systems and capability.</p>	<ul style="list-style-type: none"> Develop and implement an Asset Management System that is consistent across Power and Water's business units and aligned to the ISO5500x suite of standards and the 39 GFMAM practice areas. Ensure asset management activities are systematic, consistent, reliable and sustainable, and responsive to changes in operations, technology and financial circumstance. Develop stronger asset management capability and awareness through the design & implementation of a Capability Development Plan for Power Services by 2024
Data and information management strategy	The collection, management and analysis of data and information to support asset management decision-making.	<ul style="list-style-type: none"> Develop an asset information policy Consolidate existing standards, processes and systems that capture condition and performance data in an "Asset Information Management Standard" and identify any gaps Ensure ICT systems are fit for purpose for our asset data and asset management. Manage data as an asset, establishing quality and performance criteria/standards that, when achieved, provide confidence to invest in advanced asset analysis and risk quantification tools/software.

Asset management strategy	Objective	Description
Asset integrity and risk strategy	Demonstrate prudent and efficient investment decision making to provide a safe and reliable network.	<ul style="list-style-type: none"> • All investment decisions made based on clear cost benefit analysis that includes quantified asset risk. • Systemised defect prioritisation supported by asset criticality triggers. • Works management systems and processes support consistent and quality decisions. • Create ability for asset inspectors to capture asset condition – before it is a defect – to enable forecasting of asset population risks.
Asset Life-Cycle Management Strategy	Manage assets to achieve the least cost or highest value across the asset's serviceable life	<ul style="list-style-type: none"> • Decisions on asset planning, delivery, operations, maintenance and renewal/disposal based on whole of life costs, asset performance and risk. • SAMP and AMPs to coordinate asset management activities from an asset class and network area perspective.
Future network strategy	Maximise the hosting capacity for renewables to achieve the NT's commitment to renewables in both our major and minor centres and communities, while ensuring the safety and security of power systems through modernising control systems and improving resilience to threats.	<ul style="list-style-type: none"> • Reliable protection and operational technology that enables Power Services to meet performance requirements and ensures the power system remains safe and secure through abnormal events. • Systems that can respond to a rapidly changing power system energy mix and ensure safety and equipment protection is not compromised. • Improve network information and visibility and forecasting of the LV network and understanding of power flows with increasing penetration/hosting capacity of DERs.
Network safety strategy	Maintain the safety of customers, community and our employees.	<ul style="list-style-type: none"> • Demonstrate network safety through reduced HSE incidents and implementing targeted lead indicators for reporting and responding to trends in performance. • Analysis of safety incidents and asset condition deterioration modes to proactively implement initiatives to address emerging safety risks. • Learn from industry forums and peers • Consider critical community services and network resilience to major weather events. • Manage our current operational risks proactively, leverage lessons learned to remove hazards through design and equipment selection. • Embedding/reinforcing Safety in Design practices • Public safety campaigns and engagement,

Asset management strategy	Objective	Description
Customer reliability strategy	<p>Maintain reliability performance within targets set by the Utilities Commission.</p> <p>Reduce the number of poor performing feeders (exceeding the category SAIDI threshold) by 50% by 2025.</p>	<ul style="list-style-type: none"> • Improve recording of outage data, including allocation of cause codes, location and affected asset • Improve analysis of outages to ensure the root cause is identified and can be managed. Apply root cause analysis, FMECA etc. • Review the performance of vegetation management strategy to build on recent success and leverage improved data. • Monitor and review performance monthly to assess trends • Undertake asset replacement, refurbishment and augmentation as required to ensure reliable supply to meet the forecast demand • Review design and construction standards to ensure fit for purpose assets • Develop comprehensive reliability reporting for Minor Centres and IES, such as SAIDI and SAIFI at a whole of non-regulated network level.
Power quality performance	Maintain voltage and frequency within the specified limits	<ul style="list-style-type: none"> • Develop a strategy and implementation plan for system wide measurement to better understand performance at key points and voltage levels • Baselining of performance and key metrics that are essential for specification and management of connection compliance, particularly for inverter-based generators. • Establish efficient data management processes and external support arrangements to analyse performance and plan for efficient investment to address performance issues. • Undertake root cause analysis (FMECA etc.) to identify drivers of poor quality • Implement specific initiatives to correct poor quality as required, including compliance management processes for large customers and generators.
Portfolio delivery strategy	Deliver the portfolio of projects and programs developed for the 2024-29 Regulatory Period.	<ul style="list-style-type: none"> • Develop the COWP to identify current and future: • asset and service procurement needs • recruitment and external support needs • Develop project development and delivery management capability • Continue to build-on robust reporting and governance processes delivered through project delivery uplift initiatives.
Cyber security strategy	Achieve cyber security levels as specified by legislation (i.e. SOCI Act)	<ul style="list-style-type: none"> • This initiative is led by the ICT business unit. Power Services will provide input as required. • Contribute to achieving AESCEF Maturity level 2.5 and Security Profile 2 by 2025 – or as otherwise specified by legislation.

Asset management strategy	Objective	Description
Demand management and non-network solutions strategy	Engage with customers and proponents to manage demand or reduce costs to customers through non-network solutions.	<ul style="list-style-type: none"> • Demand side strategy and register • Develop staff capability and awareness of innovative and non-network solutions • Consider non-network solutions as part of options analysis and actively engage with the demand side register when appropriate. • Consider alignment or functionality developed by the Future Network Strategy for resolving network constraints, such as the Dynamic Operating Envelopes or advanced analytics • Share knowledge and improve customer engagement through reporting, such as the RINs and TDAPR.

Table 19 – Summary of asset and network strategies

Appendix 3 Asset management information systems

Data / information type	AM Information System	Description	Status	Performance measures
Asset attributes	Maximo	The primary asset management system that catalogues asset related data and works management. Utilised for all regulated, non-regulated, remote generation and IES community power assets. Source of truth for facility assets. Integrated with ESRI ArcFM for linear assets and Oracle Financials for Fixed Financial Asset Register.	Compliance and exception reporting for asset creation and handover, existing asset data quality and integration quality.	Asset Attribute Accuracy Reporting (16 KPI's)
Maintenance works	Maximo	As above	Exception reporting for new assets based on Asset Strategies. Annual reporting for delivery, which identifies compliance with work order management rules/policy.	Annual Exception Reporting Maintenance Compliance
Spatial data	GIS	ESRI ArcFM is the Geographical Information System (GIS) database providing geo coding of assets registered in Maximo. Contains the primary network maps and connectivity of our network infrastructure and enables spatial analysis. Utilised for all Urban and Remote linear (cable) assets. Source of truth for linear assets and integrated with Maximo.	For regulated networks, connectivity within GIS is validated through routine exception reporting. Implementation of connectivity modelling for Non-regulated and IES communities is in progress.	GIS Network Topology Exceptions Connectivity Implementation Plan Performance
Asset operational control parameters	GE SCADA & Energy Management System applications	The primary control and data acquisition system for the regulated power systems, covering all transmission equipment, and remotely controlled distribution equipment.		
	CITECT SCADA	The primary control and data acquisition system used in the operation of the asset base across the various power stations operated in minor centres and IES communities.		

Data / information type	AM Information System	Description	Status	Performance measures
Operational Data Archive	OSISoft PI including PI Historian and PI Vision (data link and process book)	Data warehouse for time series information and data analysis tool, including data historian and asset framework. Visual interface for remote Power Station monitoring and performance analysis.		
Engineering drawings	Drawing database	The NTG central electronic repository that catalogues all civil, mechanical and electrical drawings related to NTG assets including the IES asset base.		
Asset financial information	Oracle	The corporate financial management system for management of asset depreciation, remaining financial life and replacement value.		
Asset management data analysis	Business Intelligence (BI), Tableau	Reporting tool which interfaces with other data management systems		
Customer data	Retail Management System (RMS)	Customer and billing information to support payments, eligibility for service level scheme and meter information.	Undergoing major replacement to improve supportability and enhance functionality to meet expectations and achieve compliance to NER.	GIS Network Topology Accuracy Customer Addressing Exception Reporting
Corporate data	Corporate systems	Linkage with (but exclusive of) other business management systems (e.g. organisational, resource, WHS, environmental management).	Uplift of legacy corporate systems ongoing. Recent achievements include HSE reporting and compliance system implementation (HERCS).	Reporting, investigation and action management reporting. Strategic and operational risk mitigation action reporting.
Network demand forecasts	Rosetta Portal	Portal supports the TDAPR and provides direct access to demand forecasts at zone and feeder level to inform developers or other investors.	Refreshed annually as part of TDAPR	TDAPR and the information contained in the portal meets regulatory reporting obligations.