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POWERLINK QUEENSLAND REVENUE PROPOSAL

Supporting Document – PUBLIC

Reinvestment Criteria Framework

Powerlink – Reinvestment Criteria – Framework

Policy stream	Asset Management	
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Version History

Version	Date	Section(s)	Summary of amendment
1.0	31/05/2020	All	Original version

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1. Introduction

1.1 Purpose

The purpose of this document is to define the methodology that Powerlink uses to assess the need and timing for intervention on network assets based on meeting requirements prescribed by legislation, regulations, standards, jurisdictional requirements, and other relevant instruments.

The methodology aims to provide improved transparency and consistency within the asset reinvestment planning process, and allows Powerlink's customers and stakeholders to better understand the processes and criteria used to identify and determine the need for network asset reinvestment.

1.2 Scope

This document provides an overview of the methodology used to assess the need and timing for interventions on network assets approaching the end of their technical or economic life.

The Framework outlines a process which enables the criteria for asset reinvestment needs and timing to be determined in a structured, transparent and consistent manner. The nature and type of reinvestment is dependent on a range of considerations and these are evaluated on a case-by-case basis.

This process is used as part of Powerlink's asset reinvestment planning and regulatory approval activities.

1.3 References

Document code	Document title
-	Powerlink Customer Service Charter
A2294480	AMP-POL-1035 – Asset Management Policy
A2300019	ASM-FRA-A2300019 – Asset Management Framework
A2852589	ASM-STR-A2852589 – Asset Management Strategy

1.4 Defined Terms

Terms	Definition
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator.
RC	Reinvestment Criteria. Defines the criteria by which Powerlink assesses the need and timing for intervention.
RIT-T	Regulatory Investment Test for Transmission. An economic cost benefit test and consultation process developed by the Australian Energy Regulator prescribed under the National Electricity Rules.
SFAIRP	So Far As Is Reasonably Practicable. A guiding principle where all people are given the highest level of health and safety protection based on what could reasonably be done at a particular time.

1.5 Roles and Responsibilities

Who	What
EGM Strategy and Business Development (SBD)	Ensuring that the reinvestment criteria framework is fit for purpose, and supports Powerlink's asset management principles, objectives and practices.
GM Network Portfolio (SBD)	Setting the reinvestment criteria framework used for assessing the need and timing for intervention into Powerlink's network assets.
Manager Asset Strategies (SBD)	Applying the reinvestment criteria framework to assess the need and timing for intervention into Powerlink's network assets.
Manager Portfolio Planning and Optimisation (SBD)	Incorporating the reinvestment criteria framework within strategic asset planning and management activities.
Manager Network and Alternate Solutions (SBD)	Incorporating the reinvestment criteria framework for regulatory approval activities including the Regulatory Investment Test for Transmission.

2. Overview of Reinvestment Criteria

2.1 Introduction

Powerlink is committed to delivering sustainable long term performance of its assets which provide customers, stakeholders and community with timely, reliable, cost effective electricity transmission services.

Powerlink demonstrates this commitment by adopting a proactive approach to the management of its assets that optimises whole of life-cycle costs, benefits and risks while ensuring compliance with applicable legislation, regulations, standards, statutory requirements, and other relevant instruments[1].

The Reinvestment Criteria framework defines the methodology that Powerlink uses to assess the need and timing for intervention on network assets based on meeting industry compliance obligations.

The methodology aims to improve transparency and consistency within the asset reinvestment process, and enables Powerlink's customers and stakeholders to better understand the processes and criteria used for reinvestment.

The need and timing for intervention is defined when "business as usual activities (including routine inspections, minor condition based and corrective maintenance and operational refurbishment projects) no longer enable the network asset to meet prescribed service levels due to deteriorated asset condition".

The Reinvestment Process is detailed in Figure 2.1 below.

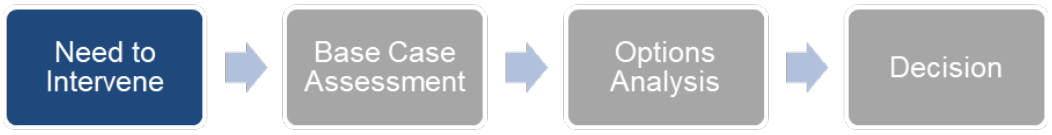

Figure 2.1 – Reinvestment Process

An assessment of the need and timing for network asset intervention is the first step of the asset reinvestment process. The type and nature of reinvestment is dependent on a range of considerations and these are evaluated on a case-by-case basis.

The trigger to intervene needs to be identified early enough to provide an appropriate lead time for the asset reinvestment planning and assessment process. This enables informed and prudent decisions to be made that considers all economic and technically feasible options (including non-network options)[2].

2.2 Reinvestment Criteria

The Reinvestment Criteria has four layers as shown in Figure 2.2 below. Each layer provides a linkage between the overarching driver for reinvestment through to the specific criteria used to assess the need and timing for intervention.

[1] As outlined within Powerlink's Asset Management Policy.

[2] A range of options are evaluated to identify the optimal asset investment solution, including retiring or decommissioning assets where there is unlikely to be an ongoing future need, refurbishing to extend the service life of assets, replacing assets of different capacity or type, changing the network topography, and non-network solutions.

This layered approach provides the linkages between customer and stakeholder objectives through to the asset condition limits. Conversely, the approach can also provide a direct linkage upwards from a specific asset condition limit through to customer and stakeholder objectives.

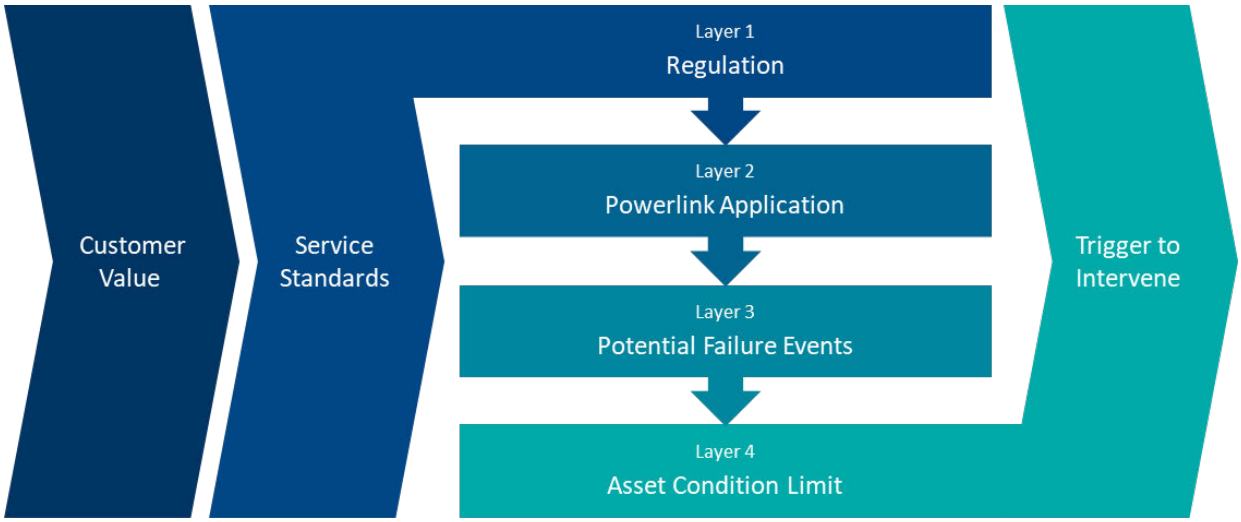

Figure 2.2 – Reinvestment Criteria Layers

2.3 Customer Value

Powerlink has worked with customers and stakeholders to develop its Customer Service Charter[3]. This charter details commitments that Powerlink has to its customers. The Charter is focused on embedding a customer-centric culture into Powerlink's business and creating tangible improvements in affordability and service delivery.

Powerlink is committed to:

- the safety of communities in which we operate, our people and our contractors;
- delivering safe, cost-effective and reliable transmission services to customers;
- placing customers' needs at the centre of everything we do;
- genuinely engaging with customers and taking their feedback into account to aid our decision making;
- ensuring our transmission services are valued by our customers; and
- using customer feedback to drive continuous improvement.

The Reinvestment Criteria is a foundational component within the asset reinvestment decision making process since the framework aims to balance the cost of investing earlier than absolutely necessary versus the risks of non-compliance and failure of service delivery.

Investing earlier than required increases the cost of providing the service, whilst not reinvesting in a timely manner increases risks of service delivery failures, costs of reinvestment, and risks of non-compliance.

The impacts of sub-optimal asset reinvestment timing are shown in Figure 2.3 below.

[3] Refer Powerlink's website:
https://www.powerlink.com.au/sites/default/files/2018-07/Customer%20Service%20Charter_0.pdf

Figure 2.3 – Impacts on Sub-Optimal Reinvestment Timing

The need to reinvest in an asset may be evident, but the optimal timing of that reinvestment is dependent on a range of considerations and factors. Applying the reinvestment framework ensures timing decisions consider all relevant factors so that asset reinvestment is made in a prudent, cost efficient and optimal manner.

Timely identification of the need to reinvest directly supports options analysis by providing the ability to:

- comprehensively assess and understand the condition and performance of existing network assets;
- identify and evaluate all economic and technically feasible options (including non-network options) to address emerging condition and performance related issues; and
- recommend prudent, cost effective, and optimal asset reinvestment strategies and options.

Once the need and timing for asset intervention has been determined, processes to identify and determine prudent, cost effective, and optimal asset reinvestment solutions can be implemented.

2.4 Service Standards

Asset compliance is relevant when the asset condition changes such that the asset does not meet its level of service or does not comply with a regulatory requirement. This category of reinvestment is triggered when the existing asset has degraded over time and no longer provides the required standard of service.

The Reinvestment Criteria defines four broad areas of compliance relating to the service level compliance for Powerlink's transmission system. These are detailed within Table 2.1.

Table 2.1 – Categories of Compliance Service Levels

Compliance	Description	Example
Safety	Managing network assets in a safe manner for the general public, customers, our employees and contractors.	Taking action to reinvest in an overhead transmission tower before structural integrity degrades to a point that it presents an unacceptable risk to public safety.
Function	Ensuring our network continues to meet reliability standards prescribed within Powerlink's Transmission Authority.	Monitoring transformer condition and initiating reinvestment where there is a continued need to meet reliability of supply standards.
Environment	Ensuring network assets meet environmental legislative requirements.	Taking remedial action on an ageing circuit breaker before it degrades to the point where managing the risk of SF6 leakage into the atmosphere is considered unacceptable.
Supportability	Managing network assets to ensure post-fault service restoration can occur without outages of the network for periods longer than stipulated as acceptable by the National Electricity Rules and industry guidelines.	Monitor the level of support and spares to ensure the protection system can be returned to service in the event of a failure within timeframes which meet regulatory requirements.

2.5 Need for Investment

Powerlink regularly assesses the existing and forecast performance of the transmission system to ensure that prudent, cost effective and optimal asset investment decisions are made in a timely manner. Asset planning decisions are linked to clear outcomes that may involve augmentation to the network, reinvestment into existing network assets, or respond to opportunities that provide cost efficiencies and/or additional value for our customers.

The Reinvestment Criteria focuses on service standard and compliance related drivers for assets reaching the end of their economic and technical life.

Powerlink's asset planning drivers are detailed in Table 2.2.

Table 2.2 – Asset Planning Drivers

Capacity	Compliance	Opportunity
Asset requirements have changed and the asset no longer meets the required level of service. To address forecast capacity shortfalls, augmentation of the network may be necessary. Examples include investments to respond to increased load demand, changing customer requirements, or to meet new regulations.	Although requirements remain unchanged, the asset has degraded to the point where it is no longer forecast to be compliant and meet required levels of service. Asset reinvestment is needed to ensure assets continue to meet service standards.	A change to the asset system or external events creates an opportunity and benefit for customers. An investment may be made to an asset that is otherwise compliant with requirements to realise cost efficiencies, benefits and/or additional value to Powerlink's customers.

2.6 Whole of Life

Powerlink examines assets from a whole of life perspective balancing benefits, costs and risks throughout the asset lifecycle. The asset planning and reinvestment process is a key component of the asset management life cycle.

Monitoring and evaluating asset condition is a key component of a comprehensive asset management strategy, and is used by Powerlink across the network.

The Reinvestment Criteria uses data captured during condition monitoring and other asset management activities to assess forecast asset condition deterioration rates. This provides information on the expected future performance of an asset, and is able to better inform the emerging need and timing for asset intervention.

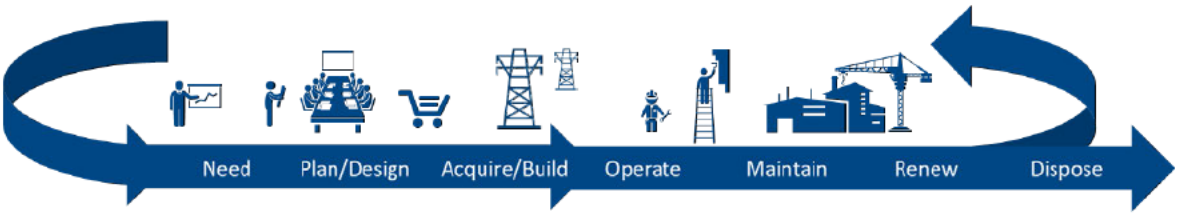

Figure 2.4 – Asset Management Lifecycle

3. Reinvestment Criteria Layers

3.1 Regulation (Layer 1)

Powerlink is a Transmission Network Service Provider (TNSP) and the Jurisdictional Planning Body for Queensland. Powerlink is required to comply with its Transmission Authority, and all relevant acts, legislation and regulations.

These include the Electricity Act 1994 (Queensland), National Electricity Rules, Electrical Safety Act (Queensland), Electrical Safety Regulations and associated Codes of Practice, Work Health and Safety Regulation 2011, and relevant standards and guidelines.

As an example, Clause 34 (1) (a) of the Electricity Act 1994 (Queensland) prescribes that:

"The transmission entity must operate, maintain (including repair and replace if necessary) and protect its transmission grid to ensure the adequate, economic, reliable and safe transmission of electricity."

Although legislation is specific regarding Powerlink's obligations to operate and maintain a safe, reliable and economic transmission grid, these requirements need to be interpreted within the specific network asset and management context.

3.2 Powerlink Application (Layer 2)

Powerlink has interpreted legislation and regulations to establish Reinvestment Criteria that link network assets to a required level of service across four broad categories as follows:

Safety Compliance

Powerlink sets asset condition limits to ensure assets do not breach limits for community, public, employee and contractor safety by applying a So Far As Is Reasonably Practicable (SFAIRP) principle as set in Workplace Health and Safety legislation 2011, in managing safety related to its assets.

Functional Compliance

Assets are required to maintain a level of functional performance to meet regulatory requirements.

Powerlink is committed to intervening, where possible, prior to asset life ending events where there is an enduring need for the network asset to ensure that reliability planning standards prescribed within Powerlink's Transmission Authority are met.

Environmental Compliance

Powerlink ensures that condition limits are established that comply with all environmental requirements.

Limits consider the individual and aggregate effect that all Powerlink assets have on the surrounding environment and community health.

Supportability Compliance

Powerlink sets asset condition, supportability and obsolescence criteria to ensure that requirements prescribed within the National Electricity Rules (NER) and AEMO Guidelines are met.

3.3 Asset Failure Events (Layer 3)

This layer supports the identification of asset failures that may result in non-compliance with legislative or regulatory requirements. Within this document, asset failure is defined as an irreparable failure that requires replacement for continued functionality.

The methodology is primarily focused on asset failure or non-conformance as a result of deteriorated condition or insufficient support and spares in the event of equipment failure. The criteria excludes irreparable failures associated with external events such as natural disasters, third party interference, and extreme weather events.

Failure of assets may not always result in non-compliance to legislative or regulatory instruments. The Reinvestment Criteria applies to failures that lead to breaches of legislation, regulations, standards and minimum mandated service standards.

3.4 Asset Condition Limits (Layer 4)

Although legislation is specific regarding operating and maintaining a safe, reliable and economic transmission grid, these requirements need to be interpreted and applied within the network asset and management context. Powerlink has developed asset condition limits that are designed to indicate when an asset will no longer be able to meet required service levels and on-going compliance with legislative and regulatory obligations.

Asset condition limits provide a deterministic threshold that forms the basis for asset intervention. The use of these quantitative measures provides a transparent and consistent means to determine where the boundary for non-compliance exists.

The derivation of these limits use a range of methods, including industry standards from reputable organisations and engineering analysis.

The most common failure modes for each major asset type are used to identify which condition limits are required to be derived. Information from routine inspection activities, as well as known technology and product obsolescence, are then used to monitor the rate of degradation and forecast non-compliance of the asset against the defined limits.

Powerlink manages assets taking into account costs across the entire lifecycle of the asset, including the costs of asset management. Asset condition limits are established for failure modes which are able to be more readily and effectively monitored so that the cost of asset management provides value and does not unnecessarily increase the cost of asset ownership. It is also important to ensure that asset monitoring techniques are not overly intrusive so as to introduce additional risks and modes of failure.

4. Reinvestment Timing Considerations

The required reinvestment timing is based on a number of considerations including:

- The lead time required for Powerlink to adequately and economically address the emerging non-compliance. The lead time is dependent on the nature of the reinvestment.
- The nature of failure modes and asset degradation mechanisms.
- The forecast rate of degradation of the ageing asset. The rate of deterioration is dependent on a range of factors including external and environmental influences; and
- The level of uncertainty regarding the existing asset condition and forecast rate of deterioration. For example, hidden failure modes or condition assessment using sampling techniques could lead to higher levels of uncertainty of equipment condition and performance.

The reinvestment timing incorporating these factors can be represented conceptually as shown in Figure 4.1 below.

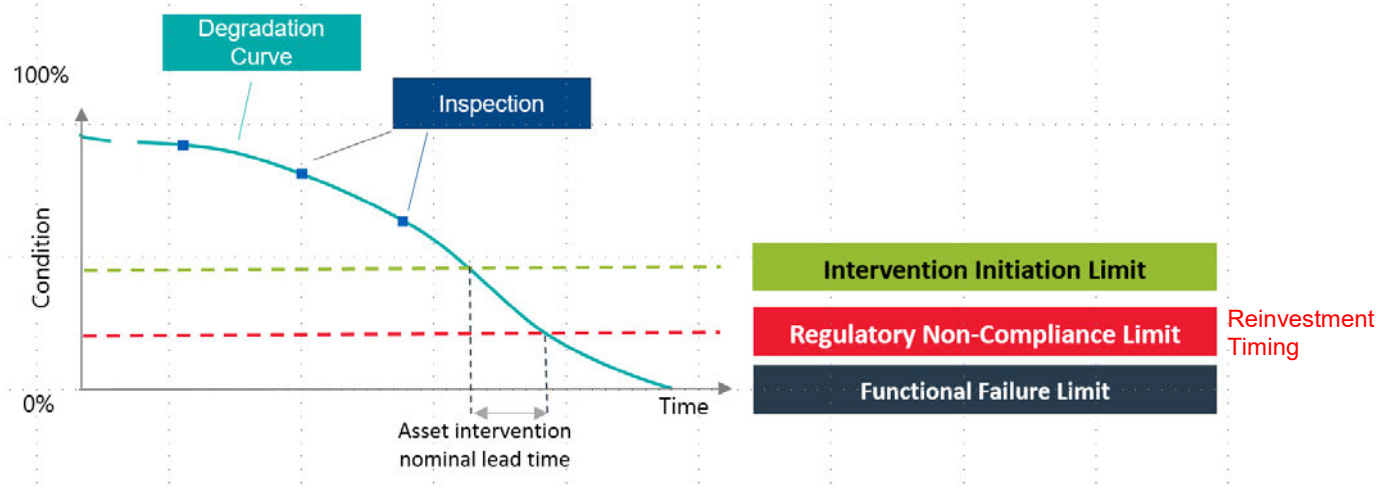

Figure 4.1 – Reinvestment Timing Limits

The asset intervention nominal lead time represents the period of time that is required to deliver on works to address legislative and regulatory requirements. The nominal lead time is dependent on the nature of the reinvestment. For example, lead times required for minor corrective action are considerably less than those associated with larger scale reinvestments.

To ensure that prudent, cost effective and optimal asset reinvestment solutions can be identified and implemented, the intervention initiation limit needs to be earlier than the regulatory non-compliance limit and take into account factors such as the nature, complexity and scale of technically feasible and economic solutions.

5. Application of Reinvestment Methodology

5.1 Practical Application

Examples of the practical application of the reinvestment framework illustrating links between customer and stakeholder objectives through to asset condition limits are shown in Figure 5.1.

These examples illustrate application of the framework to three major asset classes having differing legislative compliance requirements. Where the relevant attribute of the asset exceeds the asset condition limit, this provides the regulatory failure limit point.

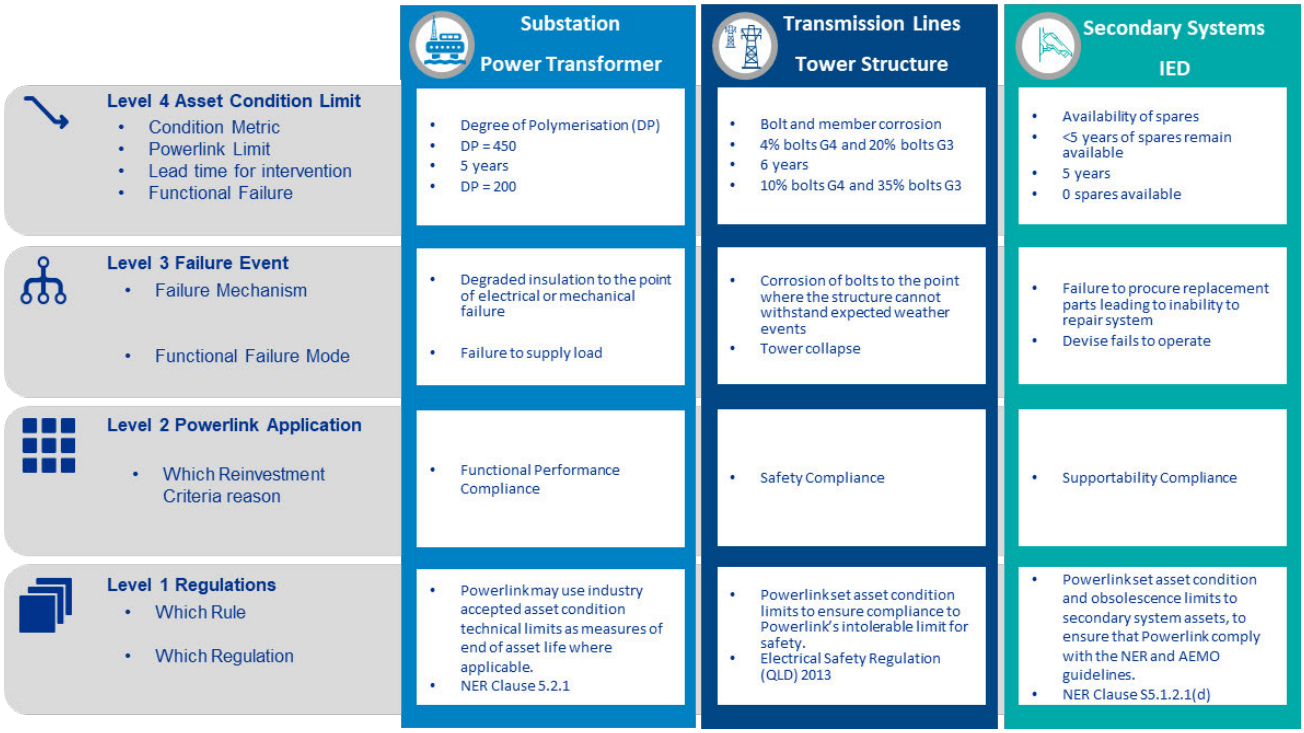

Figure 5.1 – Practical Application of the Reinvestment Criteria (Examples)

6. Conclusions

This document outlines the methodology used to assess the need and timing for intervention where network assets are approaching the end of their technical and economic life.

The methodology provides a transparent, consistent and structured approach for determining the intervention timing of network assets. This approach is used as part of Powerlink's asset reinvestment planning and regulatory activities to enable decisions on asset reinvestments to be made in a prudent, optimal and cost effective manner.

7. Distribution list

Internal	Contact details
☐ Strategy and Business Development	Executive General Manager Strategy and Business Development General Manager Network Portfolio General Manager Strategy Manager Portfolio Planning and Optimisation Manager Network and Alternate Solutions Manager Network Strategy
☐ Delivery and Technical Solutions	Executive General Manager Delivery and Technical Solutions General Manager Technology and Planning Manager Asset Strategies Manager Network Planning Manager Technology Solutions and Support, Delivery and Technical Solutions
☐ Finance and Governance	General Manager Regulation Manager Governance and Risk