1. Introduction

Powerlink is committed to asset management practices that ensure delivery of a transmission network that is fit-for-purpose and provides value for money to customers and stakeholders. Throughout the asset lifecycle, Powerlink must determine when to intervene with its assets to deliver cost-effective, safe and reliable services.

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

This methodology enables improved transparency and consistency within asset lifecycle stages, and allows Powerlink's customers and stakeholders to better understand the processes and criteria used for asset intervention. The nature of the intervention is dependent on a range of considerations and these are evaluated on a case-by-case basis.

Asset intervention in this document is defined as "intervention required when business as usual activities (including routine inspections, minor condition based and corrective maintenance) no longer enable the asset to meet the required level of service due to the asset condition reaching the end of its life". (Refer to Figure 1 for an overview of this process.)

Figure 1 – Asset intervention process

2. Asset intervention criteria

The asset intervention criteria has five layers as shown in Figure 2 below. Through this layered approach, the asset intervention criteria provides a direct link between customer and stakeholder objectives through to asset condition limits.

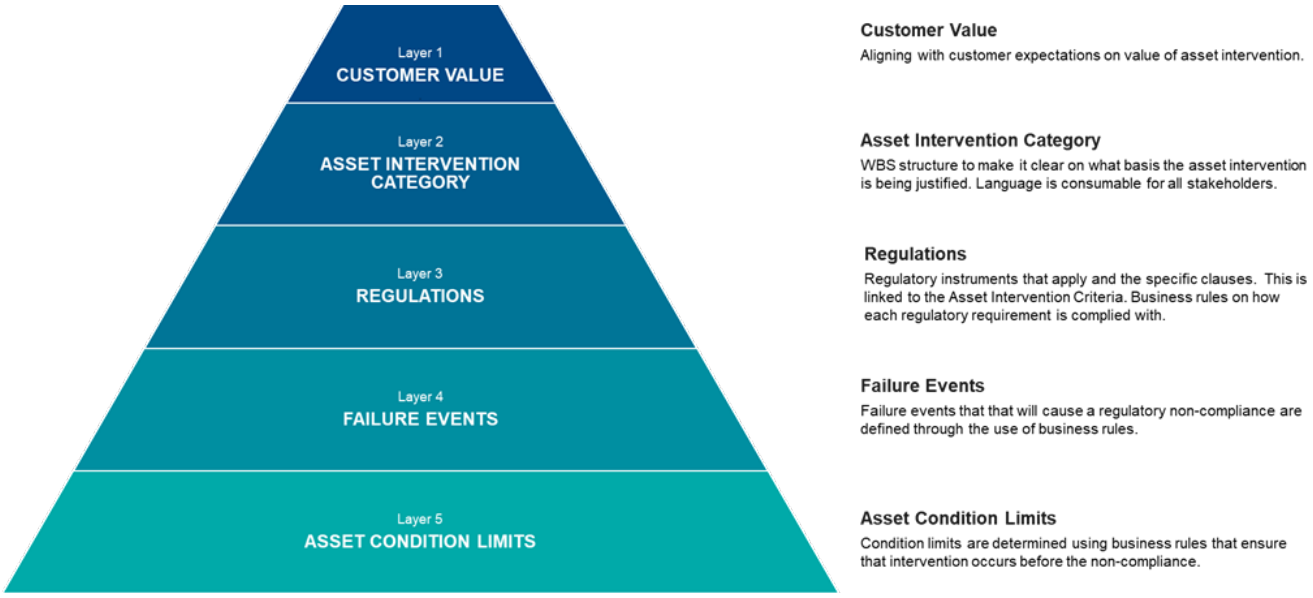

Figure 2 – Asset intervention criteria layers

Layer 1 - Customer value

Powerlink has worked with its stakeholders to develop the Customer Service Charter, a commitment that Powerlink has to our 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 the community, our contractors and our people
- placing the customer at the centre of everything we do
- listening to our customers to better understand their needs using customer feedback to drive continuous improvement
- genuinely engaging with customers, demonstrating how their input has improved decision-making
- ensuring our customers see value in the services we provide.

Layer 2 - Asset intervention category

The asset intervention category defines the broad areas of compliance relating to the asset intervention criteria. There are four key areas relevant to Powerlink's transmission network:

Safety compliance
Managing network assets in a safe manner for our employees, contractors, customers and the general public. For example, this means 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.

Functional compliance
Ensuring our network continues to meet our planning criteria set by our transmission licence. For example, this means monitoring transformer condition and initiating replacement before failure violates this criteria (failing to comply with network reliability requirements).

Environmental compliance
Ensuring network assets meet environmental legislative requirements. For example, taking remedial action on an ageing transformer before it degrades to the point where managing the risk of unplanned oil discharge is considered unacceptable.

Supportability compliance
Managing network assets to ensure post-fault service restoration can occur without placing load at risk for a period longer than stipulated as acceptable by National Electricity Rules. For example, this means continually monitoring the level of support and spares to ensure the protection system can be returned to service in the event of a failure within sufficient timeframes to meet regulatory requirements.

The mapping between asset intervention measures and relevant regulations is shown conceptually within Appendix 1. Note, this is not an exhaustive mapping of relevant legislation and regulations.

Layer 3 - Regulations

Powerlink is a Transmission Network Service Provider (TNSP) and jurisdictional planning body for Queensland. As part of licence conditions, Powerlink is required to comply with its Queensland Transmission Authority, and all relevant acts, legislation and regulations.

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

For 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 very specific regarding operating and maintaining a safe, reliable and economic transmission grid, these requirements are not always expressed as quantitative limits.

Layer 4 - Asset failure events

This layer supports the identification of asset failures that may result in non-compliance to 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 ageing, deteriorated condition, or insufficient support and spares in the event of a protection system's failure.

This criteria excludes irreparable failures associated with external events such as natural disasters, third party interference, and extreme weather events.

Failure of assets which are preventable may not always result in a non-compliance to a legislative or regulatory instrument. The asset compliance intervention criteria only applies to failures which lead to breaches of legislation, regulations, design standards and minimum mandated service standards.

Layer 5 - Asset condition limits

Powerlink has developed a series of asset condition limits that are designed to indicate when an asset will no longer be able to meet the required service levels to ensure its ongoing compliance with all mandated obligations.

The asset condition limits aim to set clear measurements to provide a transparent, consistent and readily comprehensible means to determine the basis of a trigger for asset intervention.

The most common failure modes for each major asset type are used to identify which asset element will require condition limits to be derived and set. Readily available 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.

3. Asset intervention timing considerations

The required asset intervention 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 intervention.
- The asset degradation mechanisms and nature of failure modes.
- 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.
- 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 intervention timing incorporating these factors (e.g. lead time and degradation rate) can be represented conceptually as shown in Figure 3 below.

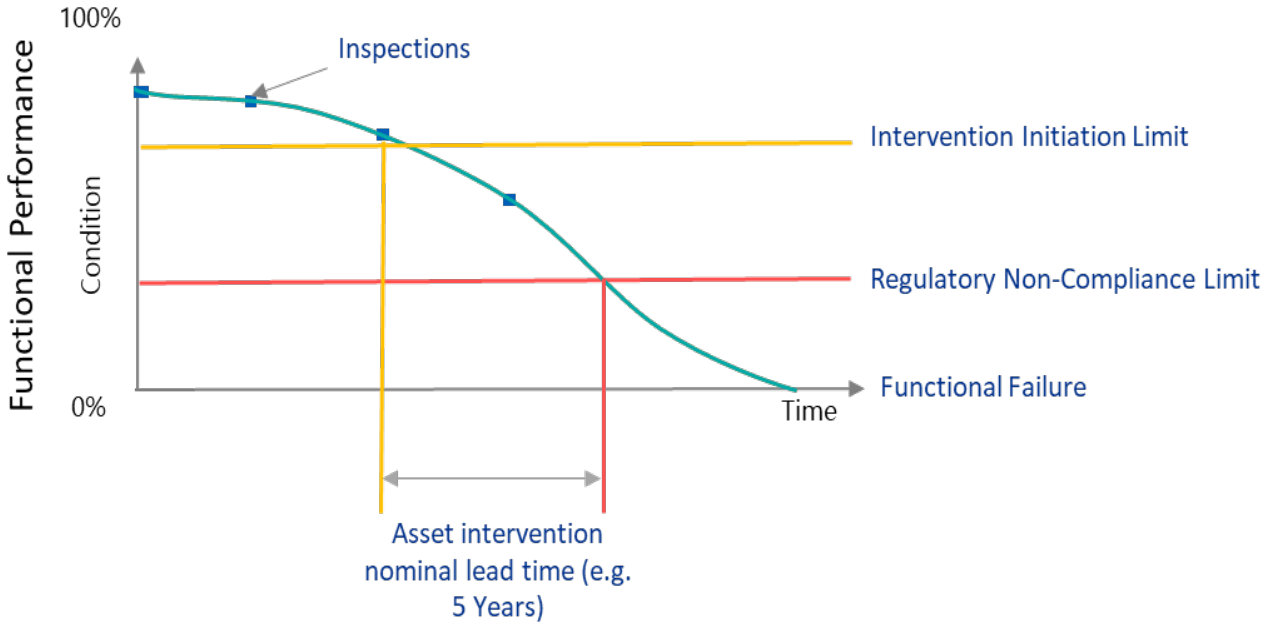

Figure 3 – Powerlink's approach to asset intervention timing limits

The nominal asset intervention 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 asset intervention. For example, lead times required for minor corrective action are considerably less than those associated with larger scale asset reinvestments.

In order to minimise the risk of late intervention, the intervention timing will be earlier than the regulatory failure limit.

4. Application of asset intervention methodology

Examples of the practical application of the asset intervention framework illustrating links between customer and stakeholder objectives through to asset condition limits is shown in Figure 4.

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.

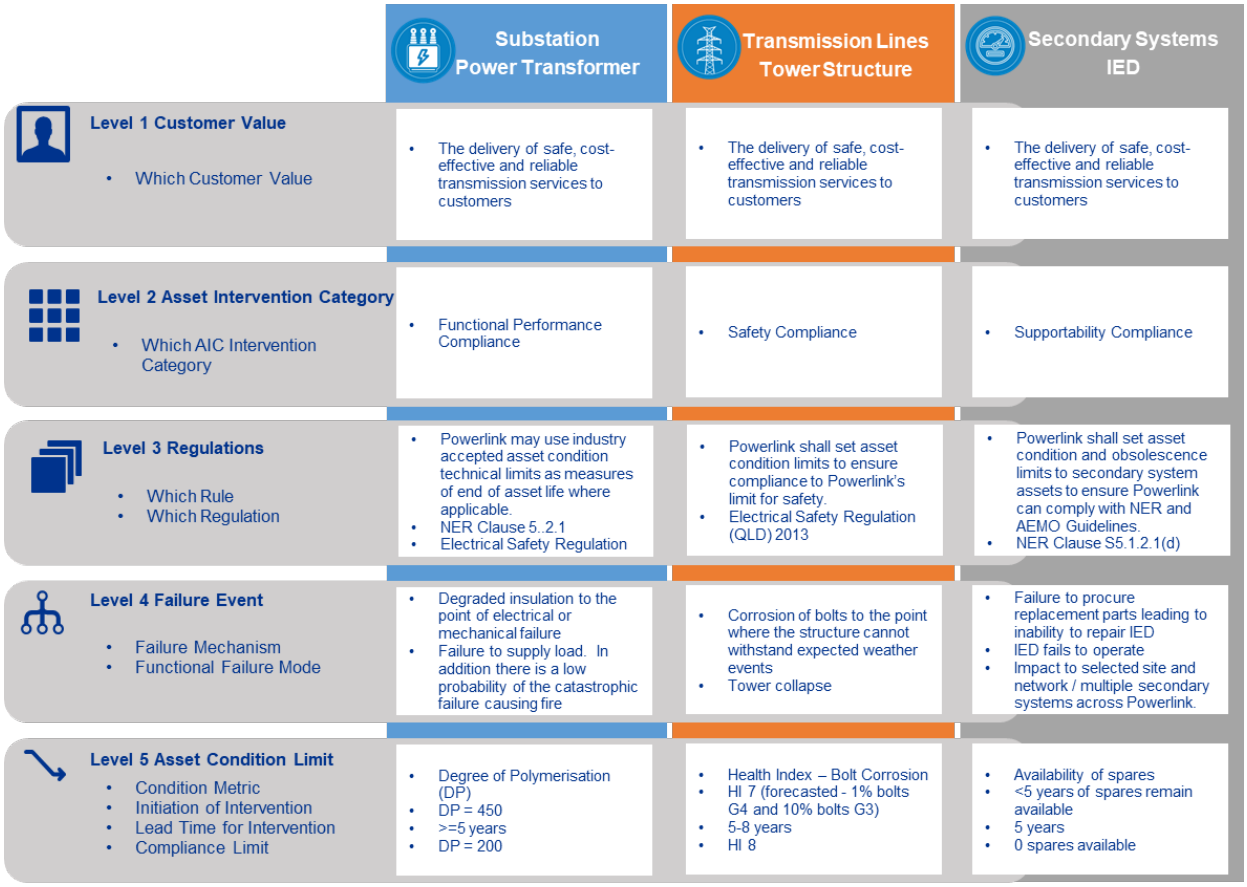

Figure 4 – Practical application of the asset intervention criteria framework (example)

5. Conclusions

This document outlines an approach for evaluating the required intervention timing before an asset's condition reaches a point where legislative and regulatory requirements are breached.

The methodology provides a link between customers and stakeholders, mandatory legislative and regulatory requirements and the timing to initiate an asset intervention.

Powerlink is committed to good asset management practice and timely asset reinvestment decisions that meet the needs of our customers and stakeholders, as well as relevant legislative and regulatory requirements.

6. Questions for discussion

a. Is there anything else we need to consider as part of the asset intervention framework to help deliver better outcomes for customers?

b. How can we communicate this framework to customers and stakeholders in a simple way?

Appendix 1 – Mapping of asset intervention categories to regulations