

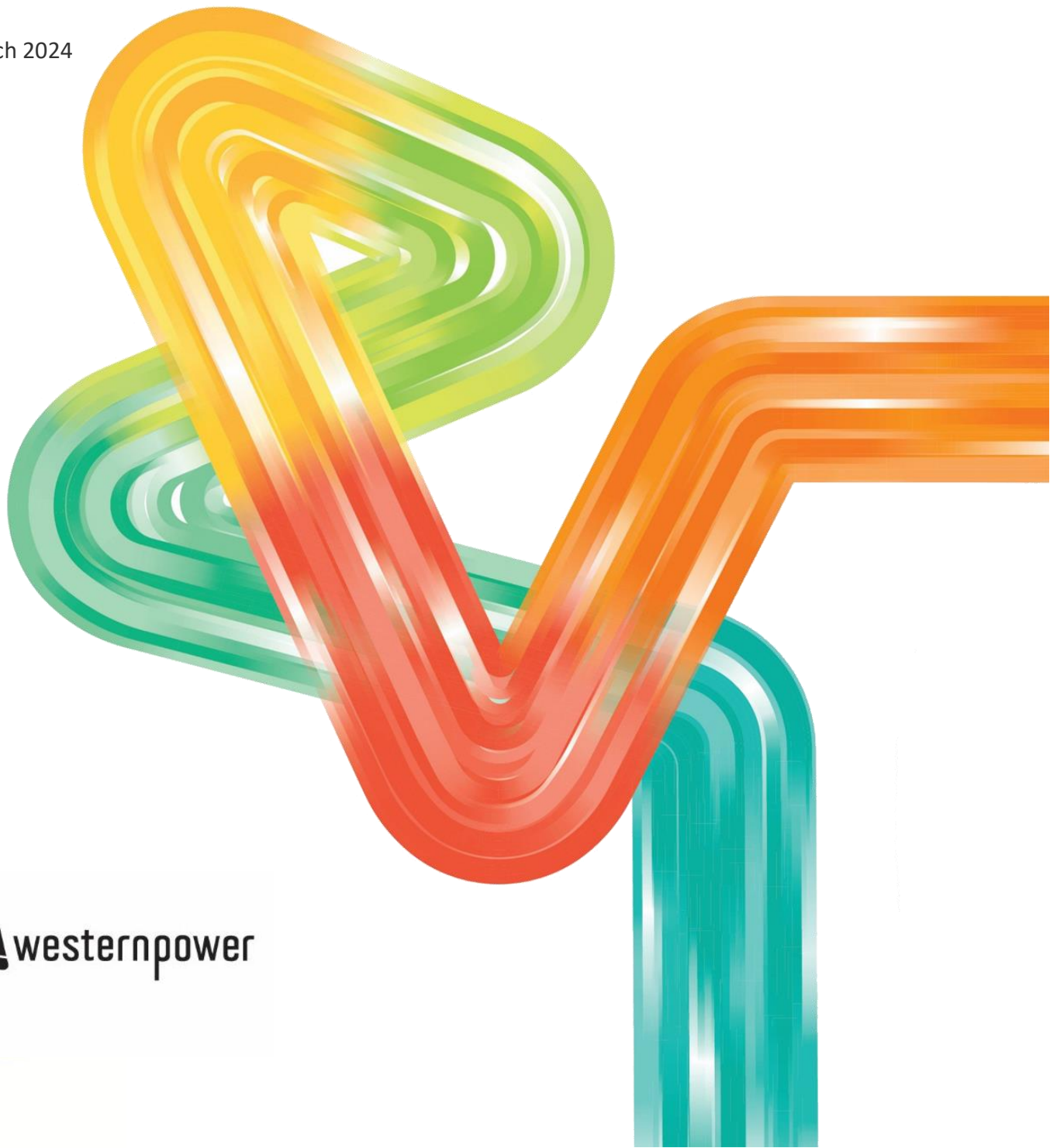
Non-Co-optimised Essential System Services Trigger Submission

Reliability and system strength services for the Eastern Goldfields region

Submission to the Coordinator of Energy

Public

12 March 2024



NCESS assessment template

Organisation: Western Power	Date: 12 March 2024
<p>Summary of proposal:</p> <p>Western Power understands that following an outage impacting the Eastern Goldfields (EGF) region, the Minister for Energy (Minister) and Energy Policy WA (EPWA) have been considering the need for improvements in the reliability of the network in the EGF region and have engaged Western Power and the Australian Energy Market Operator (AEMO) to consider options.</p> <p>Due to the distance and anticipated cost involved in building a second transmission supply to the EGF, Western Power has identified that one option to deliver improved reliability to the EGF region in the short to medium term may be through a Non-Co-Optimised Essential System Service (NCESS). In making this submission Western Power intends to seek expressions of interest from potential NCESS providers as an efficient alternative option to maintain the reliability of the covered network and its ability to provide contracted covered services.</p> <p>By making this submission, Western Power is also seeking to encourage development of innovative non-network solutions (by service providers) that maintain reliable supply to the EGF region and meet customer expectation for increased renewable energy in the region in the short to medium term.</p> <p>In addition, Western Power considers it likely that NCESS providers will also be able to provide services that benefit the wider Wholesale Electricity Market and assist AEMO to fulfill their obligations.</p> <p>Please refer to section 1.1 of this submission for further information.</p>	
<p>Trigger for assessment:</p> <p>Western Power has identified that while it complies with the current reliability standard, if the Minister proposes amendments to the minimum reliability standards, it may require the need for additional NCESS located in the EGF region as an alternative option to major augmentation or new network facilities investment.</p> <p>Please refer to section 1.2 of this submission for further information.</p>	
<p>Formal assessment:</p> <p>Western Power is seeking expressions of interests from potential NCESS providers to determine the most cost-effective option to improve reliability of the network in the EGF region if the Minister proposes amendments to the minimum reliability standards.</p> <p>Please refer to section 1.5 and 1.6 of this submission for further information.</p>	
<p>Consultation:</p> <p>Western Power has consulted with EPWA and AEMO as required by clause 3.2.1 of the NCESS Guideline. Outcomes from this engagement have been included in this submission and this submission is made with the support of both EPWA and AEMO.</p> <p>Please refer to section 1.7 of this submission for further information.</p>	

Services required:

Western Power seeks expressions of interest to procure a reliability service and a system strength service for the EGF region. The proposed services are required to improve reliability of the network in the EGF region if the Minister proposes amendments to the minimum reliability standards. The timing of commencement of the proposed services is currently being considered by Western Power but will be refined through this NCESS process including through input from potential NCESS providers.

A prospective NCESS provider may offer either a reliability service or a system strength service, or both, that can fully or partially meet the relevant service requirements. Please refer to section 1.4 of this submission for further information.

Attachments:

Not included.

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1. Reliability and system strength services

1.1 Proposal

Western Power understands that following an outage impacting the EGF, the Minister and EPWA have been considering improvements in reliability of the network in the EGF region and have engaged Western Power and AEMO to consider options. Due to the distance and anticipated cost involved in building a second transmission supply to the EGF, Western Power has identified that one option to deliver improved reliability to the EGF region in the short to medium term may be through an NCESS. Western Power has also identified that any amendments made by the Minister to the minimum reliability standards may require the need for an emerging service provided by non-network services located in the EGF region.

Western Power is seeking expressions of interest from potential NCESS providers as an efficient alternative option to investment in the network in order to improve the security and reliability of the covered network and its ability to provide contracted covered services.

Western Power's assessment of the potential improvement to the minimum reliability has identified several factors which forecast a need for an alternative option in the EGF region, including:

- Reliability service: If prolonged supply disruptions were to occur there will be an increasing amount of unserved energy.
- System strength: This requirement has historically been provided through a relatively high proportion of large, synchronous generators on the network, which assisted with maintaining voltage stability/system frequency, providing sufficiently high fault levels for protection systems to operate as intended, and avoiding unstable operation of inverter-based resources/generator control systems and power quality issues. The move to more inverter-based resources along with the retirement of large synchronous generators across the network means that the potential improvement to the minimum reliability standards may require a non-network service.

By making this submission, Western Power is also seeking to encourage the development of innovative non-network solutions (by service providers) that maintain reliable and secure supply to the EGF region and meet customer expectations for increased renewable energy in the region in the short to medium term.

If through the NCESS procurement process appropriate services are identified, then changes to the reliability regulatory framework will be required prior to entry into an NCESS. This could occur through further changes to the *Network Quality and Reliability of Supply (NQRS) Code 2005 (NQRS Code)*.

1.2 Trigger

On the basis that proposed improvements to the minimum reliability standards are made by the Minister via the NQRS Code or otherwise, clause 3.11A.2 of the Wholesale Electricity Market (**WEM**) Rules requires Western Power to make this submission to request the Coordinator to determine whether to trigger an NCESS procurement process in accordance with section 3.11B of the WEM Rules.

The trigger submission must include sufficient information and analysis to allow the Coordinator to consider the following factors outlined in clause 3.11A.7 of the WEM Rules:

- (a) the extent to which an NCESS will address the issue;
- (b) the extent to which an NCESS will minimise costs in the WEM;
- (c) the relative merits between procuring an NCESS or augmenting the network;

- (d) whether it is suspected that there is a potential exercise of market power;
- (e) whether the procurement of an NCESS is consistent with the Wholesale Market Objectives; and
- (f) whether procurement of an NCESS will be in the long-term interests of consumers.

Western Power considers it likely that NCESS providers will also be able to provide services that benefit the wider Wholesale Electricity Market and assist AEMO fulfill their obligations.

This trigger submission summarises Western Power's technical and economic assessment of the need for additional non-network services to be located in the EGF region as an alternative option to major augmentation or new network facilities investment, on the basis that proposed improvements to the minimum reliability standards in the NQRS Code or otherwise may be made by the Minister.

1.3 Background

The EGF region relies on a single 650km 220 kilovolt (kV) line from Muja terminal to West Kalgoorlie terminal for the provision of secure and reliable electricity supply (Figure 1). It then steps down to the local 132kV network which connects several zone substations and large mining customers. The network supplying the EGF is designed under an N-0 criterion and is compliant with the current Technical Rules under the Access Code.

The capacity of the 220kV line is not a fixed value; rather it is calculated dynamically based on system conditions at any given time. Essentially, the power transfer limit is a function of generation within the EGF compared with that across the rest of the South West Interconnected System (**SWIS**). The limit is in place to ensure that technical requirements are met to maintain adequate supply to existing customers in the EGF region. Typically, this power transfer limit is between 100-200 MW, but the figure varies based on changing system parameters.

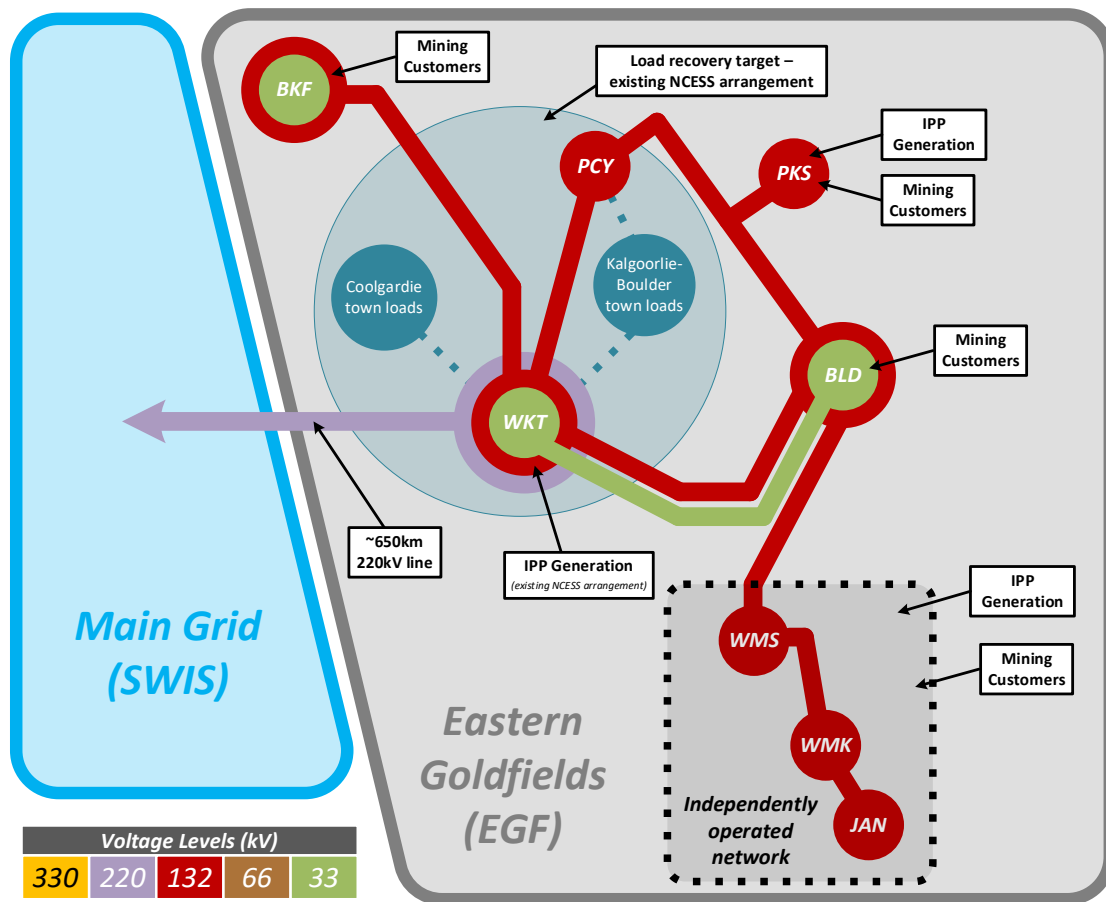
Currently, there are over 16,700 domestic, commercial, agricultural and large mining customers in this load area, including 120 sensitive customers.¹ The majority of small customers (including 91% of sensitive customers) are in the Kalgoorlie-Boulder and Coolgardie townships.

At 5.46pm on 17 January 2024, a severe storm over the Wheatbelt led to the collapse of five towers supporting the 220 kV transmission network lines that connect Kalgoorlie to the SWIS. As a result, the EGF region was disconnected from the SWIS, cutting power supply to customers in Kalgoorlie and surrounding areas. An estimated 16,000 customers in the EGF lost power as a result of the towers collapsing. Western Power acknowledges the impact that the unplanned outage that occurred in the EGF region had on customers.

As a result of an innovative network solution deployed in collaboration between AEMO and Western Power, electricity was eventually restored to the region, supplied by the SWIS. All residential customers directly impacted by the collapse of the towers had power restored by 6.57am on 19 January 2024. Remaining customers, primarily mining and industrial loads, had power restored over the following days, with all customers having power restored by 3.35pm on 23 January 2024.

¹ Sensitive customers include people on life support, hospitals, water pumping stations, schools, prisons, and traffic lights.

Figure 1: Overview of the EGF load area



The inherent challenge of any long overhead line is in its exposure to environmental factors that may cause an unplanned outage. In the event of a 220kV line outage, the EGF region would experience a major power supply disruption (or blackout). While most unplanned outages are of short duration, there have been infrequent occasions (including the January 2024 incident above) where the outage period can last for an extended period due to major equipment or line structure damage. Such events could escalate into a potentially high-risk situation if smaller residential and commercial customers are unable to have a functioning backup power arrangement.

From a regulatory perspective, Western Power is required to maintain minimum reliability standards for supply to the EGF prescribed through temporary obligations under the NQRS Code. The current obligations are effective through to 30 September 2028 and require Western Power to:

- restore and maintain at least 45MW of supply to essential services loads and the majority of small use customers in the EGF as soon as is reasonably practicable following the occurrence of an unplanned outage of a transmission element supplying the Eastern Goldfields; and
- maintain at least 45MW of supply to essential services loads and the majority of small use customers in the EGF during the occurrence of a planned outage of a transmission element supplying the Eastern Goldfields.²

² The NQRS Code 2005 can be accessed [here](#).

Western Power has been utilising a third-party service to meet its current obligations under the NQRS Code for the EGF region. As the existing service ensures reliable supply for small use customers, only a portion of the energy use is supported in the event of a planned or unplanned outage. Load requirements of large commercial and industrial customers are unlikely to be met unless they source their own back up supply.

The existing reliability service is provided by Synergy from their two gas turbines at the West Kalgoorlie Terminal substation. One of the units has black-start capability that enables it to run following a contingency event.

Recent technical and economic assessments carried out by Western Power have identified that, while it complies with the current reliability standard, if the proposed improvement to the minimum reliability standard is implemented it will require Western Power to consider an alternative option in order to maintain the safety or reliability of the covered network and its ability to provide contracted covered services as the existing two Synergy gas turbines do not have the capability to service any increased load.

1.4 Services required

On the basis that proposed improvements to the minimum reliability standards under the NQRS Code or otherwise may be implemented by the Minister, Western Power is seeking expressions of interest from NCESS providers to provide:

- a reliability service – capability to minimise power supply disruption as a result of planned or unplanned outages (with ability to maintain a stable islanded network following the loss of the 220kV line and provide black-start capability in the event of total power loss to the region); and
- a system strength service – capability to maintain voltage stability, power quality obligations and sufficiently high fault levels for intact network conditions, or as a result of planned or unplanned outages (with ability to maintain a stable islanded network following the loss of the 220kV line). Western Power also requires services to ensure system inertia requirements are met for islanded and black-start situations.

The contract term for the proposed services could commence on 1 July 2026 (or as otherwise required by the minimum reliability standards) and have a five-year duration with the possibility of a five-year extension. Western Power will seek to gain industry feedback through the expressions of interest step on any benefits associated with a different contract duration or a change to the commencement date.

To ensure compliance with the potential improvements to the reliability requirements under the NQRS Code or otherwise, Western Power is seeking expressions of interest from NCESS providers to procure the following quantities of service, noting that these may need to be adjusted to reflect the final form of the potential improvements to the minimum reliability standards in the EGF region:

- reliability services – up to a maximum of 150 MW, and
- system strength services – up to a maximum of 1,500 MVA of available fault level.

A prospective NCESS provider may offer either a reliability service or a system strength service, or both, that can fully or partially meet the relevant service requirements. Western Power aims to secure services from multiple NCESS providers to manage redundancy and encourage a diversity of supply in the EGF region. For new facilities Western Power will facilitate future connections in accordance with the WEM Rules and its Connections Policy within preferred locations in the EGF; these preferred locations would be outlined in the draft NCESS Service Specification, should the Coordinator determine to trigger this NCESS procurement process.

When the services are not called under Western Power’s NCESS Contract³, the NCESS providers may offer their capabilities into the WEM by participating in the WEM trading mechanisms for energy, Essential System Services and Reserve Capacity. NCESS providers capable of receiving Certified Reserve Capacity Credits will be required to apply for certification for each relevant Capacity Year during the contract term in accordance with clause 5.2A.2 of the WEM Rules. In instances where the NCESS provider participates in the WEM trading mechanisms, the offered capabilities will be called upon by AEMO in accordance with the WEM Rules.

NCESS Contracts will be structured in a manner that endeavours to ensure availability and delivery of the service without exceeding the value of the service to consumers by, for example, accounting for any relevant market revenues received outside of the NCESS Contract.

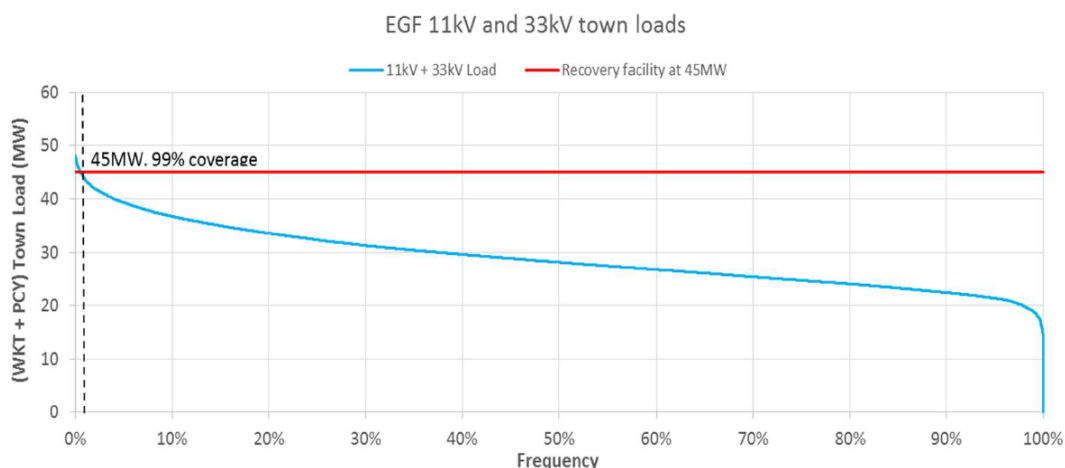
If the Coordinator decides to trigger an NCESS procurement process, the draft NCESS Service Specification, released alongside a call for expressions of interest would outline the full requirements for these services.

1.5 Analysis

1.5.1 Reliability service requirement

Currently, following an unplanned outage, the Kalgoorlie-Boulder and Coolgardie township loads are recovered by dispatching two Synergy gas turbines connected to the West Kalgoorlie terminal substation which has been sufficient to meet the minimum reliability standards to date. This contractual arrangement covers 99% of the township loads (~45MW) as shown in Figure 2 and AEMO assists with the load recovery of the remaining reference customers by dispatching additional generation capacity (as required) during an islanding event.

Figure 2: EGF annual township loading profile



This arrangement has historically enabled the recovery of the EGF load and relies on the existing generation in the area being inherently sufficient to meet reliability and system strength needs. However, with the move to more inverter-based resources along with the retirement of large synchronous generators across the network, if the Minister makes improvements to the minimum reliability standards in the EGF region this arrangement will not be sustainable in the future.

³ When the NCESS providers are called upon under Western Power’s NCESS Contract, they will be dispatched by AEMO, with the agreed requirements reflected in the relevant NCESS Contract.

1.5.2 System strength service requirement

On the basis that the proposed improvements to the minimum reliability standards may be made by the Minister to the NQRS Code or otherwise, Western Power's recent analysis of the network, has shown that an increase of circa 1,500 MVA of available fault level (system strength) will be required to support system security and stability in the EGF region.

1.5.3 Merits of a non-network solution versus network build

Building transmission infrastructure connecting the EGF to the Southwest requires significant lead times (up to 10 years) needed for planning and construction.

In the short to medium term, Western Power considers a non-network solution in the EGF region may be the most suitable and cost effective option to address the proposed improvements to the minimum reliability standards in the short to medium term, specifically:

- a non-network solution establishes an efficient alternative supply source for the EGF region during periods in which the upstream network supply is restricted or unavailable.
- a non-network solution is also likely to be more readily available for implementation when compared to the lead times it would take to plan and construct a new transmission line.

Western Power's financial analysis of a non-network solution versus a network build is set out in further detail at Schedule 1 which is to be redacted in any publication of this submission.

1.6 Other Factors for Consideration

This section presents relevant analysis to enable the Coordinator to consider the extent to which an NCESS will meet factors under clauses 3.11A.7(c) – (f) of the WEM Rules:

- the relative merits between procuring an NCESS or augmenting the network;
- the outcome of any investigation of behaviour that reduces the effectiveness of the market, including behaviour related to market power;
- whether the procurement of an NCESS is consistent with the Wholesale Market Objectives; and
- whether procurement of an NCESS will be in the long-term interests of consumers.

1.6.1 Considerations under 3.11A.7(c)

The relative merits between procuring appropriate market services and relevant network augmentation options are considered in section 1.5.3 and Schedule 1 of this submission.

1.6.2 Considerations under 3.11A.7(d)

Western Power is not aware of any market power aspects relating to the identified trigger.

1.6.3 Considerations under 3.11A.7(e)

Western Power considers that the mitigation of the issue identified in this submission is consistent with the Wholesale Market Objectives, specifically:

- a service specification can be developed such that the services can be delivered by a range of technologies, meeting the Wholesale Market Objective in clauses 1.2.1(c).

- the NCESS procurement process will ensure the cost of the service is as efficient as possible, meeting the Wholesale Market Objectives in clauses 1.2.1(a), (b) and (d).

1.6.4 Considerations under 3.11A.7(f)

Western Power considers that the mitigation of the issue identified in this submission is in the long-term interest of consumers as the service will ensure reliable and secure supply as required by the minimum reliability standards.

1.7 Consultation

Western Power has consulted with EPWA and AEMO as required by section 3.2 of the NCESS Guideline (published in accordance with clause 3.11A.2A of the WEM Rules) and met the requirements of clause 3.11A.2(f) of the WEM Rules. This submission is made with the support of both EPWA and AEMO and reflects the consultation outcomes.

2. Schedule 1 - Redacted