

D-factor Submission Summary

Eastern Goldfield Network Control Services

20 October 2020



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1. Purpose

In accordance with section 6.76 of the *Electricity Network Access Code 2004* this D-factor submission is provided to the Authority for the Authority to determine whether:

- (a) actual non-capital costs incurred by Western Power meet the requirements of section 6.40

This D-factor Submission Summary has been prepared to support Western Power's proposed D-factor adjustment to target revenue over the fifth Access Arrangement (AA5) period. Specifically, this summary details the additional non capital costs incurred by Western Power during the fourth access arrangement (AA4) period in relation to demand management initiatives or Network Control Services (NCS).

Its primary purpose is to:

- (i) demonstrate that the NCS relates to demand management or a generation solution that would otherwise require network augmentation
- (ii) demonstrate that the operating expenditure proposed complies with the requirements of sections 6.40 and 6.41 of the *Electricity Network Access Code 2004 (Code)*.

This document provides a summary of the key information required to demonstrate compliance with the requirements of the access arrangement and the Code. This document also provides references to the key documents that support this summary and capture the decisions and justifications made throughout the course of the project/program.

Where relevant, this D-factor Submission Summary supplements key documents by:

- providing references to additional information and documents which assist in demonstrating compliance, created during AA4 but not referenced or included in the key project documentation
- providing supplementary information which supports and/or demonstrates compliance of the project where this was not apparent in any existing documentation
- providing evidence of compliance with the expenditure governance framework.

2. D-factor Compliance

Project / Program Numbers:	SSM00039 T0478908
Strategy / Activity Description:	NCS provision for Synergy generation facilities at West Kalgoorlie.
Business case(s):	[REDACTED]
Regulatory Category:	Non-recurring operating expenditure

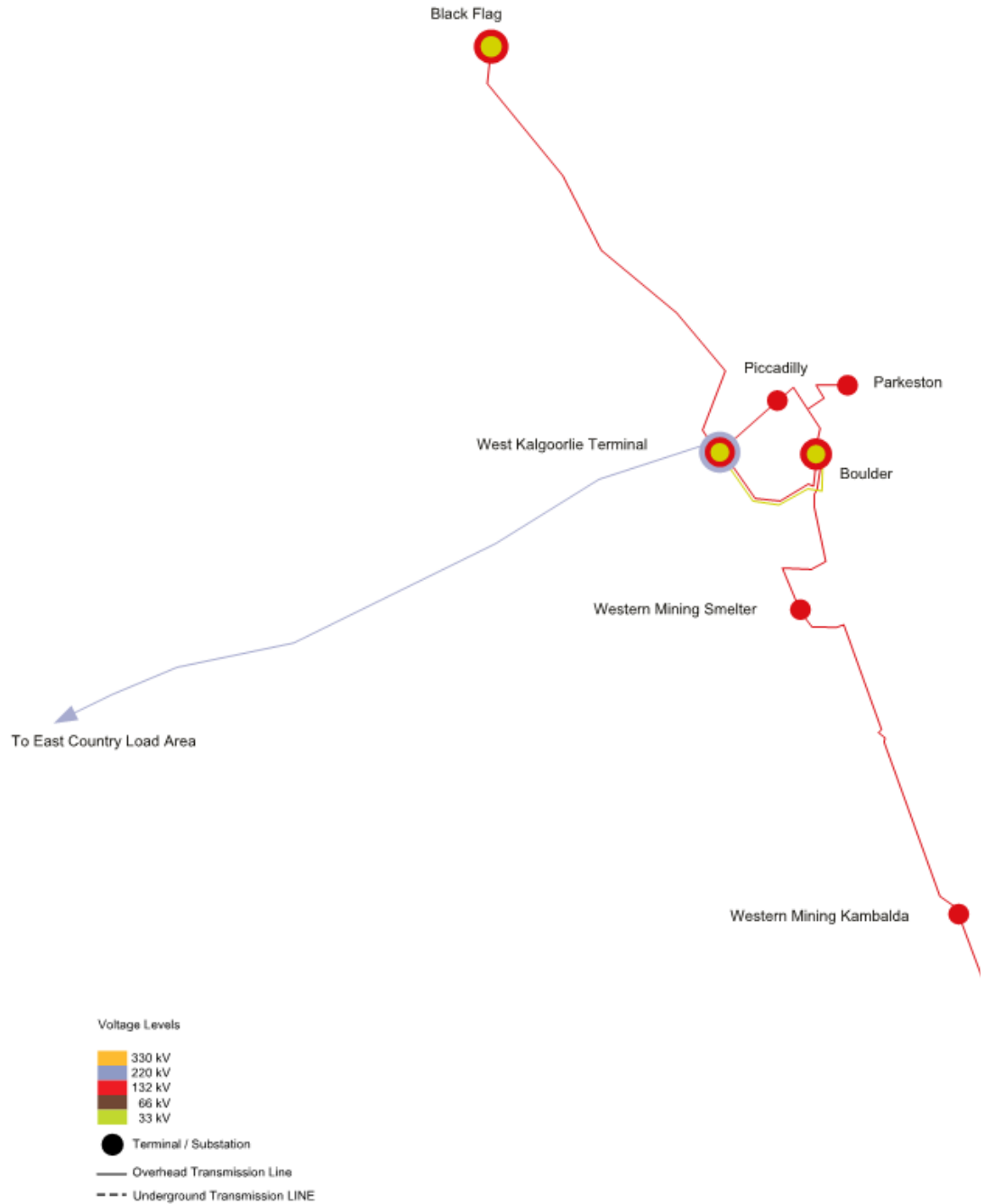
Table 1: Investment reconciliation overview (\$M, nominal):

		\$M, nominal
Internal approvals	AA4 submission*	N/A
	Business case	17.5
	Business case + change control	N/A
AA4 D-factor	AA4 Actual (18 Months Actual + 2 Year & 3 Months F'cast)**	12.3
Variances	To AA4 submission	N/A
	To internal approvals (AA4 period)	2.1

* Note there was no approved expenditure associated with this project in AA4 as the Economic Regulation Authority advised that all NCS expenditure was to be recovered through the D-factor mechanism if it could be demonstrated that the expenditure met Code requirements 6.40 and 6.41.

** The business case forecast costs of \$17.5M, for a 5 year NCS contract. The AA4 component (3 years & 9 months) is \$14.4M

Identified Need & Timing:	<p>The need and timing for the NCS investment in Eastern Goldfields (EGF) can be attributed to following factors:</p> <ul style="list-style-type: none"> • characteristics of the EGF load area and reliance on a single 650km 220kV line for reliable electricity supply • customer load characteristics, and • external market changes that resulted in the retirement to Synergy's generation facilities and termination of the existing Dispatch Support Service (DSS) which came into effect on September 2018 <p>The EGF load area is mainly supplied via a single 650km 220kV line construction from Muja to West Kalgoorlie (WKT) terminal. There are approximately 16,500 (including 106 sensitive customers) domestic, commercial, agricultural and large mining customers in this load area. Sensitive customers include people on life support, hospitals, water pumping stations, schools, prisons, and traffic lights etc. In the event of the 220kV line outage, the entire Goldfields region would experience a major power supply disruption (or blackout). While most outages are of short duration, there have been infrequent occasions where the outage period lasted between 2-3 days (due to major equipment or line structure damage).</p>
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The diagram above shows the 220kV transmission line supplying the Eastern Goldfields region from the East Country Load Area (Merredin Terminal).

In the event of an unplanned outage, EGF load recovery has been administered via a DSS contract by dispatching two Synergy gas turbines (GT) connected at WKT substation. However, as a result of the market changes contemplated by the Electricity Market Review (EMR), existing supply arrangements via the DSS contract between System Management and Synergy in the EGF area were terminated, resulting in an unacceptable supply risk. A brief timeline of the EMR decision making process is provided below:

On 14 March 2016, a Position Paper released by the EMR entitled “Design Recommendations for Wholesale Energy and Ancillary Service Market Reforms” stated an expectation that the current contract for the provision of DSS by Synergy for the EGF area

(via the West Kalgoorlie Power Station) would terminate at the time proposed new market arrangements commenced in mid-2018.

Subsequently, the Final Report¹ for the design recommendations released in July 2016 considered that the current framework for DSS in the Wholesale Electricity Market (WEM) would be replaced by new arrangements similar to those which exist in the National Electricity Market for Network Support and Control Ancillary Services. The report proposed that the existing DSS contract between Synergy and System Management would be terminated on 1 July 2018. The EMR also intended for Western Australia to transition to the national framework for the regulation of Western Power's network (including connection and access) by this date. The national framework provisions for Network Support and Control Ancillary Services, in conjunction with commensurate reforms would have allowed existing DSS and NCS mechanisms to be replaced.

On 4 May 2017, as a result of market changes recommended by the EMR, the Minister for Energy confirmed the State Government's decision to retire 436MW of Synergy's generation capacity, which included the WKT GTs in the EGF network. In conjunction with this, the decision to terminate the DSS arrangement operating in the EGF area was confirmed, effective June 2018. Synergy's associated generation facilities were scheduled for retirement on 30 September 2018. The relevant EMR changes that would have effectively 'replaced' the DSS did not eventuate; however, the decision to terminate the DSS remained.

As a result of the decision by the State Government to terminate the DSS, Western Power entered into discussions with the Public Utilities Office (PUO), the Economic Regulation Authority (ERA) and AEMO to explore current regulatory requirements and responsibilities, and policy direction to determine where the responsibility might / should reside to provide a service that replaces the current DSS service (at some level) for customers in Kalgoorlie-Boulder and Coolgardie towns to ensure the ongoing provision of reliable supply is maintained².

Following meetings the PUO held with Western Power, AEMO and Synergy, the PUO provided confirmation of the decision to progress with a regulatory obligation amendment under the Electricity Industry (Network Quality and Reliability of Supply) Code (NQRS Code) that explicitly placed reliability of supply obligations on Western Power in the EGF area. The NQRS Amendment was gazetted on 25 September 2018, effective from 1 October 2018 to 30 September 2023. NQRS Amendment Section 13B "Temporary reliability standards for supply to Eastern Goldfields" states the following:

13B. Temporary reliability standards for supply to Eastern Goldfields

- (1) *Electricity Networks Corporation must, so far as is reasonably practicable, have in place arrangements to—*
 - (a) *restore and maintain at least 45MW of supply to essential services loads and the majority of small use customers in the Eastern Goldfields as soon as is reasonably practicable following the occurrence of an unplanned outage of a transmission element supplying the Eastern Goldfields; and*

¹ http://www.finance.wa.gov.au/cms/uploadedFiles/Public_Utility_Office/Electricity_Market_Review/Final-Report-Design-Recommendations-for-Wholesale-Energy-and-Ancillary-Market-Reforms.pdf

² This submission supports Western Power's proposed D-factor adjustment in relation to the EGF. A separate D-factor submission will be prepared for the North Country.

(b) *maintain at least 45MW of supply to essential services loads and the majority of small use customers in the Eastern Goldfields during the occurrence of a planned outage of a transmission element supplying the Eastern Goldfields.*

[Section 13B inserted: Gazette 25 Sep 2018 p. 3568-9.]

In order to meet the new reliability compliance obligations under the NQRS code and satisfy the objectives of the Access Code, Western Power identified a Network Control Service solution as the most prudent solution over the prescribed 5 year period, allowing dispatch of Synergy generation to enable Western Power to:

- continue providing reliable supply to customers in the towns of Kalgoorlie-Boulder and Coolgardie in the EGF load area
- secure sufficient planned outages to be able to deliver customer and network driven works, including maintenance (so as to manage associated reputation and operating risks)

The proposed NCS solution offers superior benefits (across the evaluation criteria) relative to competing alternatives (build new lines or do nothing) and is the lowest cost solution that will meet the regulatory obligation in the (NQRS Code).

As acknowledged by the PUO and AEMO, the service level (reliability) after implementing the proposed NCS solution is expected to be similar in the EGF when compared to the current DSS.

Options Analysis:

In accordance with Western Powers' Investment Governance Framework a detailed Business Case [REDACTED] was developed. Section 2 of the business case details a thorough options analysis to identify the most prudent and efficient option to satisfy the requirement of maintaining reliability of supply in the EGF load area. Five options were investigated, which included both network and non-network options.

Table 2: Overview of Options

Option #	Description
1	Do Nothing
2	Construct a new 330kV rated (double circuit) from MRT to WKT
3	Improve emergency response capability
4	Emerging Technology (i.e. battery)
5	Arrange an NCS contract with local generation

All options were evaluated against a set of 6 criteria to enable a clear and consistent assessment in relation how effective they were at meeting reliability compliance obligations under the NQRS code; provision of sufficient load coverage for required planned and unplanned outages; and to ensure selection of the most prudent and efficient solution. The 6 criteria are listed below:

- Investment cost – lowest sustainable cost to meet reliability obligations
- Effectively mitigates risk
- Satisfies key objectives

- Technical feasibility
- Deliverability (by 30 September 2018)
- Reflects prudent investment

Selected Option

Option 5 – Procure NCS contract with local generation

An NCS tendering process with local Independent Power Producers identified Synergy as the most economical and technically capable provider of NCS in the EGF load area to maximise safety, network security and reliability while allowing Western Power to meet key regulatory commitments. The NCS contract with Synergy enables Western Power to procure generation and demand management to address network constraints in the EGFs and thereby defer the need for more costly network augmentation. Synergy generation facilities connected at the West Kalgoorlie terminal (WKT) substation have been providing Dispatch Support Services (DSS) since 2008 to support/recover supply in the event of (or in anticipation of) network outages in the EGF during planned and unplanned outages. The WKT gas turbines (GT) generation can be dispatched to provide reliable supply to approximately 16,500 customers in the region and secure sufficient planned outages to deliver customer and network driven works, including required maintenance to manage operating risk.

The NCS option provided superior benefits relative to competing alternatives (build new lines or do nothing) and is the only viable option that satisfies the regulatory obligations prescribed under the NQRS Code and provides a net benefit to the market (reduction on Value of Unserved Energy (VoUE)). The forecast cost across the 5 year period is \$17.5M.

Advantages

- Provides 99% Load coverage in the EGF area in the event of planned and unplanned outages
- Allows for operation of WKT GTs following an N-1 contingency given it has black start capability
- Reduce VoUE at risk by \$26M (when compared to (VoUE) at risk following the termination of existing DSS arrangements as of 30 September 2018)
- Provision of operational flexibility for required planned outages (i.e. routine maintenance, asset replacement, augmentation and customer connection works). Primary benefit is associated network risk from 'high' to 'medium' to achieve an NPV network risk reduction of \$10M over the 5 year period

Disadvantages

No significant disadvantages were identified with this option.

Discounted options

A brief explanation of the discounted options and the relative disadvantages of each is provided below.

Option 1 – Do nothing

The relative disadvantages of this option far outweighed the advantages. The option was only open to Western Power in the event of the regulatory obligation in the NQRS Code

not being placed on Western Power. The relative disadvantages of this option resulted in no financial assessment being undertaken.

Disadvantages

- non-compliance with the NQRS amendments
- reduced network reliability
- substantial unplanned outage impact as measured in terms of value of unserved energy (VoUE) estimated at \$37M over the 5 year period
- increased difficulty in securing planned outages for required routine maintenance, augmentation and customer connection works. Deferral or cancellation of this work poses significant safety, network security and reliability risks
- likely non-compliance to the System Minutes Interrupted Radial and Loss of Event Frequency Service Standard Benchmarks for the AA4 period
- estimated cost of \$1.1M over 5 years in penalties under the AA4 Service Standard Adjustment Mechanism

Option 2 – Construct new 330kV rated line (double circuit) MRT to WKT

This option was discounted on the basis of a both the prohibitive cost estimate at approximately \$1,000M and construction timeframe of 5-6 years.

Option 3 – Improve emergency response

This option proposed reducing response times require to fix line faults following unplanned outages via the introduction of complimentary operational measures (i.e. spare 220kV tower, line bypass concept plan) and/or the recruitment of extra operational resources. The relative disadvantages of this option resulted in no financial assessment being undertaken.

Disadvantages

- insufficient reduction in terms of duration of outages
- does not address load interruptions
- does not effectively mitigate risk of outage/to reliability and revenue penalty

Option 4 – Emerging Technology (i.e. battery)

The relative disadvantages of this option resulted in no financial assessment being undertaken.

Disadvantages

- cost of battery solution to meet significant energy requirement to provide reliable supply for extended outages is cost prohibitive. The cost of a 50MWh battery for the Gannawarra Battery Storage project in Victoria was \$34.7 million, or approximately \$700,000/MWh.
- approximate 3 year timeframe to deliver battery solution.

Taking the advantages and disadvantages of each option into account, it was concluded that the preferred option (Option 5) would achieve equivalent service level outcomes in terms of reliability when compared to the existing DSS for the most efficient cost.

<p>Basis & Refinement of Cost Estimates over time (including explanation of variances if applicable)</p>	<p>The cost of NCS can vary considerably depending on a number of factors including the running time, cost of fuel, power station configuration and contractual arrangements. As noted in the options analysis section of this paper, an open NCS tendering process with local Independent Power Producers determined Synergy as the most economical and technically capable NCS provider in EGF load area and provided the basis of the cost estimates.</p> <p>For the purpose of establishing and running the NCS in the EGF, the business case proposed operating expenditure (over the 5 year period) from the transmission non-recurring expenditure category of:</p> <ul style="list-style-type: none"> • [REDACTED] for a new contract with Synergy over 5 years covering the operation and maintenance of the West Kalgoorlie Power Station/gas turbines • [REDACTED] for fuel use and variable maintenance (to run the associated power station) over 5 years. This expenditure will continue for the 5 year period to September 2023, as per the terms of the contract with Synergy • [REDACTED] of internal labour costs to manage the project <p>[REDACTED]</p> <p>Actual cost v Forecast cost (October 2018 – March 2020)</p> <p>The variation between the actual cost of \$4.4M and forecast costs of \$6.5M in the 18 months of operation was driven by actual generation requirements being [REDACTED] lower than forecast. The main contributing factors for the below forecast generation requirements are:</p> <ul style="list-style-type: none"> • Coordination of planned maintenance resulting in reduced frequency, duration and generation requirements • Delivery of 1 of 3 planned capex projects (MRT Tx relocation) forecast within the AA4 period • Execution of customer funded outages concurrently with planned maintenance works <p>The business case forecast costs for the remaining 3 years and 6 months is \$11M. Western Power will monitor actual costs in line with its standard contract management practices.</p>
<p>Scope of Works:</p>	<p>The works associated with the recommended Option 5 are detailed in Section 3.1 of the Business Case and involve the following:</p> <p>Contract related works</p> <ul style="list-style-type: none"> • Prepare for the NCS tender • NCS tender evaluation • Power simulation validation • Generator performance test • Review the required protection and control systems • Prepare operation protocol with AEMO and Network Operations • Finalising contract with the successful bidder for NCS contract

	<p>Project delivery related works</p> <ul style="list-style-type: none"> Quality assurance testing of black-start capability of WKT GTs Annual testing of GTs operation
Implementation Timing:	<p>Proposed: 1 October 2018</p> <p>Actual: 1 October 2018</p>
Implementation Cost:	<p>Proposed: \$17.5M</p> <p>Actual/Forecast: \$15.3M</p> <p>Reason for variance:</p> <p><input type="checkbox"/> changed timing <input type="checkbox"/> un-costed activities</p> <p><input type="checkbox"/> changed scope <input type="checkbox"/> cost control <input checked="" type="checkbox"/> other</p> <p>The reasons for the variance are discussed in detail in the Basis and Refinement of Costs Over Time section of this D-factor compliance summary.</p>
Engineering Design:	<p>This project was designed in accordance with Western Power's suite of standards, guidelines and manuals relating to planning and technical design. This suite of design documentation was developed in line with good electricity industry practice and met the relevant external standards requirements.</p>
Procurement:	<p>The procurement of an NCS contract was undertaken via a competitive tendering process, to identify potential NCS provider in the market. The tendering process was run with oversight from an external probity audit firm and relevant subject matter experts within Western Power. This process identified Synergy as the preferred NCS provider.</p>
Project/Program Governance:	<p>This program was governed by Western Power's Governance Framework [REDACTED] and Delegated Financial Authority (DFA). The Business Case was approved in accordance with the DFA.</p>
Project/Program Management:	<p>This project was delivered under Western Power's standard project management practices which impose specific controls in relation to:</p> <ul style="list-style-type: none"> project change/scope management project time management project cost management project risk management project performance monitoring project closure. <p>The Business Case was approved by the Board in September 2018.</p>
Complies with S. 6.40	<p><input checked="" type="checkbox"/> Yes – necessary efficient minimum cost investment <input type="checkbox"/> No</p>
<p>S. 6.41 – Where in order to maximise the net benefit after considering alternative options, a service provider pursues an alternative option in order to provide covered services, the non-capital cost component of approved total costs for a covered network may include non-capital incurred in relation to the alternative option if:</p>	

	<p>a. the alternative option non-capital costs do not exceed the amount of alternative option non-capital costs that would be incurred by a service provider efficiently minimising costs; and</p> <p>b. at least one of the following conditions is satisfied:</p> <ul style="list-style-type: none"> i. the additional revenue for the alternative option is expected to at least recover the alternative option non-capital cost ii. the alternative option provides a net benefit in the covered network over a reasonable period of time that justifies higher reference tariffs; or iii. the alternative option is necessary to maintain the safety or reliability of the covered network or its ability to provide contracted covered services
<p>S. 6.41(b)</p> <p>Justification Applied & Recoverable Portion (nominal):</p>	<p><input type="checkbox"/> Incremental revenue \$</p> <p><input type="checkbox"/> Net benefits \$</p> <p><input checked="" type="checkbox"/> Providing covered services (safety and reliability) \$17.5M</p>
<p>Justification Description:</p>	<p>The recommended option and associated works satisfy clause 6.40 of the non-capital cost component as the works did not exceed the amount that would be invested by a service provider efficiently minimising costs.</p> <p>Section 2 of the Business Case described each of the options under consideration and outlined the relative advantages of the preferred option. The selection of Option 5 was based on an assessment of the most efficient cost to achieve continued provision of reliable supply to customers in the towns of Kalgoorlie-Boulder and Coolgardie in the EGF load area, as well as satisfying the new reliability compliance obligations under the NQRS code and satisfy the objectives of the Access Code.</p> <p>It is concluded that the robust option analysis clearly identified a NCS contract for local generation as the most prudent and efficient solution to provide reliable supply to the EGF area and demonstrates that Western Power implemented a cost effective network investment and therefore satisfies section 6.40 of the Access Code.</p> <p>The main benefits of the NCS solution is that the localised generation facilities enables Western Power to satisfy the new reliability compliance obligations under the NQRS code and procure generation and demand management to address network constraints in the EGFs and thereby defer the need for more costly network augmentation. The location of Synergy's two West Kalgoorlie GTs within the EGF load area ensures rapid response capabilities to enable power restoration and respond to the following operational challenges to the 220 kV system:</p> <ul style="list-style-type: none"> • unplanned outages with duration > 1 hours (minor defects, shorter duration, potentially a few times a year), • unplanned major outage (major damage, longer outage duration, in frequent in nature), • planned outages related to maintenance works, capex and customer funded projects <p>Given the extremely tight implementation timeframes, an NCS solution was the only viable solution that could provide the below required capabilities:</p>

	<p>a. responding to anytime dispatch request in response to 220kV system outage. This request will be received from the Australian Energy Market Operator (AEMO) or Western Power Network Operations (NO);</p> <p>b. performing Black-Start within 15 minutes after receiving a request from AEMO or NO, with an expected continuous runtime of a minimum of 50 hours with a possible peak load of 45MW or around 2000MWhr;</p> <p>c. supporting the energisation of the EGF 132kV network up to WKT, WKT-Piccadilly (PCY) 132 kV line and 132/11 kV power transformers at WKT and PCY substations and the downstream distribution network loads. This will be achieved in stages as instructed by Western Power NO;</p> <p>d. performing voltage control as per the Technical Rules requirements;</p> <p>e. performing frequency control as per the Technical Rules requirements;</p> <p>f. generating sufficient fault levels to enable reliable protection clearing on the EGF distribution network (11-33kV), and employ suitable protection schemes;</p> <p>g. providing reliable SCADA and duplicate telecommunication systems to enable remote monitoring, emergency control and effective communication.</p> <p>Based on the above, it can be concluded that the recommended non-capital investment satisfies section 6.41 of the Access Code based on the following:</p> <ul style="list-style-type: none"> • it has been demonstrated that the recommended investment represents the amount that would have been invested by a service provider efficiently minimising costs • the recommended works satisfy the 'Provision of Contracted Covered Services' test based on the need to provide alternative supply recovery in the EGF area as a result of the termination of the existing DSS arrangements <p>Without an NCS supplied via Synergy's WKT GTs, Western Power's ability to meet reliability compliance obligations prescribed under the NQRS code would deteriorate, resulting in significant non-compliances relating to reliability.</p> <p>As detailed in the above discussion, the NCS will ensure that the network can provide an equivalent service level outcome in terms of reliability when compared to the existing DSS, at the lowest sustainable cost.</p>
<p>Complies with S6.41(b)?</p>	<p><input checked="" type="checkbox"/> Yes fully <input type="checkbox"/> No</p>

3. Compliance with Governance Framework

The following table provides key documentation references as evidence that the program has been managed in compliance with Western Power’s Governance Framework. The primary evidence is the existence of project deliverable documents prepared prior to the project/program progressing to the next phase.

Phase	Project Deliverable Document/s	
1 - Initiation Phase	Investment Approval Request	
2 - Scoping Phase	EGF 220kV Outage Mitigation Works Planning Report	
3 - Planning Phase	Network Control Services (NCS) – Eastern Goldfield Load Area Business Case Network Control Service contracts for North Country and Eastern Goldfields Investment Evaluation Model	
4 - Execution Phase	N/A – project in execution phase	
5 - Closeout Phase	N/A – project in execution phase	
6 – Benefits Realisation Phase	A formal benefits realisation will be undertaken post project execution and closeout	

4. Endorsements

All information presented in this document is considered accurate and is intended for use in supporting Western Power's D Factor submission.

Endorsed by:

Name	Position	Signature	Date
[Redacted]	[Redacted]		September 2020