Network Quality & Reliability of Supply (NQRS) Code Audit

Review of systems relating to Code Part 2, Divisions 1 to 4

INDEPENDENT ASSURANCE REPORT

August 2020

CutlerMerz

westernpower

Mr John Paolino
Senior Compliance Specialist
Regulatory Compliance
Western Power

363 Wellington Street
Perth WA 6000

21 August 2020

Dear John,

Re: 2017-2020 Network Quality & Reliability of Supply (NQRS) Code Audit

I am pleased to provide our Independent Assurance Report resulting from the audit on the operation of the systems that are in place to monitor compliance with Part 2 of the *Electricity Industry (Network Quality & Reliability of Supply) Code 2005* for the 2017-2020 financial years.

I confirm my approval of the content of the report, and that it is an accurate presentation of the audit findings and CutlerMerz' opinions.

Sincerely,

Ryan Dudley
Principal

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Executive Summary

The *Electricity Industry (Network Quality & Reliability of Supply) Code 2005* (the "Code") requires that Western Power arrange for an independent expert to audit, and report on, the operation of the systems in place for monitoring compliance with Part 2 of the Code.

CutlerMerz ("we") have been engaged by Western Power to conduct the independent audit for the 2017-2020 financial years. As required by the Code, the objective of the audit is to assess whether Western Power has adequate controls (Process and Systems) in place to monitor compliance with each obligation under the Code.

Based on our review, we consider that there have been no material changes made in relation to the management of power quality and network reliability, since the last audit. Incremental improvements have been made in relation to software upgrades and the systemisation of dashboards that were previously manually managed.

Western Power are still reporting substantial breaches on an ongoing basis. However, it is recognised that this is due to the limitations in the imposed regulatory regime, specifically, the inclusion of extreme weather events, as opposed to Western Power's system capability.

One opportunity for improvement has been identified. Western Power's Distribution Reliability Strategy details how Western Power considers both the requirements of the Code and its Service Standard Benchmarks (SSB) that are applicable under its Access Arrangement. The Strategy states that SSB targets for SAIDI and SAIFI will be updated once the outcome from AA4 is finalised; however, this does not appear to have occurred.

Overall, we consider Western Power's systems in relation to Part 2 of the Code to be adequate.

1 Introduction

CutlerMerz was engaged by Western Power to conduct an independent audit and report on the operation of the systems that are in place to monitor compliance with Part 2 of the Electricity Industry (Network Quality & Reliability of Supply) Code 2005 (the "Code") for the 2017-2020 financial years

The requirement for an audit of these systems relating to Part 2 of the Code is based on clause 26 of Part 4 – Division 3, which reads as follows:

> *Part 4 — Duties incidental to the prescribed standards*
>
> *Division 3 — Performance reporting*
>
> *26. Annual report on monitoring systems*
>
> *(1) A transmitter and a distributor must, as required by subsection (2), arrange for an independent expert to audit, and report on, the operation of the systems that the transmitter or the distributor has in place for monitoring its compliance with Part 2 or an instrument made under section 14(3).*
>
> *(2) An audit under subsection (1) is to be carried out in respect of the operation of such systems during each reporting period.*

1.1 Audit objective

The objective of the audit is to make an independent assessment of the operation of the systems used by Western Power for monitoring its compliance with Part 2 of the Code between 1 July 2017 and 30 June 2020.

1.2 Western Power's key systems and procedures

With regards to compliance with the Code, Western Power has implemented a number of systems and procedures to support compliance. The key systems are identified below.

Reliability

- PowerOn Fusion (PoF): PoF is a leading industry tool for network control and management. It integrates call centre, network control, and data capture and removes much of the manual processing in relation to monitoring customer notifications and network reliability data. PoF / Data Warehouse / NRDV system are considered to be robust systems for capturing and processing customer and network information.
- Qlik is a SaaS analytics package that provides an end-to-end platform which includes data integration, user-driven business intelligence, conversational analytics and dashboard reporting.
- Electronic Network Access Request (eNAR): The eNAR system is used to request planned outages and capture information in relation to the works. It is a functional tool for ensuring compliance with the Code in relation to planned outage requirements.

Power quality

- Power quality notifications are captured through PoF, before being actioned through business as usual processes. CutlerMerz considers this to be an appropriate system for managing power quality issues.

2 Audit Approach

We assessed Western Power's compliance with the applicable Code requirements by undertaking the following:

- A review of Western Power's systems designed to meet the compliance requirements;
- A review of Western Power's systems designed to monitor compliance; and
- Identifying any opportunities for improvement.

The steps involved in our approach to the assessment were as follows:

- A risk-based approach to focus the audit on higher risk areas – based on Australian/New Zealand Standard 31000:2018 (Risk Management – Guidelines);
- Interviews with Western Power personnel via video conference. This was used to gain an appreciation of the control environment, information systems, control procedures, compliance attitude and outcome compliance;
- Sampling procedures in accordance with ASA 500 and ASA 530 (Audit Sampling); and
- Reporting in accordance with ASAE 3000 and AEAE 3500.

2.1 Audit scope

The scope of the audit covers the systems in place at Western Power to monitor compliance against Part 2 of the Code, which includes four divisions:

- Division 1 - Quality Standards
- Division 2 - Standards for the interruption of supply to individual customers
- Division 3 - Standards for the duration of interruptions of supply in particular areas
- Division 4 - Variations of obligations under this Part

2.2 Audit standard

An audit plan was developed by the auditor based on the requirements in Part 2 of the Code and the auditors experience conducting reviews and audits of the systems and procedures for monitoring quality and reliability of electricity network businesses.

The audit plan was subsequently reviewed and approved by Western Power.

2.3 Audit steps

The audit steps are summarised in ***Table 1***.

Table 1: Audit steps

Audit step	Tasks
Planning	Prepare audit plan
	Establish interviews
Meetings	Audit meetings from 3rd to 5th August 2020
Review and reporting	Review supplementary documentation and prepare audit report

2.4 Audit team

The audit team is outlined in ***Table 2***.

Table 2: Audit team

Name	Role	Responsibility
Ryan Dudley	Audit Director and Lead Auditor	Overall responsibility for the delivery of the audit
Mark Dragar	Project Manager and Auditor	Day-to-day management and delivery of the audit plan, audits interviews and audit report

2.5 Western Power key staff

The key Western Power staff that have participated in the audit are identified in ***Table 3***.

Table 3: Western Power key staff

Role(s)	Function
Senior Compliance Specialist	Regulation & Investment Assurance
Principal Planning Consultant	Grid Transformation
Transmission Grid Strategy Manager	Grid Transformation
Senior Standards and Technology Engineer	Grid Transformation
Acting Distribution Grid Strategy Manager	Grid Transformation
Quality and Compliance Officer	Network Operations
Planned Outage Notification Team Leader	Customer Services
Senior Insight Analyst	Business Intelligence & Data Analytics
Access Solutions Manager	Customer Services
Team leader Outage Co-ordination and Compliance	Operational Maintenance
Project Support Officer	Operational Maintenance
Project Support Officer	Operational Maintenance

3 Western Power's response to previous recommendations

There were no recommendations made for the previous audit which covered the 2016-17 period.

4 Observations

Overall, CutlerMerz considers Western Power's processes and systems to be adequate in maintaining compliance in relation to requirements of Part 2 of the Code.

However, based on our conversations and review of documents during the audit, CutlerMerz make the following observations:

- That no material changes have been made in relation to the management of power quality and network reliability since the last audit. Incremental improvements have been made in relation to software upgrades and the systemisation of dashboards that were previously manually managed;
- Western Power personnel that participated in the audit process demonstrated an understanding of the Code and its requirements, and a commitment to the effective management of power quality and network reliability by the business;
- Due to the design of the system, Western Power does not have a lot of installed reactive capacity to address high voltages due to the significant amount of installed rooftop solar. Over the last 24 months, the load profile on the transmission network has changed where the minimum is now in the middle of the day due to solar PV output;
- As a result, system voltages are increasing which has caused issues / limitations with the tapping range of zone substation (e.g. 132/22kV) power transformers being most impacted. Western Power is progressing investments in reactors and some works have been completed at zone substations;
- Western Power are still reporting substantial breaches on an ongoing basis. However, it is recognised that this is due to the limitations in the imposed regulatory regime as opposed to Western Power's system capability; and
- Western Power has reliability targets prescribed under its access arrangements (Service Standard Benchmarks – SSB), which are different from those required under the Code. The SSBs are linked to a performance incentive scheme that has positive/negative financial outcomes. The Distribution Reliability Strategy states that SSB targets for SAIDI and SAIFI will be updated once the outcome from AA4 is finalised; however, this does not appear to have occurred.

The detailed findings of the audit in relation to each obligation are provided in Appendix A.

5 Recommendations

An opportunity for improvement has been identified in relation to Western Power's Distribution Reliability Strategy. The Strategy states that the targets for SAIDI and SAIFI will be updated after the results from AA4 are finalised. CutlerMerz have reviewed the Strategy and the targets have not been updated since July 2017. An opportunity exists for Western Power to update the artefact to ensure SAIDI and SAIFI targets are accurate and aligned with the outcomes of AA4.

CutlerMerz considers that any other opportunities for improvement relate to the regulatory regime rather than deficiencies in Western Power systems and processes (refer to Section 4). As such, no further recommendations have been made.

Appendix A– Detailed findings

The detailed findings from the audit are provided in ***Table 4***.

Table 4: Detailed findings

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
	An outline of the criteria for compliance	*Discussion of the evidence and how the compliance assessment was determined i.e. whether the evidence was sufficient to demonstrate compliance or not.* *Recommendations / Opportunities for Improvement are identified where relevant*
Division 1	Compliance obligation reference No: 462 Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 5(1) Obligation: A transmitter or distributor must, as far as reasonably practicable, ensure that electricity supplied by the transmitter or distributor to a customer's electrical installations to the network, at all times complies with prescribed standards. Context: The "prescribed standards" relates to the standards for harmonics and voltage fluctuation – refer to Code 2005, Part 2, Division 1, Clause 6(2) and Clause 7.	CutlerMerz has interviewed personnel responsible for power quality at Western Power and reviewed relevant information as appropriate. Based on this consultation, CutlerMerz considers that Western Power has a number of systems, processes and mechanisms in place to practicably enable compliance with the standards for harmonics and voltage fluctuations. These relate to: • The design of the system and connections to the network; • Proactive monitoring of power quality performance; and • Reactive actions where Western Power becomes aware of a power quality issue. <u>System design</u> • Over the last 24 months, the load profile on the transmission network has changed where the minimum is now in the middle of the day due to solar PV output. As a result, system voltages are increasing which has caused issues / limitations with the tapping range of zone substation power transformers (e.g. 132/22kV) being most impacted. Western Power is progressing investments in reactors and some works have been completed at zone substations. The issue arose as a result of the historic practice of specifying / procuring power transformers for peak load rather than minimum demand (i.e. the tap range was designed to boost volts due to peak loads). • Western Power receives in the order of 4,000 PV applications per month. All inverters are AS4777 compliant with Volt VAR and Volt Watt response mode as standard and consequently have little to no impact on harmonics and voltage fluctuations.

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
		• It is understood that Western Power designs its system in accordance with the Australian standards for Electromagnetic Compatibility (EMC)[1]. • A power quality assessment is conducted as part of the preliminary assessment phase as a part of the generator connection process. A review of power quality commissioning results during the commissioning phase is also undertaken. • Based on design and commissioning in accordance with the aforementioned standards, it can be expected that the system will meet the power quality requirements of the Code upon the commissioning of assets. However, it is noted that power quality issues arise due to equipment that customers connect to the network (often post-commissioning) – Western Power's mechanisms for proactive monitoring of power quality and reactive action are discussed below. <u>Proactive monitoring:</u> • Western Power proactively monitor voltages using a limited number of AMI meters, that are purposely placed in known hot spots. The health and function of these meters are currently being audited to ensure sufficient data continues to be collected. • CutlerMerz consider that proactive monitoring of power quality at all customer connections would not be practical based on the current metering technology employed within the network and would be considered cost prohibitive. • Western Power continue to participate in a National Long Term Power Quality Survey by the University of Wollongong in conjunction with Power Quality Australia. It is understood that Western Power has installed ~280 power meters throughout its network, which benchmark voltage fluctuations, unbalance, harmonics, flicker and voltage sags across the network against other national peers who participate in the study. • CutlerMerz has reviewed the results from the benchmarking report where, Western Power outperforms the national average for harmonics and unbalance in relation the percentage of sites that exceeded the "limits" defined within the survey.

[1] Standards Australia / Standards New Zealand, Technical Report – Electromagnetic compatibility (EMC) – Part 3.14: Limits–Assessment of emission limits for harmonics, interharmonics, voltage fluctuations and unbalance for the connection of disturbing installations to LV power systems, SA/SNZ TR IEC 61000.3.14:2013, EC/TR 61000-3-14, Ed.1.0 (2011)

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
		• Western Power downloads and analyses the data from the power quality meters once annually to proactively monitor power quality across the network. These reviews are undertaken to assess compliance with the standards and the data is also provided to the University of Wollongong for analysis as part of the benchmarking. • In addition, Western Power reactively investigates individual power quality cases where identified by field staff or through customer complaints. <u>Reactive action:</u> • Western Power has two primary mechanisms for "reactively" identifying power quality issues: customer complaints and when reported by operational personnel. • CutlerMerz has reviewed Western Power's process and investigations manual for addressing power quality issues. These appear reasonable in ensuring that identified power quality issues will be addressed. Finding: CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, as far as reasonably practicable, ensure that electricity supply to a customer's electrical installations complies with prescribed standards for power quality.
	Compliance obligation reference No: 463 Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 8 Obligation: A transmitter or distributor must, so far as reasonably practicable, disconnect the supply of electricity to installations or property in specified circumstances, unless it is in the interest of the customer to maintain the supply.	CutlerMerz has interviewed personnel responsible for power quality at Western Power, and reviewed the power quality investigation process. The process identifies decision points for customers to be disconnected if harmonics and voltage fluctuations are present that will "damage customer equipment" and: • The customer agrees with the disconnection (step 15); or • If the customer does not agree with the disconnection, to disconnect "if there is a safety risk" (step 15a). Western Power has advised that during the auditable period there were no disconnections related to harmonics or flicker. Finding: CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, so far as reasonably practicable, disconnect the supply of electricity to installations or property in specified circumstances, unless it is in the interest of the customer to maintain the supply.

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
	Context: The "specified circumstances" are when compliance with the standards for harmonics and voltage fluctuation (refer to Code 2005, Part 2, Division 1, Clause 6(2) and Clause 7) cannot be achieved, and this may result in damage to a customer's electrical installations or property.	
Division 2	Compliance obligation reference No: 464 Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 9 Obligation: A transmitter or distributor must, as far as reasonably practicable, ensure that the supply of electricity to a customer is maintained and the occurrence and duration of interruptions is kept to a minimum.	CutlerMerz has interviewed personnel responsible for reliability at Western Power, and reviewed relevant information as appropriate. Based on this consultation, CutlerMerz understands that Western Power has a number of systems, processes and mechanisms in place to practicably ensure that the supply of electricity is maintained and the occurrence and duration of interruptions is kept to a minimum. These relate to: • Network planning; • Planned works management; and • Unplanned outage management. <u>Network planning:</u> • CutlerMerz understands that Western Power designs its network in accordance with the Technical Rules prescribed by the ERA and available on their website. Western Power's network has various planning criteria applied to it with respect to security of supply. This includes transmission network (≥ 66kV) designed to N-1/N-1-1, Perth CBD planning criteria, and zone substation criteria e.g. NCR criterion. An exception to this is where the load is < 20MVA (e.g. Margaret River single 66kV line). In the event of an outage, the majority of the load can be supplied through the distribution network with the potential for some load shedding if the peak demand is greater than the capacity of the network. Where the security of supply is lower than the standard, Western Power has sought derogations from the ERA. • CutlerMerz understands that Western Power considers reliability as a key factor in prioritisation of maintenance programmes and defect remediation. • CutlerMerz considers the network planning processes outlined above to be broadly consistent with Western Power's peers, and gives due consideration to ensuring that the network is designed to minimise the occurrence and duration of interruptions to customers.

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
		Planned works management: • Western Power's processes for implementing planned works, consider approaches to minimise the frequency and duration of outages experienced by customers. • CutlerMerz has reviewed the Electronic Network Access Request (eNAR) user guide, and sample eNAR forms. We have reviewed sample forms where mobile generators have been issued and where they have not been issued. The use of the form is consistent with the user guide. • CutlerMerz has reviewed the Planned Outages – Customer Notification and Compliance Procedure which requires users to consider the use of mobile generators. The procedure makes specific reference to the requirements of the Code. Sample eNAR forms demonstrate that the emergency generators are being used in these circumstances. • Outages were previously coordinated to maximise staff utilisation / efficiency. Western Power is now looking to coordinate works to minimise impact on customers who are planned to experience outages. Unplanned outage management: • CutlerMerz understands that Western Power has several processes in place to minimise the duration and number of customers affected during an unplanned outage. These relate to control room procedures, procedures for field personnel and equipment availability. • It is noted that whilst field personnel make decisions on the ground regarding how to repair the network following a fault, access to the network and all switching operations (both those performed remotely from the control room and those performed by field switching operators) are executed under direction from the control room operator. CutlerMerz has reviewed the procedures for fault restoration and priority restoration guideline. These documents demonstrate that Western Power has processes in place to prudently restore power in a way that minimises the duration and number of customers affected. • Western Power uses a "priority response" approach for unplanned outage management in the field. We have reviewed the dispatch procedures which demonstrates the priority dispatch process that is aimed to make the network safe and restore power as soon as possible. Major repair works are left to be scheduled for regular maintenance crews.

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
		• CutlerMerz understand Western Power uses mobile generators during unplanned outages to minimise the outage duration and customers affected. We understand that the use of mobile generators for unplanned outages are only in exceptional circumstances. • Western Power has created a "Spares Policy" to ensure that there is standardisation in spares and have recently conducted a spares and equipment review. The identified risk of a primary transformer failure requires a significant lead time for sourcing a new transformer. Western Power have placed orders for transformers and mobile transformers to ensure the ability to rapidly respond in the event of a primary transformer failure. Finding: CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, so far as reasonably practicable, ensure that the supply of electricity is maintained, and the occurrence and duration of interruptions is kept to a minimum.
	Compliance obligation reference No: 465 Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 10(1) Obligation: A transmitter or distributor must, so far as reasonably practicable, reduce the effect of any interruption on a customer.	CutlerMerz has interviewed personnel responsible for reliability at Western Power, and reviewed relevant information as appropriate. Based on this consultation, CutlerMerz considers that Western Power has a number of systems, processes and mechanisms in place to practicably reduce the effect of any interruption on a customer. These relate to: • Reducing the frequency and duration of outages in general; • Communication with customers in relation to outages; and • Special consideration and prioritisation of customers likely to be most affected by an outage. <u>General measures for reducing the frequency and duration of outages:</u> • Where Western Power identify critical customers that are unable to be managed like most customers, consideration is given to how best to complete works with minimal impact. This includes completing works overnight and/or supplementing the network with HV injection e.g. Outage on 66kV line to Margaret River. • Western Power is making improvements to its systems, to improve visibility and control of its network e.g. GE's XA/21 Energy Management System is being replaced with PowerOn Fusion by the end of 2022. Western Power controllers will be fully using PowerOn Fusion by February 2021, with PowerOn Fusion upgrading to PowerOn Advantage the following year. This will enable scheduling and switching schedules to occur much faster and reduce the effect of interruptions to customers.

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
		• Additional points of discussion are made in relation to clause 9 above. <u>Customer communication:</u> CutlerMerz has reviewed the process for notifying customers for planned outages which details the process. It is noted that through this process the identification of customers to be notified relies on PowerOn Fusion (PoF) and the eNAR systems. <u>Customers likely to be most affected:</u> Western Power continues to place increased effort in managing customers who are adversely affected, or where an outage to these customers will adversely impact the community more broadly. These customers include: • Life support equipment (LSE) customers; • Utilities and essential services (e.g. Main Roads, traffic lights); and • Sensitive load customers (e.g. hospitals). CutlerMerz have reviewed the procedural documents for customer notifications, fault restoration, the priority restoration guideline, the priority dispatch procedures, and procedures for the deployment of generators during unplanned outages – these procedures all give consideration to "sensitive" customers in some capacity. Finding: CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, so far as reasonably practicable, reduce the effect of any interruption on a customer.
	Compliance obligation reference No: 466 Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 10(2) Obligation: A transmitter or distributor must consider whether the transmitter or distributor should supply electricity by alternative means to a customer who will	CutlerMerz has interviewed personnel responsible for mobile generator dispatch at Western Power, and reviewed relevant information as appropriate. Based on this consultation, CutlerMerz considers that Western Power has several systems, processes and mechanisms in place to supply electricity by alternative means to a customer who will be affected by a proposed interruption. These relate to: • Planned outages; and • Unplanned outages.

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
	be affected by a proposed interruption in excess of the relevant period. Context: The "relevant period" is when: • The interruption is expected to exceed 6 hours where "customer's" premises is on or south of the 26th parallel of latitude, (or 4 hours if at the time when notice of an interruption is given the forecast temperature is 30°C or more as issued by the Bureau of Meteorology in Perth for any part of the time of the interruption); • The interruption is expected to exceed 4 hours where the "customer's" premises are north of the 26th parallel of latitude; • The effect of the interruption on the customers' business is likely to be substantial; or • The interruption will affect a person with life support needs and requires electricity for the operation of equipment that caters to those needs.	<u>Planned outages:</u> Western Power's process when planning an outage is to prepare an eNAR prior to contacting the affected customer, and provide notification10 business days prior to the outage date. The eNAR requestor identifies LSE and sensitive customers and the eNAR system requires the originator of the outage request to consider whether mobile generation is required. The Generator Request Guideline is used to determine whether a generator is provided. Once the eNAR request has been completed including any determination if alternative means of supply is required, the Outage Notification & Evidence (ONE) system will automatically notify affected customers. Where customers are registered with LSE requirements, Western Power will contact them to acknowledge receipt of the notification. <u>Unplanned outages:</u> It is noted that the Code refers to "proposed interruption[s]". Notwithstanding, Western Power's process for the use of mobile generators during unplanned outages outlines that the decision to deploy should be made early and should not be delayed longer than 4 hours in the event that the fault cannot be located or further testing is required. Finding: CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, so far as reasonably practicable, supply electricity by alternative means to a customer who will be affected by a proposed interruption.
	Compliance obligation reference No: 467 Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 12(3) Obligation: A distributor must take prescribed action in the event of a significant interruption to a small use customer.	CutlerMerz has interviewed personnel responsible for reliability at Western Power, and reviewed relevant information as appropriate. Western Power continues to report a substantial number of incidents where the "prescribed standards" have not been met for both outage duration and the number of interruptions. These cases are predominantly due to extreme weather events and CutlerMerz still holds the view that it is impractical for Western Power to meet the prescribed standards during extreme weather events. Western Power manages reliability performance on the distribution network by investing in:

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
	Context: The "prescribed actions" are: • To remedy the cause or causes of the interruption so that the prescribed standard is met; or • Enter into an agreement to the small use customer's satisfaction for the supply of electricity to the customer. The "prescribed standard" is the supply of electricity for 9 years in every 10 without the interruption of supply exceeding: • An interruption of more than 12 hours continuously; or • 9 interruptions in Perth CBD and urban areas, or 16 in other areas (in the preceding year). The definition of "significant interruption" is not meeting the prescribed standard.	• maintaining the health and integrity of the network; • augmentation to provide capacity for contingency events; • targeting the reliability performance and customer expectations in hot spots; • automation of the network; and • maintenance activities. CutlerMerz has reviewed Western Power's Dx Reliability Strategy which describes how its Service Standard Benchmarks (SSB) applicable under its Access Arrangement, and the requirements of the Code, for the basis of its overall strategy in maintaining reliability. Western Power has advised that they have not entered into any agreements with small use customers in relation to providing lower than the prescribed standards. Finding: CutlerMerz notes that Western Power consistently reports a substantial number of incidents where the "prescribed standards" are not met. These are due to extreme weather events. CutlerMerz maintains the view since the last audit that it would be appropriate to amend this clause of the Code, to exclude extreme weather events. It is also noted that Western Power has not entered into any agreements with small use customers in relation to providing lower than the prescribed standards. CutlerMerz recognises that it would be impractical for Western Power to enter into an agreement with each customer that may be subject to extreme weather events. Notwithstanding the above, CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, so far as reasonably practicable, remedy sections of the network with poor reliability.
Division 3	Compliance obligation reference No: 468 Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 13(2)	CutlerMerz has interviewed personnel responsible for reliability at Western Power, and reviewed relevant information as appropriate. Western Power's processes and systems that ensure compliance with reliability obligations are detailed above within the findings relating to Division 2 obligations. Western Power's network planning and outage management processes consider factors that drive the risk of reliability and customers affected. These processes however, naturally lend themselves to a greater focus on reducing higher

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
	Obligation: A transmitter or distributor must, so far as reasonably practicable, ensure that customers in particular areas do not have average total lengths of interruptions of supply greater than specified durations. Context: The overall "specified durations" are: • Perth CBD: 30 minutes • Urban (other than Perth CBD): 160 minutes • Other areas: 290 minutes	density areas as a priority i.e. Perth CBD, then other areas of the network (assuming greater number of customers per feeder in higher density areas). Western Power's Dx Reliability Strategy details how Western Power considers both the requirements of the Code and its Service Standard Benchmarks (SSB) that are applicable under its Access Arrangement. The strategy states that the targets for SAIDI and SAIFI will be updated after the results from AA4 are finalised. CutlerMerz have reviewed the strategy and it has not been updated since July 2017. As per Division 2 – clause 12(3), the Code does not allow for the exclusion of extreme weather events, which has resulted in Western Power not meeting its overall targets. CutlerMerz maintains the view that this requirement is impractical (i.e. in not excluding extreme weather events). Western Power have conducted three separate investigations for each of the three areas of compliance in the Code, to determine: • The status of Western Power's compliance against the targets, starting from the 2006/07 financial year – the first full year after the Code came into effect; • Cost-benefit analyses over 45 years (nominal asset life) for each area of investigation; and • A sensitivity analysis was also included in calculating the benefits associated with the improved reliability outcomes. The outcome of the investigations recommended to not invest further in addressing the average SAIDI for urban and rural areas. Finding: As per Division 2 – clause 12(3), CutlerMerz notes that Western Power consistently reports not meeting the "specified durations". This is due to extreme weather events. CutlerMerz maintains the view that it would be appropriate to amend this clause of the Code to exclude extreme weather events. Notwithstanding the above, CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, ensure that customers in specified areas do not have average total lengths of interruptions of supply greater than specified durations.
	Compliance obligation reference No: 469	CutlerMerz has interviewed personnel responsible for reliability systems and calculations at Western Power, and reviewed relevant information as appropriate.

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
	Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 13(3) Obligation: The average total length of interruptions of supply is to be calculated using the specified method. Context: The overall "specified method" is to be calculated as at 30 June in each year: • by taking the average total length, in minutes, of interruptions of supply to customer premises in an area during each year of the period of 4 years ending on that day; and • by then taking the average of the 4 annual figures determined above.	Western Power calculates the average total length of interruptions using its Network Reliability Data Validator (NRDV) system. The NRDV system is configured to run Structured Query Language (SQL) to interrogate the Data Warehouse (which captures and stores reliability data generated by PowerOn Fusion). Since the last audit, improvements have been made through the systemisation of "Momentary Interruption" data and development of Reliability Dashboards tools through the implementation of software known as Qlik. This was previously managed through MS Excel spreadsheets. CutlerMerz has observed the queries being run through Qlik to produce the reliability calculations and considers this to be an appropriate system to generate the required reports. Finding: CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, so far as reasonably practicable, calculate the average total length of interruptions using the specified method.
Division 3A	Compliance obligation reference No: N/A Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 13B(1) Obligation: A transmitter or distributor 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	CutlerMerz has interviewed personnel responsible for reliability systems and calculations at Western Power, and reviewed relevant information as appropriate. Based on this consultation, CutlerMerz considers that Western Power has several systems, processes and mechanisms in place to restore and maintain supply of electricity to a customer who will be affected by an interruption. Western Power have procured network support services to provide reliable supply to customers in the Eastern Goldfields region. These services help secure the management of planned outages and support for unplanned outages to enable the delivery of customer and network driven works, including maintenance (so as to manage associated reputation and operating risks). CutlerMerz have reviewed the relevant business cases for support services for the Eastern Goldfields region. Finding: CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, so far as reasonably practicable, restore and maintain supply to essential loads and the majority of small use customers in the Eastern Goldfields.

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
	unplanned outage of a transmission element supplying the Eastern Goldfields; and (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.	
	Compliance obligation reference No: N/A Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 13C(1) Obligation: A transmitter or distributor must, so far as is reasonably practicable, have in place arrangements to— (a) restore and maintain at least 50MW of supply to essential services loads and the majority of small use customers in the North Country as soon as reasonably practicable following the occurrence of an unplanned outage of a transmission element supplying the North Country; and (b) maintain at least 50MW of supply to essential services loads and a majority of small use customers in the North Country during a planned outage of a transmission element supplying the North Country.	CutlerMerz has interviewed personnel responsible for reliability systems and calculations at Western Power, and reviewed relevant information as appropriate. Based on this consultation, CutlerMerz considers that Western Power has several systems, processes and mechanisms in place to restore and maintain supply of electricity to a customer who will be affected by an interruption. Western Power have procured network support services to provide reliable supply to customers in the North Country region. These services help secure the management of planned outages and support for unplanned outages to enable the delivery of customer and network driven works, including maintenance (so as to manage associated reputation and operating risks). CutlerMerz have reviewed the relevant business cases for support services for the North Country region. Finding: CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, so far as reasonably practicable, restore and maintain supply to essential loads and the majority of small use customers in the North Country.
Division 4	Compliance obligation reference No: 470 Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 14(8)	CutlerMerz has interviewed personnel responsible for customer services at Western Power. No changes have been identified in complying with this obligation since the last audit. Western Power has advised that no "instruments" have been issued by the Minister during the audit period, nor are there any previously issued instruments that are applicable within the audit period.

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
	Obligation: A transmitter or distributor must, on request, provide to an affected customer a free copy of an instrument issued by the Minister and of any notice given under section 14(7) of the Electricity Industry (Network Quality and Reliability of Supply) Code 2005. Context: If, having regard to the advice of the Authority, the Minister is satisfied that it is appropriate to do so, the Minister may by "Instrument": • Exempt the transmitter or distributor from compliance with the provision concerned; and • Attach to the exemption a condition that another provision, in place of the provision for which an exemption is granted, is to be complied with by the transmitter or distributor in the supply of electricity. "Section 14(7)"- The Minister may at any time, after obtaining the advice of the Authority, by notice in writing to the transmitter or distributor revoke or vary an instrument above including by imposing any further condition to be complied with by the transmitter or distributor.	Interaction with the Minister is through a single point of contact within Western Power's Government Relations division, and interactions with customers is through Western Power's Customer Services division. CutlerMerz considers that this is an appropriate structure to provide to an affected customer a free copy of an instrument issued by the Minister (should the Minister issue a notice in future and a customer then request a copy of the instrument). Offering a single point of contact with the Minister's office helps maintain continuity and facilitates a relationship between Western Power and the Minister. Finding: CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, so far as reasonably practicable, provide to an affected customer a free copy of an instrument issued by the Minister upon request.
	Compliance obligation reference No: 471 Clause: Electricity Industry (Network Quality and Reliability of Supply) Code 2005 clause 15(2)	CutlerMerz has interviewed personnel responsible for customer services at Western Power and reviewed relevant information as appropriate. No changes have been identified in complying with this obligation since the last audit. Western Power has advised that no "agreements" are in place with customers to exclude or modify certain provisions of Part 2 of the Code.

NQRS Code, Part 2: Division #	Compliance Obligation and Context	Findings
	Obligation: A transmitter or distributor that agrees with a customer to exclude or modify certain provisions must set out the advantages and disadvantages to the customer of doing so in their agreement.	Finding: CutlerMerz considers that Western Power's systems, processes and mechanisms can be expected to, so far as reasonably practicable, enable Western Power to enter into agreements with customers to exclude or modify provisions in their agreement.

Appendix B – Information provided

The information provided during the audit is provided in ***Table 5***.

Table 5: Information provided

Document name
N.1 Power_Quality_Strategy.pdf
N.2 Network Challenge - System low.pdf
N.3 Snapshot of PI Vision Pages.pdf
N.4 University of Wollongong Western Power (Distribution) 2018-2019 PQCA Utility Report.pdf
N.7 Power Quality - Complaint Handling Process Chart.pdf
N.8 SOP 163 Dispatching Fault Jobs.pdf
N.9 NQRS - ENAR 389028 NO Generator (CONSTRAINED) with Notification.pdf
N.9.01 NQRS - ENAR 423105 Generator Provided.pdf
N.10 Audit of 12mth Network Access Planning Process.pdf
N.11 Transmission Network reliability Strategy.pdf
N.12 Transmission Power Transformers Spares Inventory Audit.pdf
N.13 Network Control Services (NCS) for Eastern Goldfields (EGF) Load Area Business Case.pdf
N.13.1 Network Control Services (NCS) for North Country (NC) Load Area Business Case.pdf
N.14 Distribution Network Reliability Strategy.pdf
N.15 Network Standard - Transmission Strategic Spares.pdf
N.16 Cost of Compliance Report - NQRS Code.pdf
N.17 Annual_Compliance_Report_to_the_ERA_for_2016-17_Schedule A (extract).pdf
N.17.1 Annual_Compliance_Report_to_the_ERA_for_2017-18_Schedule A (extract).pdf
N.17.2 Annual_Compliance_Report_to_the_ERA_for_2018-19_Schedule A (extract).pdf
N.18 Generator Request Guidelines.pdf
N.19 Planned Outage Notification Letter.pdf
N.20 Planned Outage Customer Notification and Compliance Procedure_.pdf
N.21 Introduction to eNARS - Learner guide_.pdf
N.21.01 Extract from PTS 859 - Introduction to eNARs - Life Support Equipment - Planned Interruption.pdf
N.22 Reference Guide - Notification and Evidence through ONE.pdf
N.23 NQRS Systems Data Map.pdf
N.24 Works Scheduling Process Poster.pdf
NQRS - Written PQ Complaints Process- DP 27 Mar.pdf
N.5 Report from DQM of all Incidents and Follow Up- 01072017 - 30062020.xlsx
N.24.01 Schedule & Dispatch Process maps.vsd
N.25 NQRS - Written PQ Complaints Process- DP 27 Mar.vsdx