2017 Asset Management System Review

Review Report

September 2017

CutlerMerz

westernpower

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v5-0	28/09/2017	Edited in consideration of comments from the Economic Regulation Authority and EnergySafety	A. Homan	R. Dudley	T. Edwards

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Acronyms

Acronym	Description
AA	Access Arrangement
AMF	Active Management Forum
AMP Dx	Asset Management Portal Distribution
AMP Tx	Asset Management Portal Transmission
AMS	Asset Management System
APMS	Asset Performance Management System
AS	Australian Standards
AS / NZS	Australian Standards / New Zealand Standards
ASAE	Standards on Assurance Engagements (as issued by the Auditing and Assurance Standards Board – AUASB)
Augex	Augmentation Expenditure
AUASB	Auditing and Assurance Standards Board
BAU	Business as Usual
BI	Business Intelligence
BTT2	Name of a power transformer located at Western Power's Muja substation
BUCC	Backup Control Centre
CAGR	Compound Annual Growth Rate
CBRM	Condition Based Risk Management
CEO	Chief Executive Officer
CMT	Crisis Management Team
COGNOS	Name of Western Power's business intelligence (BI) and performance management software suite
CT	Current Transformer
DMS	Distribution Management System
DER	Distributed Energy Resource
DERT	Direct Estimation Risk Tool
DM	Demand Management
DM#	Document Management Number
EC	Effectiveness Criteria
EDL1	Electricity Distribution Licence 1
EDM	Electronic Document Management
ENA	Electricity Networks Australia
EMT	Emergency Management Team
EPCC	East Perth Control Centre
ER	Effectiveness Rating
ERA	Economic Regulation Authority
Etc.	Etcetera
ETL2	Electricity Transmission Licence 2
EWD	Equipment and Works Data Warehouse
FAR	Fixed Asset Register
FMS	Field Mobility Services
FY	Financial Year
GIS	Geographic Information System
HV	High Voltage
IBP	Issues Briefing Paper
IEM	Investment Evaluation Model

Acronym	Description
ISO	International Organization for Standardization
ISO-55000	International Organization for Standardization (ISO) for Asset Management
ISO-31000	International Organization for Standardization (ISO) for Risk Management
ICT	Information & Communication Technology
IT	Information Technology
ITOMS	International Transmission Operations & Maintenance Study
JPT	Joint Planning Team
KPA	Key Process Area
KPI	Key Performance Indicator
kV	Kilovolt
LV	Low Voltage
MIS	[Asset] Management Information System
NARC	Network Risk Assessment Criteria
NDP	Network Development Plan
NFIT	New Facilities Investment Test
NIS	Network Investment Strategy
NMP	Network Management Plan
NOCC	Network Operations Control Centre
NPS	Network Planning Standard
NQRS	Network Quality and Reliability of Supply
NRMS	Network Risk Management Standard
NRMAT	Network Risk Matrix Assessment Template
NRMF	Network Risk Management Framework
NRMT	Network Risk Management Tool
NSP	Network Service Provider
OCR	Online Compliance Register
OFI	Opportunity for Improvement
Opex	Operational Expenditure
PAR	Priority Attention Required
PIR	Post-Implementation Reviews
PLS-CADD	Power Line Systems - Computer Aided Design and Drafting
PoF	PowerOn Fusion is the name of Western Power's Distribution Management System (DMS)
P1	Priority 1
P2	Priority 2
PAS 55	Publically Available Specification 55
PRMF	Project Risk Management Framework
RAB	Regulatory Asset Base
RCM	Reliability Centred Maintenance
REC	Recommendation
Repex	Replacement Expenditure
RMP	Risk Management Policy
RMU	Ring Main Unit
SAIDI	System Average Interruption Duration Index
SAMP	Strategic Asset Management Plan
SCADA	Supervisory Control And Data Acquisition
SAIFI	System Average Interruption Frequency Index

Acronym	Description
SES	State Emergency Service
SEQT	Safety, Environment, Quality and Training
SHE	Safety, Health & Environment
SME	Subject Matter Expert
SOCC	System Operations Control Centre
SOP	Standard Operating Procedure
SOTI	State of the Infrastructure
SPIDA	Name of Western Power's Geographic Information System (GIS)
SPS	Standalone Power System
SSB	Service Standard Benchmarks
ST	Structured Tools
SWIS	South West Interconnected System
TLS	Transmission Lines System
TMS	Transmission Management System
TRIS	Transmission Ratings Information System
WPGM	Work Program Governance Model
WPP	Works Program Planning
WPR	Works Planning Report
WSMS	Works Scheduling Management System
XA21	Name of Western Power's Transmission Management System (TMS)
ZBAM	Zone Based Asset Management

1. Executive summary

This review has been conducted to assess the effectiveness of Western Power's Asset Management System (AMS) over the period 1 July 2014 to 30 June 2017. Western Power's AMS applies to two operating licences issued by the Economic Regulation Authority (ERA) – Electricity Distribution Licence (EDL1) and Electricity Transmission Licence (ETL2).

The assets covered under these licenses are used to provide electricity distribution and transmission services within the South West Interconnected System (SWIS); these assets include substations, transmission lines and cables, distribution lines and cables, and associated assets. The assets have continued to be used for the provision of transmission and distribution services over the period. We did not observe indication of asset health deteriorating inconsistent with their age. Based on this we consider that there have been no major changes to the assets since the previous review.

The previous review was carried out in 2014, and resulted in twenty recommendations. Western Power has taken actions to address these recommendations. CutlerMerz considers that no further action is required in relation to all of the recommendations from the previous review. A detailed review of Western Power's efforts to address previous recommendations is provided in Section 3.

The key findings of the 2017 review are as follows (detailed observations are provided in Section 5):

- The maturity of Western Power's AMS has strengthened significantly over the review period, particularly in relation to defining strategy and objectives and enhancing the sophistication of approaches and supporting tools;
- There are comprehensive and rigorous processes in place for business as usual planning, resulting in effective asset management plans;
- Operational activities and programme delivery is systematically managed and monitored to enable desired outcomes to be achieved; and
- Western Power's approach to risk based asset management can be considered effective, particularly as applied to asset maintenance and renewal.
- Priority areas where Western Power can further progress its AMS maturity are as follows:
    - Whilst the AMS has a strong approach to meeting organisational objectives in relation to safety and reliability, there is scope to formalise the strategic intent to the "affordability" objective. [REC-01/2017]
    - Although Western Power has developed a "Risk Based Capacity Planning Methodology", the deterministic requirements of the Technical Rules constrain its application. Risk-based augmentation planning is increasingly important in the context of a widening gap between peak demand and energy throughput. Western Power has sought exemptions from the Technical Rules where a risk based approach has been preferred. Applying a "probabilistic" approach, coupled with a considered approach to asset utilisation, has the potential to yield significant benefits. [REC-02/2017] and [REC-03/2017]
- Key focus areas for the AMS looking forward over the coming review period are as follows:
    - Significant efforts by Western Power to engage with customers were observed. Western Power captures customer needs outside the AMS via its "customer insights" survey. These insights are then cross-checked against the asset management objectives to provide assurance of alignment. Notwithstanding, there is an opportunity to advance the AMS maturity through a concerted

customer focus (within the AMS) that demonstrably drives asset management objectives across the spectrum of applicable customer requirements. This is particularly important given that there may be a lag in regulated and legislative responses to customer requirements, and this lag is likely widening in a rapidly changing environment (with increasingly interactive consumers and producers ("prosumers") and emerging technology feasibility). [OFI-03/2017]

- Emerging technologies are presenting increasing risks and opportunities, as evidenced by the widening gap between maximum demand and energy throughput on Western Power's network. This is recognised as a key issue at the corporate level, and there is scope for Western Power's AMS to address the issue with a more robust strategic approach going forward (it is anticipated that this will be led by corporate strategic initiatives). [OFI-06/2017]
- As the intelligence of electricity networks and the sophistication of supporting systems continues to increase, so too does their criticality to the effectiveness of the AMS. Given this, it would be beneficial for Western Power to embed asset management philosophies in the management of its AMS information systems, commensurate with the maturity that it applies to the management of its network assets. [OFI-14/2017]

Western Power's control environment has been reassessed following the review, applying the ERA's framework (refer to Appendix 4 of the Guidelines for a description of the framework). The post-review controls assessment is provided in Appendix A.

The detailed effectiveness assessment of the AMS is provided in Section 4. The overall effectiveness rating is summarised as follows:

- 66% of effectiveness criteria for asset management process and policy definition adequacy were rated as "A" (adequately defined), and 63% of effectiveness criteria for asset management performance were rated as "1" (performing effectively);
- The remaining effectiveness criteria we rated as "B" (requires some improvement) "2" (opportunity for improvement); and
- No effectiveness criteria were rated "C" (requires significant improvement), "D" (inadequate), "3" (corrective action required), and "4" (serious action required).

CutlerMerz' recommendations arising from the 2017 AMS review are summarised in Table 1.

Table 1: Summary of issues and recommendations

Ref	AMS Component	Issue	Recommendation
01/2017	**Key Process Area (KPA):** 1. Asset Planning	**Effectiveness Criteria (EC):** Asset management plan covers key requirements **Effectiveness Rating (ER):** B2 Whilst the asset management objectives take a strong position on the "safe" and "reliable" organisational objectives, and convert these into "key objective strategies" for the AMS, the organisation's "affordable" objective does not appear to be given commensurate focus by the AMS. The absence of strategic documentation in relation to affordability does not suggest that Western Power hasn't incorporated cost efficiency throughout its AMS processes; only that it has not articulated its approach at the strategic tier of the AMS as robustly as it has for other objectives. The review of cost related elements of the AMS elements demonstrates that these considerations are strongly embedded throughout the AMS processes. This includes: <u>Affordability (or price impact):</u> • Assessments undertaken as a part of the Regulatory Submission, and reviewed as a function of Corporate Strategy/ Business Plan; • New Facilities Investment Test (NFIT) Reviews as a part of business cases; and • Ex-Post reviews as a part of regulatory submission. <u>Efficiency assessments:</u> • Top down assessments undertaken as a part of the Corporate Strategy/ Business Plan; • NFIT Reviews as a part of business cases; and • Individual asset class level/ delivery provision efficiency tested through benchmarking, competitive tendering, optioneering for	It is recommended that Western Power develop asset management strategy to articulate its delivery on the "affordable" objective, commensurate with the strategies developed to deliver on the "safe and reliable" objectives. It is noted that in the new corporate strategic plan (still under development), the "affordable" objective is likely to be replaced with new objectives. In this case, the above recommendation should consider the new objectives rather than the current "affordable" objective.

Ref	AMS Component	Issue	Recommendation
		standards and strategy development (includes risk-cost-benefit assessment at asset class level). Notwithstanding these processes, it is appropriate for the AMS to articulate its direction at the strategic tier for how it delivers on the "affordable" objective holistically, commensurate with the robust articulation of its approaches that deliver on the "safe" and "reliable" objectives.	
02/2017	**Key Process Area (KPA):** 2. Asset creation and acquisition	**Effectiveness Criteria (EC):** Projects reflect sound engineering and business decisions **Effectiveness Rating (ER):** B2 Generally, Western Power's Technical Rules appear highly prescriptive (as compared to rules applied to peer NSPs). Specifically, the Technical Rules impose prescriptive deterministic criteria to be applied for capacity planning. It is observed that peer NSPs have achieved significant efficiency gains through developing probabilistic risk-based capacity planning approaches with increasing sophistication. Although Western Power's risk-based approach to renewal planning can be considered amongst industry leaders, the prescription of the Technical Rules appears to be constraining it from achieving similar outcomes in relation to capacity planning. The application of a similar mindset (as currently applied to renewal planning) to capacity planning would significantly advance Western Power's maturity in this area. This is an increasing imperative as demand profiles and power flows on the network are altered by emerging technology (as is currently evident in Western Power's trend of increasing maximum demand and reducing energy throughput). It is noted that Western Power has made efforts in this area, and has developed a draft Risk Based Capacity Planning Methodology document; however, the implementation of the methodology requires Western Power to seek exemptions from complying with the Technical Rules. It is understood that Western Power is planning to undertake an internal review of the Technical Rules.	It is recommended that Western Power undertake an internal review of the Technical Rules, with a specific focus on considering the deterministic planning criteria that are prescribed (predominantly within Section 2.5) to identify areas that constrain it from optimising capacity planning through risk-based probabilistic approaches. The review should identify discrepancies between the Technical Rules and Western Power's Risk Based Capacity Planning Methodology (EDM 41025116) document (also in view of continued evolution of the document with leading industry practice).

Ref	AMS Component	Issue	Recommendation

03/2017	**Key Process Area (KPA):** 3. Asset disposal	**Effectiveness Criteria (EC):** Under-utilised and under-performing assets are identified as part of a regular systematic review process; The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken
		Effectiveness Rating (ER): B2
		Traditionally, it may be considered satisfactory to consider asset utilisation predominantly in the following context:
		• Over-utilised assets as those that are peak-capacity constrained;
		• Under-utilised assets as those that are redundant, or that are found to not be highly utilised during investigations into other issues that may require an investment or disposal decision.
		However, a clearer intent with respect to asset utilisation is required in the context of:
		• Increasing peak demand and reducing average demand;
		• Increasing electricity prices; and
		• Increasing cost effectiveness of alternate power supplies.
		Western Power currently considers asset utilisation primarily in relation to peak demand. Peak demand thresholds are defined in relation to over-utilisation; however, under-utilisation does not appear to be clearly defined (although, there are examples of under-utilised assets being rationalised). The average utilisation of assets does not appear to be well understood, and opportunities for rotation / redeployment to achieve a target network utilisation are likely to be available.
		Further, the Risk Based Planning Methodology document shows that typical load-duration curves peak for a small percentage of time. The difference between the peak and average demand is widening as demand increases and energy throughput decreases. This indicates that considering utilisation based on peak demand thresholds is increasingly unsuitable.
			It is recommended that Western Power define a clearer intent in relation to asset utilisation. This should consider:
			• Enhancing the understanding of asset utilisation and articulating a preferred position based on average demand in addition to peak demand (in view of the demand profiles);
			• Defining target utilisation rates based on the above understanding for:
			  ○ Maximum and minimum utilisation targets for individual assets or types of assets; and
			  ○ Target average utilisation rates for the network as a whole.
			The above should be incorporated into asset strategy, which could consider opportunity for asset rotation and redeployment, and demand management.
			This should be considered in conjunction with tariff strategy, and transitioning towards risk-based capacity planning.

2. Scope of work

The scope of the AMS Review focuses on the AMS, including asset management plans, which set out the measures that are taken by Western Power for the proper operation and maintenance of assets. The plans are required to convey Western Power's business strategies to ensure the effective management of assets over at least a five-year period.

The purpose of the review was to:

- Assess the measures taken by Western Power for the proper management of assets used in the provision and operation of services and, where appropriate, the construction or alteration of relevant assets; and
- Provide the ERA an independent view of the effectiveness of Western Power's AMS in respect of the assets that are delivering the services covered by the licences.

The adequacy and effectiveness of the AMS has been assessed by evaluating the twelve key asset management processes below.

1. Asset planning
2. Asset creation/acquisition
3. Asset disposal
4. Environmental analysis
5. Asset operations
6. Asset maintenance
7. Asset management information system
8. Risk management
9. Contingency planning
10. Financial planning
11. Capital expenditure planning
12. Review of the asset management system

The scope of the review also includes a review of the actions taken to address the status of the last review report's (2014) management actions. This review covers the period of 1 July 2014 to 30 June 2017, and the previous review covered the period of 1 July 2012 to 30 June 2014. The review has been conducted over March to July 2017.

The methodology for the review included three core elements:

- Review plan – The review plan was developed consistent with Section 9 of the ERA Guidelines and in conformance with the requirements outlined in ASAE 3000 (Sec. 40-47) and ASAE 3500 (Sec. 32 to 52).
- Fieldwork – The effectiveness of Western Power's AMS was assessed consistent with Section 10 of the ERA Guidelines. This included assessing: the effectiveness of the control environment, the effectiveness of information systems, the effectiveness of control procedures, the attitude towards effectiveness, and whether effective outcomes are achieved.

- Review Report – This review report is consistent with Section 11 of the ERA Guidelines to expresses our opinion in respect of the findings of the review.

The time applied by the CutlerMerz team to carry out the review is provided in Table 2.

Table 2: Time applied to review by CutlerMerz team

Auditor	Role	Hours
Ryan Dudley	Lead Auditor	62
Adam Homan	Auditor	244
Gerhard Joubert	Auditor	104
Tim Edwards	Review Auditor	8
Total hours		418

The list of Western Power representatives that participated in the review is provided in Appendix A.

The list of documentation and information sources examined by CutlerMerz during the course of the review is provided in Appendix C.

3. Western Power's response to previous recommendations

Western Power's response to recommendations is reviewed using the table format specified within the ERA Guidelines in Table 3. All recommendations have been resolved during the current review period.

Table 3: Table of Previous Review Ineffective Components Recommendations – Resolved during the current Review period

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
01/2014	**Effectiveness Rating (ER):** B1 **Key Process Area (KPA):** 1. Asset Planning **Effectiveness Criteria (EC):** Asset management plan covers key requirements **Issue:** *At present Western Power does not have an overarching asset management strategy document which outlines an approach for each lifecycle stage.*	*There should be an overarching asset management strategy applicable to all network assets which considers each stage in the asset lifecycle e.g. plan, design, build, operate, maintain, renew and dispose.*	Dec 2015	**No further action is required.** Western Power has developed an overarching "Network Strategy" document, as well as a "Key Considerations for Asset Management Strategy" document (DM#10399003) which is used to develop individual asset class strategies over the asset lifecycle. The application of these documents achieves the intent of the recommendation to establish a considered general approach across all network assets.
02/2014	**Effectiveness Rating (ER):** C2 **Key Process Area (KPA):** 1. Asset Planning **Effectiveness Criteria (EC):** Planning process and objectives reflect the needs of all stakeholders and is integrated with business planning **Issue:** *It was difficult to gain insight into the total asset renewal driven investment requirements of the business. In particular, it is not clear whether Western Power can articulate an overall asset renewal strategy, and the extent to which there is a hierarchy in its approach to asset renewal planning that allows for the development of an optimised asset renewal driven investment portfolio.*	*It is recommended that Western Power establish a long term view of the total asset renewal expenditure requirement that integrates renewal needs across the range of asset classes. This should demonstrate how renewal needs for "child" assets roll up in a coordinated way to an overall renewal plan for a parent asset (for example, circuit breakers and transformers into substation renewal, etc.).*	Dec 2015	**No further action is required.** Western Power has developed a "Network Outlook" document (EDM# 13290587) to capture its long-term view of the network. Renewal modelling and "renewal to development overlap synergies" are also included in varying contexts throughout the following documents: • Network Development Plan (EDM#34294247) • Network Management Plan (EDM#34159326) • Network Plan (EDM#41748714) • Network Planning Standard (EDM#34387365) and supporting methodologies • Risk Based Renewal Investment Overhead Lines Methodology (EDM#40195844)

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	Also, it is unclear whether Western Power has a long term view of the total asset renewal expenditure requirement, or is able to demonstrate how renewal needs for "child" assets roll up in a coordinated way that would lead to an overall renewal plan for a parent asset; for example, being able to demonstrate the planning of how the confluence of replacement needs for individual assets in a substation may lead to the need to plan for the replacement of the substation as a whole.			The intent of the recommendation has been satisfactorily addressed in a manner suited to Western Power's requirements.
03/2014	**Effectiveness Rating (ER):** B2 **Key Process Area (KPA):** 1. Asset Planning **Effectiveness Criteria (EC):** Service levels are defined **Issue:** *Service levels are defined in the Network Investment Strategy (NIS) and in the Network Management Plan (NMP). The NIS defines the performance standards for the network as a whole, and the NMP articulates performance outcomes and re-investment needs for individual asset classes.* *The auditor was unable to observe however how long-term objectives for these service levels were developed, whether they were informed by particular strategic business objectives, or the extent to which they reflected community and stakeholder expectations.*	*It is recommended that Western Power establish clear long-term objectives for the key performance measures such as SAIFI, SAIDI, supply security standards etc, and provide a sharp focus for the investment program through this.* *These objectives may be along the lines of maintaining current standards but at higher efficiency levels, or may be targeted, for example, by increasing performance standards for rural areas whilst maintaining standards for urban areas, etc., and should be clearly linked to overall business strategic plans and objectives.*	Jun 2015	**No further action is required.** Western Power has outlined overarching reliability service levels within its Asset Management Objectives Report. Strategy documents for both transmission and distribution networks have also been developed, which articulate the approach to achieving it objectives, and provide a sharp focus for the investment programme.
04/2014	**Effectiveness Rating (ER):** B2 **Key Process Area (KPA):** 2. Asset Creation and Acquisition **Effectiveness Criteria (EC):** Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions **Issue:** *Whilst it was clear that the consideration of non-network options formed part of the planning process,*	*The auditor recommends that Western Power articulate its intentions regarding Demand Management and Non-network solutions through a specific policy and associated strategy, and should consider developing high-level targets for DM programs or outcomes if practicable.*	Jun 2015	**No further action is required.** Although a specific policy and strategy for Demand Management has not been developed, Western Power has embedded the requirement to pursue demand-side management in its asset management policy, developed a Demand Management & Non-Network Options Guideline, and a Demand Management Screening Tool,

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	Western Power's strategic intent in this area was not strongly evident. The auditor was unable to observe a Demand Management (DM) or non-network solution policy, framework or strategy that would normally be expected in order to drive behaviours in this regard. It was not clear whether there exists within Western Power a specific DM strategy, and the extent to which this is actively pursued as a separate corporate activity with its own objectives, management framework, and performance measurement. *The auditor is of the view that DM initiatives tend only to be actively considered when done so with deliberate corporate intent and are resourced accordingly.*			which CutlerMerz has observed being systematically applied in investment business cases. This achieves the intent of the recommendation.
05/2014	**Effectiveness Rating (ER):** C3 **Key Process Area (KPA):** 2. Asset Creation and Acquisition **Effectiveness Criteria (EC):** Ongoing legal/environmental/safety obligations of the asset owner are assigned and understood **Issue:** *The auditor explored Western Power's approach to the management of strategic spares (at a whole-of-plant level). Whilst it was clear that Western Power had intent around this issue and facilities to acquire and manage strategic plant spares, it is not clear the extent to which this was actively planned and managed in accordance with a policy framework that governed issues such as the identification, acquisition, management, and deployment of strategic spares for key items of electrical plant.*	*The auditor recommends that a strategic spares policy be developed that specifically spells out the types of risks being addressed, the appropriate level of spares to be kept, location and spares access arrangements, and a spares management regime (e.g. rotation through the live network, retention periods, maintenance arrangements, etc.)* *This spares policy should also give consideration to access, transport arrangements and define boundaries around acceptable time-to-site in order to better define storage requirements.*	Jul 2016	**No further action is required.** Western Power has undertaken a considered review to establish its contingency planning requirements, and the approach and requirements in relation to strategic spares was captured as part of this process Western Power has developed a Network Standard for Transmission Strategic Spares. This is supported for transmission transformers by a comprehensively developed document and analysis tool. Distribution spares are managed through the existing processes for stocking and replenishing stores. The above achieves the intent of the recommendation.
06/2014	**Effectiveness Rating (ER):** B2 **Key Process Area (KPA):** 3. Asset Disposal	*Review of the performance KPIs and targets be formalised within an appropriate review process.*	Dec 2015	**No further action is required.**

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	Effectiveness Criteria (EC): Under-utilised and under-performing assets are identified as part of a regular systematic review process **Issue:** *The auditor notes that while asset performance is considered in the annual Network Management Plan (NMP) revisions, it was not clear what emphasis the review process places on validation and re-evaluating the performance KPIs and targets that are used to assess asset performance. It is noted that KPI review is not specified within the scope of the Network Management Plan Review (Period: 1 July 2014 – 30 June 2019) (DM# 12028950).*			This action has been addressed through the development of the Asset Management Objectives Report which sets out objectives and associated metrics for the assets. This is supported by the development of measures through asset class strategies in accordance with the strategy development guideline, which form the basis for the Network Management Plan. The Asset Performance Management Framework provides a process for broadly monitoring asset performance. As such, Western Power has developed a comprehensive approach for establishing, validating, reviewing and monitoring KPIs in relation to underperforming assets.
07/2014	**Effectiveness Rating (ER):** C2 **Key Process Area (KPA):** 4. Environmental Analysis and "Area of Special Focus 2 – Distribution Wood Poles" **Effectiveness Criteria (EC):** Performance standards (availability of service, capacity, continuity, emergency response, etc.) are measured and achieved **Issue:** *The auditor recognises that Western Power's approach to the management of wood poles has significantly evolved over the 2012-14 period. However, the auditor considers that the reporting mechanisms (Executive Dashboard – Delivery & Public Safety and Western Power Corporate Monthly Performance Report and Unserviceable Wood Pole Report) have not been revised consistent with the new approach. In the auditor's view this means that the risk profiles associated*	*The auditor recommends that Western Power introduce and monitor timeliness indicators for attending to defects. This should be consistent with the new approach such that risk profiles are accurately represented to stakeholders. Specific areas that should be considered include:* • *Pole remediation for all risk categories (Fault-Short Term Deferred / PAR / ZBAM); including volumes, failures and timeliness.* • *Pole remediation with respect to Western Power's high consequence areas (i.e. bushfire zones etc.); including volumes, failures and timeliness.* *The auditor advises that Western Power may wish to consider revising its reporting for all assets consistent with the above; with a view on ensuring that risk profiles are being accurately represented.*	Feb 2015	**No further action is required.** CutlerMerz has reviewed the "Managing Defects on Western Power's Distribution Network Assets" document and considers this document to provide adequate clarity on the definition and management of defects. It is anticipated that the defined approach will be reflected through relevant documentation through their periodic revision. The "Evaluating the effectiveness of Western Power's risk management approach for its distribution network assets – through the development of performance Indicators" document is considered to outline a robust approach to understanding the defects on the network. As data is accumulated and reviewed this should provide a strong platform for

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	with wood poles are no longer being accurately reflected in the dashboard reports. **Effectiveness Rating (ER):** Not applicable (recommendation related to "Previous Recommendation – 2012/08") **Key Process Area (KPA):** Not applicable (recommendation related to "Previous Recommendation – 2012/08") **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Previous Recommendation – 2012/08") **Issue:** *The auditor has reviewed the Wood Pole Management Dashboard for December 2013 (DM# 11674354). The auditor is satisfied that the December 2013 dashboard appropriately reported performance against the backlog of Priority 1 (P1) / Priority 2 (P2) poles.* *However, with the transition to a risk based approach the previous P1 and P2 timeliness targets are no longer applicable. Under Zone Based Asset Management (ZBAM) a volume of high-risk poles are targeted based upon available resources. This means that measuring the backlog against the resources-based target volume no longer captures the issue surrounding timeliness of pole remediation.* *The auditor understands that under the new risk-based approach the highest priority categories are 'fault' poles and the second highest priority are Priority Attention Required (PAR). Faults are addressed immediately or, should this be prevented due to access restrictions, made safe and reclassified as 'Short Term Deferred' works. PAR poles have 12 week remediation targets and Short Term*			identifying where changes can be made to defect identification and management to improve the risk profile of its assets. It is noted that the approach is only applied to high-risk defects. Western Power may wish to consider extending the approach to all defect categories (although, it is noted that non high-risk defects will be reassessed during inspections inspections).

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	Deferred poles are re-assessed on a two-weekly basis until remediated. Performance against these targets is not however reported in the dashboard. *Wood pole performance is now reported in the Executive Dashboard for Delivery & Public Safety, and the auditor has reviewed this dashboard for May 2014 (DM# 12081090). The auditor is not satisfied that the May 2014 dashboard reported wood poles remediation KPIs against timeliness targets.* **Effectiveness Rating (ER):** Not applicable (recommendation related to "Area of Special Focus 4 – Transformer Management") **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 4 – Transformer Management") **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Area of Special Focus 4 – Transformer Management") **Issue:** *The auditor has reviewed the June 2014 Asset Performance Dashboard - Distribution Transformers (DM# 12049029). This provides a snapshot of the transformer population for the previous month; including general attributes and defect analysis. The auditor found that there is scope to improve the dashboard reporting to better present risk profiles to stakeholders.* *For example, statistics for pole-top and ground-mount transformers are grouped together, pending defects are identified but there is no information on timeliness, and no historical data is presented to give an understanding*			

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	of trends. Also, the dashboard did not provide any information on inspections.			
08/2014	**Effectiveness Rating (ER):** B2 **Key Process Area (KPA):** 4. Environmental Analysis and "Area of Special Focus 2 – Distribution Wood Poles" **Effectiveness Criteria (EC):** Compliance with statutory and regulatory requirements **Issue:** *Western Power is reporting pole failures against the 'target' of 1 in 10,000 in accordance with its pole management policy and strategy. It is unclear how this target was derived, and therefore whether a comparison against this target is appropriate. It is further unclear whether such a comparison is an effective representation of the level of risk associated with the number of pole failures, particularly given that Western Power now prioritises its pole replacements on the basis of risk impact.*	*The auditor recommends that Western Power seek guidance from Energy Safety and the Authority on appropriate pole failure targets for reporting purposes.*	Mar 2015	**No further action is required.** CutlerMerz has reviewed Western Power's correspondence with Energy Safety and the ERA and considers this to be adequate engagement on the subject of pole failure targets. CutlerMerz has considered Western Power's position on pivoting its focus on increased understanding and targeting of risk reduction rather than an arbitrary universal failure target. Western Power's risk based approach to wood pole management is considered appropriate; however, Western Power should continue to monitor failure rates by risk category so that it can demonstrate improvement in high risk areas and subsequent reduction in overall risk profile should it need to substantiate its position to Energy Safety or the ERA.
09/2014	**Effectiveness Rating (ER):** B2 **Key Process Area (KPA):** 6. Asset Maintenance **Effectiveness Criteria (EC):** Risk management is applied to prioritise maintenance tasks **Issue:** *The auditor observes that for its transmission assets Western Power plans to migrate away from a time-based routine maintenance approach to a Condition Based Risk Management (CBRM) approach where the nature of the plant and the condition data available facilitates this.* *This has the potential to impact the project planning and implementation phases of the Combined*	*The auditor recommends that a review be undertaken of the merits of adopting a broad CBRM approach in light of the Combined Maintenance framework. This would be aimed at:* • *assessing the impacts of CBRM on the efficiencies of combined maintenance,* • *ensuring an orderly migration plan from time-based maintenance to condition and risk based maintenance across the asset base,* • *ensuring the Combined Maintenance Framework is adjusted to reflect the impacts of the CBRM*	Feb 2015	**No further action is required.** Western Power has undertaken a stakeholder engagement process in relation to the Reliability Centred Maintenance (RCM) / Condition Based Risk Management (CBRM) approach for transmission assets. This is considered to demonstrate an effective level of stakeholder engagement at this stage. The engagement process highlighted the potential risks and benefits in relation to the Reliability Centred Maintenance (RCM) / Condition Based Risk

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	Maintenance program, and may introduce risks in the effectiveness of the Combined Maintenance approach, especially in the light of the observations regarding the project management aspects of the Combined Maintenance program (refer to JR: 11/2014).	*approach, and that the project management structures are in place to accommodate this, and* • *ensuring that CBRM remains targeted to the areas of greatest impact.*		Management (CBRM) approach for transmission assets.
10/2014	**Effectiveness Rating (ER):** C2 **Key Process Area (KPA):** 6. Asset maintenance and "Area of Special Focus 2 – Distribution Wood Poles" **Effectiveness Criteria (EC):** Maintenance policies and procedures are documented and linked to service levels required **Issue:** *The 12 week Priority Attention Required (PAR) benchmark was selected on the maximum reasonable time to rectify a defective pole based on the pragmatic issues such as the time to schedule access (up to 6 weeks) and the time to plan the work (up to a further 6 weeks). There is performance monitoring against this benchmark, and the reasons for not achieving this timeframe for some poles are investigated and understood.* *Nevertheless, it was not evident whether this benchmark was in itself a focus for performance improvement, whether it generated an appropriate risk-management outcome, and whether strategies were being considered to facilitate improvement in this benchmark.* *As a legacy and nature of Western Power's works programming structure, the timeframe for remediating PAR poles is nominally 12 weeks. The auditor has not observed any investigation that concludes these timeframes as appropriate, or whether they should be improved.*	*The auditor recommended that Western Power should investigate the appropriateness of the 12 week PAR remediation timeframe to assess whether it is appropriate, and whether there is scope for its improvement. Additionally, Western Power should consider the monitoring and reporting of time to remediate 'Faulted' and 'Short-Term Deferred' Poles.* *The auditor considered that Western Power should exercise a demonstrable focus on improving defect rectification times, not just for poles but across all of its distribution maintenance activities (where practicable).* *Issues that may frustrate the achievement of benchmarks (and benchmark improvement) may be considered to develop a suite of sub-benchmarks, for example time to rectify for access constrained poles versus access available poles.*	Feb 2015	**No further action is required.** CutlerMerz considers that the actions taken in relation to recommendation 07/2014 address this issue.

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
11/2014	**Effectiveness Rating (ER):** B2 **Key Process Area (KPA):** 6. Asset maintenance **Effectiveness Criteria (EC):** Risk management is applied to prioritise maintenance tasks **Issue:** *The auditor notes that, in general, Western Power displayed the broad application of project management principles to the planning and implementation of its Combined Maintenance program for transmission assets (in particular substation assets).* *Whilst the auditor observed that the approach was sophisticated, well-understood, and well-embraced within Western Power, it is believed that some risks with the approach exist. These mainly relate to a degree of informality in the project management approach, and the fact that the Combined Maintenance program was largely planned and managed by one subject matter expert.*	*The auditor recommends that project management disciplines are formally implemented, and that Western Power considers the more formal provision of project planning and management support, perhaps through the formation of a permanent Combined Management Projects team.* *The creation of this team would need to be underpinned by process and procedure documentation, team resource planning, and succession planning.*	Sep 2016	**No further action is required.** CutlerMerz has observed documentation which indicates that Western Power introduced a formal project team structure for the Combined Maintenance programme, involving Project Managers with responsibility for the delivery of the work programmes with support provided by project coordinators and administrators. However, since the previous review Western Power has changed its substation maintenance approach. It now maintains assets on individual schedules rather than holistically for the substations. As a result, the recommendation for a formal project management team is no longer applicable.
12/2014	**Effectiveness Rating (ER):** B2 **Key Process Area (KPA):** 6. Asset maintenance and "Area of Special Focus 2 – Distribution Wood Poles" **Effectiveness Criteria (EC):** Risk management is applied to prioritise maintenance tasks **Issue:** *The auditor considers the Zone Based Asset Management (ZBAM) approach to be a rigorous methodology for prioritising non high-risk poles. However, it was not clear what timeframes are in place to ensure that low-risk defects will eventually be treated.*	*The auditor recommends that Western Power consider whether firm time limits are appropriate for low-risk defects, and whether defect escalations are appropriate after specified time periods have lapsed.*	Feb 2015	**No further action is required.** CutlerMerz has reviewed the "Managing Defects on Western Power's Distribution Network Assets" document which demonstrates that the ongoing treatment of low risk defects has been considered.

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
13/2014	**Effectiveness Rating (ER):** Not applicable (recommendation related to "Area of Special Focus 4 – Transformer Management" rather than a KPA) **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 4 – Transformer Management" rather than a KPA) **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Area of Special Focus 4 – Transformer Management" rather than a KPA) **Issue:** *The auditor understands that investigations have identified the suspected causes of the transformer failures at Muja. However, investigations are ongoing with the following currently being carried out:* • *An independent investigation of the BTT2 transformer failure at Muja.* • *An internal investigation of the power system to understand if there were network operating conditions that may be a contributing factor in the failure of the transformers. The auditor understands that this investigation is also considering the reactive attributes of the network including the location of reactive compensation equipment.*	*The auditor recommends that:* • *Western Power takes appropriate action based on the findings of the independent investigation [Muja BTT2 failure], and in view of the findings of other investigations and actions taken to-date.* • *A report be produced detailing the findings of the internal system investigation, and actions be taken as appropriate based on the findings.* • *Based on the outcome of the current investigations, Western Power may wish to consider whether external expertise may be of assistance in diagnosing any broader system irregularities that may have contributed to the transformer failures.*	Sep 2015	**No further action is required.** CutlerMerz has reviewed the documentation provided and considers this to demonstrate that Western Power has conducted a thorough investigation into the causes of the transformer failure. CutlerMerz has reviewed the "Muja BTT2 Transformer Failure Review – Implementation Plan" and considers this to be a well-considered and appropriate response to the findings of the investigation.
14/2014	**Effectiveness Rating (ER):** B3 **Key Process Area (KPA):** 2. Asset Creation and Acquisition **Effectiveness Criteria (EC):** Projects reflect sound engineering and business decisions **Issue:** *Western Power demonstrated that Post-Implementation Reviews (PIR) are conducted for Board approved projects, and an annual report is provided to the Board accordingly (DM#11689575 PIR Board*	*The auditor recommends that a more formal and comprehensive approach to undertaking project post implementation reviews be developed.* *This would include a framework to facilitate a broader identification of projects that require a PIR. This should include high-significance non-Board approved projects or programs; such as the new approach to distribution assets management and*	Dec 2014	**No further action is required.** Western Power has developed a "Portfolio Assurance and Compliance Framework", which demonstrates an appropriate approach to project delivery. Although only Board approved projects and programmes are subject to a PIR, all investments are subject to a close out review through the investment governance process. A review of sample close-out reviews has

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	Approved Projects January 2014). Samples of the Work Program Governance Model (WPGM) 'gate compliance' reports for individual projects/programs (undertaken post-project) were also provided for review. *Notwithstanding this, the auditor did not see evidence that comprehensive PIRs were undertaken for all Board-approved projects and programs. Further, the auditor is of the view that there may be some projects that fall below the Board approval threshold that are worthy of PIR due to their nature, scale, or complexity.*	*significant upgrade to the asset management information system.* *A PIR framework (including a plan) should be developed that ensures that these are conducted as required and that actions and learnings are agreed upon, formally tracked and are used to inform improvements in project governance and project execution.* *Recommendation 15/2014 identifies a number of current or planned projects / programs where the auditor considers that PIRs would be beneficial but would not necessarily be carried out under the existing policies.*		demonstrated that they achieve the intent of the recommendation. Asset management practice changes that are not captured through the gated process and PIRs are monitored through BAU routine performance monitoring.
15/2014	**Effectiveness Rating (ER):** B2 **Key Process Area (KPA):** 12. Review of asset management system and "Previous Recommendation – 2012/20" **Effectiveness Criteria (EC):** A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current **Issue:** *In carrying out the 2012-14 asset management system review the auditor found that uncertainties surrounding document revisions and control still persist within the organisation; for example:* • *Critical documents don't always contain document control information.* • *Documents with control sections do not identify the intended start and completion dates for the next review.*	*The auditor recommended that PIRs be carried out for the following projects and programs that are scheduled or were implemented during the 2012-14 period:* • *Following the implementation of the new document management system which is currently out for tender. The auditor advised that: Western Power outlines and monitors all reviews that are required for each of its asset management system documents, processes and systems; and All documents should have a document control sections that includes information on past revisions and intended start and completion dates for the next review.* • *New distribution maintenance approach (Fault / PAR / ZBAM). This review should be scheduled at an appropriate time once the outcomes can be effectively considered against the original objectives. This should also consider the re-*	Apr 2015	**No further action is required.** Western Power has undertaken Post Implementation Reviews for each of the identified business improvement projects, and CutlerMerz considers that the PIRs have been undertaken appropriately.

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	The auditor understands that Western Power has carried out a review of document control and record keeping functions. The auditor has observed a presentation of the recommendations and action plan stemming from this review (DM# 11061903). *A key recommendation of the review was that 'the document management system should be upgraded, simplified and automation introduced to manage controlled documents'.* *In response Western Power has reviewed options for upgrading its document management system to simplify and automate the review of controlled documents.* *In relation to the upgrade of the electronic document management system Western Power has advised that:* • *A preferred option is to replace the current electronic document management system with the 'OpenText Content Server', which is expected to provide the enhanced capability that is required for effective document control.* • *An Expression of Interest (DM#11703735) for implementation services was released and responses assessed in February 2014.* • *A Scope of Work (DM#11791901) was issued to three short-listed providers and the responses are being assessed now (May 2014).* • *The upgrade is currently scheduled to commence in the second half of 2014, subject to business case development and approval.* **Effectiveness Rating (ER):** C2 **Key Process Area (KPA):** 6. Asset Maintenance	*evaluation of categorisation and risk assessment criteria such as the PAR classifications and the 20:80 split of resources between high-risk poles and ZBAM. In general, all specific risk prioritisation criteria should be periodically reviewed for appropriateness based on outcomes.* • *Asset Management Information System upgrade. This should include (but not be limited to) an overview of costs compared to budget, gap analysis of implemented specification to original specification, a review of changes and the change control process, observable benefits compared to originally expected benefits, and outstanding issues and action plan to resolve them.*		

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	Effectiveness Criteria (EC): Maintenance policies and procedures are documented and linked to service levels required **Issue:** *The transition to Fault/Priority Attention Required (PAR) /Zone based Asset Management (ZBAM) represents a significant change to Western Power's approach to managing its distribution assets. The auditor recognises that the approach applies an enhanced degree of scientific rigour that is expected to have significant benefits.* **Effectiveness Rating (ER):** Not applicable (recommendation related to "Area of Special Focus 1 – Asset Management Information System" rather than a KPA) **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 1 – Asset Management Information System" rather than a KPA) **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Area of Special Focus 1 – Asset Management Information System" rather than a KPA) **Issue:** *It would normally be expected that a comprehensive Post-Implementation Review (PIR) would be conducted to assess the effectiveness of the implementation of the project against key objectives articulated in the strategy or the plan. In particular, a PIR should be conducted to assess the following:*			

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	• *The extent to which expected outcomes were achieved;* • *The actual costs of the project and how they compared to budget estimates;* • *Issues identified (an issues register including close-out progress);* • *Reviews on data quality and system performance outcomes; and* • *Outstanding functionality requirements and opportunities for future development.* **Effectiveness Rating (ER):** Not applicable (recommendation related to "Area of Special Focus 2 – Distribution Wood Poles" rather than a KPA) **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 2 – Distribution Wood Poles" rather than a KPA) **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Area of Special Focus 2 – Distribution Wood Poles" rather than a KPA) **Issue:** *The 'Pareto Principle' has been applied to allocate resources between high-risk (Sniper, PAR, high-priority) poles and poles to be managed via ZBAM. This means that 20% of resources are allocated to addressing high-risk poles and 80% to addressing ZBAM poles. The auditor considers this to be a reasonable starting point; however this should be revaluated as the new approach continues.* *The above also applies to the PAR classification and other risk assessment criteria. In general, all specific risk*			

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	prioritisation criteria should be periodically reviewed for appropriateness based on outcomes.			
16/2014	**Effectiveness Rating (ER):** B2, C1, C3, C3 **Key Process Area (KPA):** 5. Asset Operations, 7. Asset Management Information System, KPA: 8. Risk Management, KPA: 9. Contingency Planning **Effectiveness Criteria (EC):** Risk management is applied to prioritise operations tasks, Adequate system documentation for users and IT operators, Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system, Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks **Issue:** *Western Power has a high-level Risk Management Policy (RMP) (DM# 3842495) which defines a consistent approach to risk management that is intended to be applied to all aspects of the business. The policy overarches three risk management frameworks; these are:* • *The Enterprise Risk Management Framework (ERMF) (DM# 3861477): The auditor understands that this covers corporate type risks such as insurance and Western Power's licence to operate.* • *Project Risk Management Framework (PRMF) (DM# 9937853): The auditor understands that this covers specific project delivery risks such as contracts, project delays and safe works delivery.* • *The Network Risk Management Framework (NRMF) (DM# 6592239): The auditor has reviewed the NRMF*	*The auditor recommends that the Risk Management Framework include network operation (including contingency planning) and business information systems.*	Mar 2015	**No further action is required.** Western Power's Risk Management Framework has evolved substantially, and now adopts an integrated approach that applies unilaterally across the business (inclusive of network operation, contingency planning and business information systems).

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	and its underlying documents and processes in detail. It focuses on network planning and management and has strong links to network investment. *Notably omitted from the suite of risk management framework documents was the specific inclusion of network operations (including contingency planning) and asset information systems.*			
17/2014	**Effectiveness Rating (ER):** C1 **Key Process Area (KPA):** 7. Asset Management Information System **Effectiveness Criteria (EC):** Adequate system documentation for users and IT operators **Issue:** *The auditor understands that an asset data quality framework is currently under development. Data management quality and performance indicators are tracked and routinely published in various asset information dashboards (either pertaining to generic data quality and timeliness standards, or relating data quality requirements of asset management process owners).* *It is not clear however how this information is used to drive performance improvement at the current development stage of the asset information management system. Western Power does not appear to have a demonstrable long-term strategic plan for asset information management, and there does not appear to be long-term stated objectives for improving data quality, data integrity, and timeliness.*	*The auditor recommends that Western Power develop a Strategic Plan for its Asset Management Information Systems and data. This plan should include a review current state of the systems and where Western Power is placed along the strategic journey. It should also include a long-term vision for the systems and outline an understanding of the likely costs, benefits, and timeframes for achieving the vision.* *Western Power should undertake a strategic review of asset information requirements for the business and establish long term objectives for key process areas as well as system integration needs; recognising that high quality data is an enabler for asset management performance improvement.* *Western Power should specifically consider as part of this strategic review the need for better gathering and integration of transmission asset condition data (and associated test data) to ensure ready access to this information. This is particularly pertinent given the separation of the Operation Asset management group from the day-to-day management of the asset maintenance activities undertaken and managed from the Kewdale depot.*	Jun 2015	**No further action is required.** CutlerMerz has reviewed the "Asset Management Tools and Systems Strategy". This document demonstrates a robust strategic plan for its asset information and systems going forwards, and an acknowledgement from the businesses on the importance of these systems in enabling and enhancing Western Power's asset management capability.

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	Effectiveness Rating (ER): Not applicable (recommendation related to "Area of Special Focus 1 – Asset Management Information System" rather than a KPA) **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 1 – Asset Management Information System" rather than a KPA) **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Area of Special Focus 1 – Asset Management Information System" rather than a KPA) **Issue:** *The auditor observed that whilst individual implementation plans for various modules of the integrated asset management information system existed, an overall strategic plan for the integration was not evident. It would normally be expected that such a complex project would have a high-level over-arching plan, or perhaps be influenced by a strategic plan for asset management information.* *The auditor is of the view that such a comprehensive systems renewal and integration project is complex and risky, with issues such as cost escalation, applications interfacing, data quality, and organisational culture potentially creating some of the highest risks to successful implementation.*			
18/2014	**Effectiveness Rating (ER):** C3 **Key Process Area (KPA):** 9. Contingency Planning **Effectiveness Criteria (EC):** Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks	*The auditor is of the view that Western Power should develop response plans for a broad range of contingencies, as given by way of example in the list below. These are by no means exhaustive but are*	Jun 2015	**No further action is required.** CutlerMerz has reviewed the Contingency Planning Management Standard and the Contingency Framework and note that these establish an appropriate set of principles to be

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	Issue: *The auditor observed that contingency planning does not appear to be widespread across all major foreseeable risks and contingencies to which the network may be subjected. In particular, the auditor observed that there did not appear to be a formal structure that provided for contingencies to be methodically identified and responded to.* *Given that Western Power has jurisdictional responsibilities for both Transmission and Distribution, it is foreseeable that widespread network events could simultaneously occur in such a manner that could confound the ability of the Emergency Management Team to effectively prioritise response and respond accordingly.* **Effectiveness Rating (ER):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/18" rather than a KPA) **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/18" rather than a KPA) **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/18" rather than a KPA) **Issue:** *Refer to PR: 2012/18 commentary. The auditor is satisfied that the training, identification of issues and action item responses by western Power for this*	*provided as an indication of the range of issues that should be considered:* • *Simultaneous loss of transmission and widespread distribution due to a single event (storm and or bushfire); review network topology where this may be a susceptibility due to local environmental factors or network topology.* • *Credible (although unlikely) multiple transmission network contingencies; Common-mode or simultaneous failures of key elements.* • *Widespread generation loss or network islanding scenarios; The auditor recognises that this is not necessarily in Western Power's jurisdiction, but plans will be required to manage community requirements nonetheless.* • *Widespread interruptions to major load centres (e.g. Perth CBD).* *These should be reviewed and tested on a routine basis – see recommendation 20/2014.*		applied in identifying credible contingency scenarios and the requirement to develop specific plans to manage these scenarios. CutlerMerz also notes that the review and exercise register appears detailed and thorough in the range of contingency response plans that are to be considered and tested on a routine basis. CutlerMerz observes that the Controlled Document Index details those specific plans that are to be reviewed on a regular basis and outlines the timetable for this for each document. In this respect, CutlerMerz affirms that the Recommendation has been broadly addressed. The Exercise Register provides evidence of tests being carried out as required.

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	recommendation have been addressed. However, the auditor is of the view that Western Power has not rigorously identified all reasonably foreseeable contingencies that would form the basis of the Emergency Management Response planning and testing exercises. **Effectiveness Rating (ER):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/19" rather than a KPA) **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/19" rather than a KPA) **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/19" rather than a KPA) **Issue:** *The auditor observed that notwithstanding actions arising from the previous review being implemented, an opportunity for improvement continues to exist in the contingency planning area. The auditor did not see evidence of a systematic and comprehensive approach to scenario planning.*			
19/2014	**Effectiveness Rating (ER):** C3 **Key Process Area (KPA):** 9. Contingency Planning **Effectiveness Criteria (EC):** Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks	*The auditor recommends that Western Power consider and factor into its contingency and emergency response plans for a broad range of issues such as social infrastructure impact and restoration prioritisation.*	Jun 2015	**No further action is required.** Western Power has updated its Priority Restoration Guideline to ensure that the items below are clearly identified and covered: • Water supply • Sewage systems

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	Issue: *The auditor understands that in the event of a significant network event, third-party impacts tended to be "operationally" factored into restoration responses on the basis of a Restoration Priority Framework. However, the extent to which the framework priorities and response plans are overtly factored into contingency plans is not clear. In this respect the auditor is of the view the Western Power should actively consider and factor into its contingency and emergency response plans issues such as social infrastructure impacts and restoration prioritisation.* *This should not only include the management of supply restoration on a priority basis, but operational issues regarding relieving emergency officers standing by fallen wires, 'make-safe' protocols, etc. In this respect the auditor notes that Western Power has a program in place where suitably qualified, trained and equipped staff are utilised in the event of such incidents to relieve other emergency services personnel from stand-by and make-safe activities.* **Effectiveness Rating (ER):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/18" rather than a KPA) **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/18" rather than a KPA) **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Area of Special Focus 3 –	*This in particular applies where Western Power's response plans actively rely upon the availability of this infrastructure such as mobile phone capability and fuel supply. In this respect, contingency plans should actively consider the restoration of supply to vital infrastructure such as the examples listed below, noting that this list is not exhaustive:* • *Water supply* • *Sewage systems* • *Food supply* • *Traffic management and public transport* • *Mobile telephones and emergency services telecommunications* • *Hospitals (coordination with Department of Health and routine testing of standby generation capability)* • *Fuel supply (Supply to Kwinana refinery, bulk supply terminals, and local supplies)* *Active consideration should also be given to the management and review of Western Powers' mobile radio capability, and the management and coordination of a fleet of mobile generators in order to facilitate their rapid deployment to vital locations and key third party infrastructure sites. This would also include agreeing on supply connection standards for such assets.* *In addition to the above, contingency plans will need to consider the coordination of responses with other utilities. In this respect, protocols should be established with other emergency service departments and social-infrastructure service providers, including the examples listed below. These*		• Food supply • Traffic management and public transport • Mobile telephones and emergency services telecommunications • Hospitals (coordination with Department of Health and routine testing of standby generation capability) • Fuel supply (supply to Kwinana refinery, bulk supply terminals and local supplies) CutlerMerz is satisfied that the changes to the Restoration Guideline place an appropriate priority on the restoration of supply to critical social infrastructure, and provides sufficient guidance for restoration priorities to be adapted as needs require. CutlerMerz has reviewed Western Power's emergency generator documentation (Review of the use of Emergency Response Generators – DM#13052250 and SOP 224 Emergency Response Generators (LV) – DM#2123938) and is satisfied that Western Power has considered and developed an appropriate approach to the coordination of its mobile generator fleet. CutlerMerz has reviewed several contingency planning documents that Western Power has developed, and is satisfied that the updated emergency management plans appropriately emphasise coordination requirements and integration of response activities with other utilities, emergency services providers, and key components of social infrastructure. It is also noted that the range of contingencies

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/18" rather than a KPA) **Issue:** *Refer to PR: 2012/18 commentary. The auditor is satisfied that the training, identification of issues and action item responses by western Power for this recommendation have been addressed. However, the auditor is of the view that Western Power has not rigorously identified all reasonably foreseeable contingencies that would form the basis of the Emergency Management Response planning and testing exercises.* **Effectiveness Rating (ER):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/19" rather than a KPA) **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/19" rather than a KPA) **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/19" rather than a KPA) **Issue:** *The auditor observed that notwithstanding actions arising from the previous review being implemented, an opportunity for improvement continues to exist in the contingency planning area. The auditor did not see evidence of a systematic and comprehensive approach to scenario planning.*	*are by no means exhaustive but are provided as an indication of the range of issues that should be considered.* • *Police* • *Fire Brigade* • *Ambulance and Hospitals* • *SES* *These should be reviewed and tested on a routine basis – see JR: 20/2014.*		considered is sufficiently broad to cover foreseeable credible events. Western Power has completed a review of its mobile radio capability and management. CutlerMerz understands that Western Power is drafting a telecommunications strategic plan to respond to the findings of the external review.

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
20/2014	**Effectiveness Rating (ER):** C3 **Key Process Area (KPA):** 9. Contingency Planning **Effectiveness Criteria (EC):** Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks **Issue:** *The auditor notes that whilst some vulnerability and emergency management response reviews were recently undertaken, evidence was not observed that regular reviews of such response plans are planned.* **Effectiveness Rating (ER):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/17" rather than a KPA) **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/17" rather than a KPA) **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/17" rather than a KPA) **Issue:** *Refer to PR: 2012/17 commentary. Whilst the auditor is satisfied that the action taken was sufficient, Western Power would need to ensure that the risks are routinely reviewed and updated accordingly. The auditor notes that evidence provided of the review is dated 2011. It would be prudent to reassess these risks, particularly in the light of recent organisational changes that have led to changes in the management arrangements for the operations centre.*	*The auditor recommends that Western Power develop a review timetable for the contingency and emergency management plans and the reviews should be undertaken at a frequency commensurate with the nature of the scenario and the likelihood of its occurrence in recognition of the changes in the network over time.* *Western Power should also develop an annual review policy, timetable or framework as appropriate for the East Perth Control Centre (EPCC). A routine formal risk re-assessment program should be implemented for the EPCC in line with Western Power's general facilities management responsibilities.* *These reviews also relate to contingency planning JR: 18/2014 and JR:19/2014*	Jun 2015	**No further action is required.** Western Power has developed a Review & Exercise Register which states that *"The purpose of this spreadsheet is to document all review, testing and exercise activities for contingency and emergency plans within Western Power's main sites, namely Head Office and EPCC."* The spreadsheet includes a timetable for items including (but not limited to), business continuity documentation reviews, emergency management documentation reviews, associated exercises, and facilities risk review for EPCC. A controlled document register is maintained, which includes review dates fo key documents, including those relating to contingency and emergency management. The EPCC Inspection and Maintenance Plan includes a timetable for specific activities relating to the EPCC facility. Evidence of the actions being carried out as required have been observed.

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	Effectiveness Rating (ER): Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/18" rather than a KPA) **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/18" rather than a KPA) **Effectiveness Criteria (EC):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/18" rather than a KPA) **Issue:** *Refer to PR: 2012/18 commentary. The auditor is satisfied that the training, identification of issues and action item responses by western Power for this recommendation have been addressed. However, the auditor is of the view that Western Power has not rigorously identified all reasonably foreseeable contingencies that would form the basis of the Emergency Management Response planning and testing exercises.* **Effectiveness Rating (ER):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/19" rather than a KPA) **Key Process Area (KPA):** Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/19" rather than a KPA)			

Reference (no./year)	(Asset management effectiveness rating / Asset Management System Component & Criteria / details of the issue)	Auditor's recommendation	Date resolved	Further action required (Yes/No/Not Applicable) & Details of further action required including current recommendation reference if applicable
	Effectiveness Criteria (EC): Not applicable (recommendation related to "Area of Special Focus 3 – SOCC and NOCC Business Continuity" and "Previous Recommendation - 2012/19" rather than a KPA) **Issue:** *Western Power conducted an emergency management risk review across a range of scenarios in 2013. Various action items and opportunities were identified, recorded and assigned. However, it is not clear that the review will be conducted annually as recommended.*			

4. Performance summary

The overall effectiveness rating for each asset management process is based on the combination of the process and policy adequacy rating and the performance rating, as defined in Table 4 and Table 5.

Table 4: Asset management process and policy definition adequacy rating

Rating	Description	Criteria
A	Adequately defined	• Processes and policies are documented. • Processes and policies adequately document the required performance of the assets. • Processes and policies are subject to regular reviews, and update where necessary. • The asset management information system(s) are adequate in relation to the assets that are being managed.
B	Requires some improvement	• Process and policy documentation requires improvement. • Processes and policies do not adequately document the required performance of the assets. • Reviews of processes and policies are not conducted regularly enough. • The asset management information system(s) require minor improvements (taking into consideration the assets that are being managed).
C	Requires significant improvement	• Process and policy documentation is incomplete or requires significant improvement. • Processes and policies do not document the required performance of the assets. • Processes and policies are significantly out of date. • The asset management information system(s) require significant improvements (taking into consideration the assets that are being managed).
D	Inadequate	• Processes and policies are not documented. • The asset management information system(s) is not fit for purpose (taking into consideration the assets that are being managed).

Table 5: Asset management performance ratings

Rating	Description	Criteria
1	Performing effectively	• The performance of the process meets or exceeds the required levels of performance. • Process effectiveness is regularly assessed, and corrective action taken where necessary.
2	Opportunity for improvement	• The performance of the process requires some improvement to meet the required level. • Process effectiveness reviews are not performed regularly enough. • Process improvement opportunities are not actioned.
3	Corrective action required	• The performance of the process requires significant improvement to meet the required level. • Process effectiveness reviews are performed irregularly, or not at all. • Process improvement opportunities are not actioned.
4	Serious action required	• Process is not performed, or the performance is so poor that the process is considered to be ineffective.

Table 6 summarises CutlerMerz' assessment of each of the twelve key asset management processes together with the effectiveness criteria for each key component.

Table 6: Asset management system effectiveness summary

Asset Management System Component & Effectiveness Criteria	Asset management process and policy definition adequacy rating	Asset management performance rating
1. Asset Planning	**B**	**1**
1.1. Asset management plan covers key requirements	B	1
1.2. Planning process and objectives reflect the needs of all stakeholders and is integrated with business planning	B	1
1.3. Service levels are defined	B	2
1.4. Non-asset options (e.g. demand management) are considered	B	1
1.5. Lifecycle costs of owning and operating assets are assessed	B	1
1.6. Funding options are evaluated	A	1
1.7. Costs are justified and cost drivers identified	A	1
1.8. Likelihood and consequences of asset failure are predicted	A	1
1.9. Plans are regularly reviewed and updated	A	1
2. Asset Creation and Acquisition	**A**	**2**
2.1. Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions	A	1
2.2. Evaluations include all life-cycle costs	A	2
2.3. Projects reflect sound engineering and business decisions	B	2
2.4. Commissioning tests are documented and completed	A	1
2.5. Ongoing legal/environmental/safety obligations of the asset owner are assigned and understood	A	2
3. Asset Disposal	**B**	**1**
3.1. Under-utilised and under-performing assets are identified as part of a regular systematic review process	B	2
3.2. The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken	B	1
3.3. Disposal alternatives are evaluated	A	1
3.4. There is a replacement strategy for assets	A	1
4. Environmental Analysis	**A**	**2**
4.1. Opportunities and threats in the system environment are assessed	A	2
4.2. Performance standards (availability of service, capacity, continuity, emergency response, etc.) are measured and achieved	B	2
4.3. Compliance with statutory and regulatory requirements	A	2

Asset Management System Component & Effectiveness Criteria	Asset management process and policy definition adequacy rating	Asset management performance rating
4.4. Achievement of customer service levels	A	2
5. Asset Operations	**A**	**2**
5.1. Operational policies and procedures are documented and linked to service levels required	A	2
5.2. Risk management is applied to prioritise operations tasks	A	1
5.3. Assets are documented in an Asset Register including asset type, location, material, plans of components, an assessment of assets' physical/structural condition and accounting data	A	2
5.4. Operational costs are measured and monitored	A	1
5.5. Staff resources are adequate and staff receive training commensurate with their responsibilities	B	2
6. Asset Maintenance	**A**	**2**
6.1. Maintenance policies and procedures are documented and linked to service levels required	A	2
6.2. Regular inspections are undertaken of asset performance and condition	A	1
6.3. Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule	A	2
6.4. Failures are analysed and operational/maintenance plans adjusted where necessary	A	2
6.5. Risk management is applied to prioritise maintenance tasks	A	1
6.6. Maintenance costs are measured and monitored	A	1
7. Asset Management Information System	**B**	**1**
7.1. Adequate system documentation for users and IT operators	B	1
7.2. Input controls include appropriate verification and validation of data entered into the system	B	2
7.3. Logical security access controls appear adequate, such as passwords	B	1
7.4. Physical security access controls appear adequate	B	1
7.5. Data backup procedures appear adequate and backups are tested	B	1
7.6. Key computations related to licensee performance reporting are materially accurate	B	2
7.7. Management reports appear adequate for the licensee to monitor licence obligations	A	1
8. Risk Management	**A**	**1**

Asset Management System Component & Effectiveness Criteria	Asset management process and policy definition adequacy rating	Asset management performance rating
8.1. Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system	A	1
8.2. Risks are documented in a risk register and treatment plans are actioned and monitored	A	2
8.3. The probability and consequences of asset failure are regularly assessed	A	1
9. Contingency Planning	**B**	**2**
9.1. Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks	B	2
10. Financial Planning	**A**	**1**
10.1. The financial plan states the financial objectives and strategies and actions to achieve the objectives	A	1
10.2. The financial plan identifies the source of funds for capital expenditure and recurrent costs	A	1
10.3. The financial plan provides projections of operating statements (profit and loss) and statement of financial position (balance sheets)	A	1
10.4. The financial plan provide firm predictions on income for the next five years and reasonable indicative predictions beyond this period	B	2
10.5. The financial plan provides for the operations and maintenance, administration and capital expenditure requirements of the services	A	1
10.6. Significant variances in actual/budget income and expenses are identified and corrective action taken where necessary	A	2
11. Capital Expenditure Planning	**A**	**1**
11.1. There is a capital expenditure plan that covers issues to be addressed, actions proposed, responsibilities and dates	A	1
11.2. The plan provides reasons for capital expenditure and timing of expenditure	A	1
11.3. The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan	A	1
11.4. There is an adequate process to ensure that the capital expenditure plan is regularly updated and actioned	A	1
12. Review of asset management system	**B**	**1**
12.1. A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current	A	1

Asset Management System Component & Effectiveness Criteria	Asset management process and policy definition adequacy rating	Asset management performance rating
12.2. Independent reviews (e.g. internal audit) are performed of the asset management system	B	1

5. Observations

The observations, recommendations, opportunities for improvement, and overall level of effectiveness in relation to each key process area is provided in Sections 5.1 to 5.12.

The key findings of the review are as follows:

- The maturity of Western Power's AMS has strengthened significantly over the review period, particularly in relation to defining strategy and objectives and enhancing the sophistication of approaches and supporting tools;
- There are comprehensive and rigorous processes in place for business as usual planning, which result in effective asset management plans;
- Operational activities and programme delivery is systematically managed and monitored to enable desired outcomes to be achieved; and
- Western Power's approach to risk based asset management can be considered effective, particularly as applied to asset maintenance and renewal.
- Priority areas where Western Power can further progress its AMS maturity are as follows:
    - Whilst the AMS has a strong approach to meeting organisational objectives in relation to safety and reliability, there is scope to formalise the strategic intent to the "affordability" objective. [REC-01/2017]
    - Although Western Power has developed a "Risk Based Capacity Planning Methodology", the deterministic requirements of the Technical Rules constrain its application. Risk-based augmentation planning is increasingly important in the context of a widening gap between peak demand and energy throughput. Western Power has sought exemptions from the Technical Rules where a risk based approach has been preferred. Applying a "probabilistic" approach, coupled with a considered approach to asset utilisation, has the potential to yield significant benefits. [REC-02/2017] and [REC-03/2017]
- Key focus areas for the AMS looking forward over the coming review period are as follows:
    - Significant efforts by Western Power to engage with customers were observed. Western Power captures customer needs outside the AMS via its "customer insights" survey. These insights are then cross-checked against the asset management objectives to provide assurance of alignment. Notwithstanding, there is an opportunity to advance the AMS maturity through a concerted customer focus (within the AMS) that demonstrably drives asset management objectives across the spectrum of applicable customer requirements. This is particularly important given that there may be a lag in regulated and legislative responses to customer requirements, and this lag is likely widening in a rapidly changing environment (with increasingly interactive consumers and producers ("prosumers") and emerging technology feasibility). [OFI-03/2017]
    - Emerging technologies are presenting increasing risks and opportunities, as evidenced by the widening gap between maximum demand and energy throughput on Western Power's network. This is recognised as a key issue at the corporate level, and there is scope for Western Power's AMS to address the issue with a more robust strategic approach going forward (it is anticipated that this will be led by corporate strategic initiatives). [OFI-06/2017]
    - As the intelligence of electricity networks and the sophistication of supporting systems continues to increase, so too does their criticality to the effectiveness of the AMS. Given this, it would be

beneficial for Western Power to embed asset management philosophies in the management of its AMS information systems, commensurate with the maturity that it applies to the management of its network assets. [OFI-14/2017]

Systems that were reviewed during the review included those identified in Table 7.

Table 7: Western Power systems reviewed

System	Description
Structured Tools (ST)	Western Power modelling tool for Dx Poles, Conductors and Plant
Network Risk Management Tool (NRMT)	NRMT is a quantitative risk assessment tool that calculates a risk score for each individual asset failure within its asset class. The output of the NRMT (i.e. risk score) is used in ST to prioritise network investment.
Demand Management Screening Tool	Used to assess non-network options during investment case optioneering
Network Risk Matrix Assessment Template (NRMAT)	NRMAT is a quantitative risk assessment tool that calculates the risk reduction benefit value (i.e. risk score) for asset class replacement investments and augmentation discrete investments. The output of the NRMAT (i.e. risk score) will be used for ranking Non-ST projects
Direct Estimation Risk Tool (DERT)	Risk evaluation tool for investment comparisons
Holocentric	Organisational process mapping system
Investment Evaluation Model (IEM)	Tool for calculating NPV assessments for investment options
Distribution Information Systems	SPIDA (Geographical Information System), Ellipse (Equipment Register), managed through a custom data portal known as the Asset Management Portal Distribution (AMP Dx), COGNOS Equipment and Works Data Warehouse (EWD) package.
Transmission Information Systems	Transmission Lines System (TLS), AMP Tx Specifications, AMP Tx Ratings, SPIDA, Transmission Ratings Information System (TRIS), Ellipse (Equipment Register) & EWD.
PowerOn Fusion	Distribution Management System
XA21	Transmission Management System

The list of Western Power representatives that participated in the review is provided in Appendix A.

The list of documentation and information sources examined by the CutlerMerz team during the course of the review is provided in Appendix C.

5.1 Asset planning

The process and outcome for the key process area are as follows:

- Process: Asset planning strategies are focused on meeting customer needs in the most effective and efficient manner (delivering the right service at the right price).
- Outcome: Integration of asset strategies into operational or business plans will establish a framework for existing and new assets to be effectively utilised and their service potential optimised.

The overall level of effectiveness for the key process area has been assessed as **B1**. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 8.

Table 8: Asset planning – observations

Effectiveness criteria	Assessment	Observations and recommendations
Asset management plan covers key requirements	B1	The suite of documents that effectively capture the "asset management plan" are the: Asset Management Objectives Report, Network Strategy (and several supporting strategies), Network Management Plan, Network Development Plan, Network Plan, and Delivery Plan. The Network Management Plan and the Network Development Plan are the core documents that articulate "the asset management plan" in terms of upcoming investment and rationale (in accordance with asset class strategies). These documents are generally comprehensive and well considered. The Network Plan provides a clear view of the total planned investment over ten years, and compares this against the previous plan, targets, and performance metrics. Together the suite of documentation provides a comprehensive view of planned investment, supported by underpinning rationale, and measured against the various metrics. Notwithstanding, the international standard for asset management (ISO 55000) defines key requirements of a Strategic Asset Management Plan (SAMP); the SAMP should articulate: • How organisational objectives are to be converted into asset management objectives – an extract of the Strategic Plan 2017-2020 was provided which defines new organisational objectives going forward. Western Power's suite of SAMP documentation is yet to be updated to reflect the new organisational objectives (but targets the previous organisational objectives of "safe, reliable, and affordable" which were applicable over the review period). The Network Strategy (Nov 2016) identifies five asset management objectives (performance, security of supply, compliance, risk and obligation), and discusses alignment to the corporate objectives through the four "key areas" of the Network Vision. **[OFI-01/2017]** The Asset Management System Description document outlines that the Network Strategy (Nov 2016) captures how the business will deliver on the asset management objectives; however, its stated objectives do not clearly align with the Asset Management Objectives Report (Jun 2017) and other asset management documentation. Establishing clear purpose on objectives at the higher level of the AMS is important to ensure that they consistently filter to the lower level processes. The

Effectiveness criteria	Assessment	Observations and recommendations
		Asset Management Objectives Report and the Network Strategy are core documents that sit atop the AMS. There appears to be broad alignment between the objectives articulated through each; however, their alignment is difficult to trace and there is an opportunity for it to be improved. Notably, whilst the asset management objectives take a strong position on the "safe" and "reliable" organisational objectives, and convert these into "key objective strategies" for the AMS, the organisation's "affordable" objective does not appear to be given commensurate focus by the AMS. The absence of strategic documentation in relation to affordability does not suggest that Western Power hasn't incorporated cost efficiency throughout its AMS processes; only that it has not articulated its approach at the strategic tier of the AMS as robustly as it has for other objectives. The review of cost related elements of the AMS elements demonstrates that these considerations are strongly embedded throughout AMS processes. This includes: <u>Affordability (or price impact):</u> - Assessments undertaken as a part of the Regulatory Submission, and reviewed as a function of Corporate Strategy/ Business Plan; - New Facilities Investment Test (NFIT) Reviews as a part of business cases; and - Ex-Post reviews as a part of regulatory submission. <u>Efficiency assessments:</u> - Top down assessments undertaken as a part of the Corporate Strategy/ Business Plan; - NFIT Reviews as a part of business cases; and - Individual asset class level/ delivery provision efficiency tested through benchmarking, competitive tendering, optioneering for standards and strategy development (includes risk-cost-benefit assessment at asset class level). Notwithstanding these processes, it is appropriate for the AMS to articulate its direction at the strategic tier for how it delivers on the "affordable" objective holistically, commensurate with the robust articulation of its approaches that deliver on the "safe" and "reliable" objectives. **[REC-01/2017]** Therefore, it is recommended that Western Power develop asset management strategy to articulate its delivery on the "affordable" objective, commensurate with the strategies developed to deliver on the "safe and reliable" objectives. It is noted that in the new corporate strategic plan (still under development), the "affordable" objective is likely to be replaced with new objectives. In this case, the above recommendation should consider the new objectives rather than the current "affordable" objective, as relevant to the scope of Asset Management System. • The approach for developing asset management plans – the Asset Management System description document provides the helicopter view of the AMS, and subsequently, the framework approach for developing asset management plans (refer to the

Effectiveness criteria	Assessment	Observations and recommendations
		"AMS artefact in Appendix D). The Network Management Plan and Network Development Plan capture the planning approach and investment plans, and interaction between the two. The strategy documents and Planning Standard define approaches to managing different issues and asset types, and define the various decision criteria based on underlying analyses. These criteria are then applied to develop the asset plans. As such, the "key requirements" are broadly covered through the suite of documents that encapsulate Western Power's asset management plan. • The role of the AMS in supporting the asset management objectives is detailed within the AMS description document. **[OFI-02/2017]** The Asset Management System document is supported by an "Asset Management System Map" which provides a view of the AMS. The map is a key communication piece in describing the AMS and should accurately reflect its status. However, it was noted that some of the boxes of the map reflect documents, whilst others are conceptual (e.g. a box is shown for the "Strategy for the Asset Management System", but this is a conceptual strategy and is understood as a concept rather than a document). There is an opportunity to improve the AMS Map by clearly identifying those components of the map that are documents within the AMS.
Planning process and objectives reflect the needs of all stakeholders and is integrated with business planning	B1	Stakeholder requirements are formally captured outside the scope of the AMS, and are understood to be a core element in defining the organisational objectives. Asset management objectives are then formed to achieve the organisational objectives. The Asset Management Objectives Report directly addresses stakeholder requirements relating to the reliability, safety and environment asset management objectives (in the form of relevant legislation and regulations). Regulatory measures play a key theme in measuring the objectives; which, by nature, should capture customer requirements. Further, although not captured directly within the AMS to directly form objectives, customer considerations and "insights" are discussed throughout AMS documentation and decision making (e.g. within the Network Strategy). The planning process appears robust and is integrated with business planning as demonstrated through the "spine" diagram approach. The process appears well considered and includes feedback loops and planned "artefact" improvement opportunities. As such, the needs of stakeholders are reflected in the process and objectives, and integrated within the planning process. **[OFI-03/2017]** Significant efforts by Western Power to engage with customers were observed. Western Power captures customer needs outside the AMS via its "customer insights" survey. These insights are then cross-checked against the asset management objectives to provide assurance of alignment. Notwithstanding, there is an opportunity to advance the AMS maturity through a concerted customer focus (within the AMS) that demonstrably drives asset management objectives across the spectrum of applicable customer requirements. This is particularly important given that there may be a lag in regulated and legislative responses to customer requirements, and this lag is likely widening in a rapidly changing environment (with increasingly interactive consumers and producers ("prosumers") and emerging technology feasibility).

Effectiveness criteria	Assessment	Observations and recommendations
Service levels are defined	B2	A comprehensive spectrum of service levels has been developed within the Asset Management Objectives Report against each asset management objective. The document also identifies next steps for embedding the objectives and a review and improvement plan, which includes developing these in further detail at lower levels within the asset management system. **[OFI-04/2017]** Western Power measures and monitors a variety of AMS related indicators through different mechanisms (including the Corporate KPI Dashboard, the Asset Performance Quarterly Report, the Annual Reliability and Power Quality Report, the annual Service Standard Performance Report, and the KPI Dashboard for Service Standard Benchmarks (SSBs)). Notwithstanding, it is difficult to readily gauge how the AMS is performing against its scope of objectives and where to focus improvement effort. There is an opportunity for Western Power to improve in this area by maintaining an "AMS dashboard" that succinctly monitors the performance of the AMS against its stated objectives. It is envisaged that this would be similar to the Corporate KPI Dashboard, except monitoring the AM objectives rather than the corporate objectives. This would be beneficial as performance against the asset management objectives is a leading indicator for performance against the corporate objectives (and noting that the corporate objectives also have a broader scope than the AMS).
Non-asset options (e.g. demand management) are considered	B1	Western Power's approach for non-asset options is detailed within its "Demand Management & Non-Network Options Guideline" document, which also considers emerging technologies. The document states that "Western Power aims to reduce, defer or remove the requirement for network investment where it is more economically efficient to implement alternatives to network options such as demand management". Consideration of demand management is embedded within the planning process; whereby, the "Demand Management Screening Tool" must be applied as part of the Options Analysis at Gate 2 of the Investment Governance Framework. **[OFI-05/2017]** The DM Screening Tool appears to provide a sophisticated means for assessing the potential for a DM solution. The systematic consideration of non-network options and the application of the tool is observed within business case documentation. The DM guideline notes the importance of ensuring that the options (e.g. emerging technologies) and variables (e.g. price of batteries) within the tool are up to date. However, there does not appear to be a formal process to ensure that this occurs. There is an opportunity for improvement; whereby, Western Power can ensure that the DM screening tool variables are formally reviewed and updated on a periodic basis (e.g. annually). Ideally, this process would require robust market research into DER procurement (e.g. cost of battery storage solutions). Western Power appears to recognise at the corporate level that emerging technologies are a key risk and opportunity to the organisation, which are fundamentally changing the function of the network. Particularly in the transfer power and energy (observable in Western Power's reducing energy throughput whilst peak demand continues to increase (and peak demand Compound Annual Growth Rate (CAGR) has reduced from >5% circa 2005 to now <1%)). **[OFI-06/2017]** Whilst the impacts of emerging technologies appear to be recognised at the high-level strategy documents, the AMS itself does not appear to translate this into implementable strategy. Peer NSPs have stronger recognition of the current impacts, and how current investment decisions will impact into the future (and are subsequently adopting strong strategic responses).

Effectiveness criteria	Assessment	Observations and recommendations
		There is an opportunity for Western Power to strengthen the AMS' strategic response to emerging technologies through the incorporation of an emerging technology strategy as part of its core strategy documents (e.g. one of the key asset management objective strategies). Whilst this is suggested by the AMS map, the implementation appears solely reliant on the DM screening tool. This strategy would likely be more readily solidified once the actions under the corporate strategic plans have had time to progress. However, it is anticipated that the AMS will have responded to this issue prior to the next AMS Review. **[OFI-07/2017]** Western Power's corporately led initiatives play a strong role in what may ostensibly be considered Asset Management activities. This was observed in relation to driving efficiencies, stakeholder requirements, and establishing new initiatives (e.g. ICT strategy). The approach that Western Power applies was observed to be beneficial in setting new direction and managing core asset management issues with greater efficacy. To improve integration of the outcomes of corporately led asset management initiatives into the Asset Management System, there is an opportunity to improve the depth of action being taken through the corporate initiatives within the asset management improvement plan. This should then include considerations for management of change to the Asset Management System from these corporately led initiatives
Lifecycle costs of owning and operating assets are assessed	B1	Western Power conducts analyses of lifecycle costs both in the development of asset class strategies and when evaluating the case for individual investments. As discussed in Section 5.1, a strong planning process has been observed. This is supported by the detailed optioneering including lifecycle cost analysis observed in augmentation business cases, and business cases for isolated repex projects. It is noted that Western Power uses "volumetric" business cases for repex programmes. These assess risk vs. expenditure for different volumes of works, and do not include the underpinning lifecycle cost analysis. Volumetric repex programmes and opex programmes are driven by the asset class strategies. The "Renewal and Maintenance Requirements, Options Analysis Methodology, Applicable to Opex and Repex Decision Making" document provides a structured approach for repex and opex optioneering analysis to form asset class strategies. **[OFI-08/2017]** CutlerMerz has observed a variety of analyses considering lifecycle costs that feed into the development of asset strategies, including: planning, design and procurement, maintenance and renewal stages of the asset lifecycle. However, there is opportunity for Western Power to collate a succinct articulation of the scope of optioneering and lifecycle analysis underpinning the strategies. It is envisaged that this could be captured as a "one pager" to support the asset strategies and subsequent volumetric repex and opex programmes.
Funding options are evaluated	A1	Funding options are evaluated through the business planning processes. Funding is available through the Access Arrangement and State Government Budgetary allowances. The business planning process sets top-down expectations for maximum expenditure within different capital expenditure categories. Western Power then applies the "Network Risk Matrix Assessment Template (NRMAT)" to its bottom-up build to prioritise competing requirements within its funding envelope. The NRMAT tools provides a risk reduction score for each project which allows Western Power to rank the benefits of each. It is understood that due to the integrated planning process there is not a significant discrepancy between the top-down envelope and the bottom up build. As such, there

Effectiveness criteria	Assessment	Observations and recommendations
		appears to be limited benefit in Western Power developing a more sophisticated approach. It is noted that in a potential future scenario of significant funding constraints Western Power may need to develop greater sophistication than the current NRMAT approach. For further detail on the evaluation of funding options refer to Section 5.10 (Financial planning).
Costs are justified and cost drivers identified	A1	Western Power has a rigorous planning process, which requires cost drivers to be identified and justified. The suite of strategy documents explains the drivers and rationale behind investment drivers (which are ultimately defines through the Asset Management Objectives Report). Business cases are developed through the Investment Governance Framework, which requires all business cases to pass through the gated review process, where the justification of costs and drivers is peer reviewed. CutlerMerz has reviewed several business case documents, which appear to have been comprehensively and rigorously developed. As such Western Power has justified costs and identified drivers (notwithstanding comments in relation to the "Lifecycle costs of owning and operating assets are assessed" in the development of asset class strategies [OFI-08/2017]).
Likelihood and consequences of asset failure are predicted	A1	Western Power has rigorous processes for evaluating the risks of asset failure. Western Power has developed a "Risk Based Renewal Methodology" for distribution overhead assets, and applies its sophisticated "Network Risk Management Tool (NRMT)" which feeds into "Structured Tools" for this purpose. This provides a rigorous system for assessing risk for overhead distribution assets. Assessment methods (Quantitative/ Semi-quantitative/ Qualitative) and associated tools vary between assets. **[OFI-09/2017]** Western Power appears to have applied thorough consideration to determining the level of sophistication that is applied for assessing risk for different asset classes. Notwithstanding, it was difficult to ascertain the range of tools that are used for different assets, which does not appear to be captured succinctly in a single location. There is an opportunity for Western Power to succinctly capture the risk approaches that are applied to different assets across the asset base (it is understood that Western Power is intending to include an appendix to its Network Risk Management Standard documentation suite which identifies the different methodology and tools applied to different assets which would achieve this purpose).
Plans are regularly reviewed and updated	A1	Western Power develops a range of plans through is rigorous business planning processes. CutlerMerz has observed the: Annual Planning Report, Network Management Plan, Network Development Plan, and Network Plan. These plans are understood to be updated on an annual basis as a minimum. All plans observed were current and had been reviewed and updated within the last year.

5.2 Asset creation and acquisition

The process and outcome for the key process area are as follows:

- Process: Asset creation/acquisition means the provision or improvement of an asset where the outlay can be expected to provide benefits beyond the year of outlay.
- Outcome: A more economic, efficient and cost-effective asset acquisition framework which will reduce demand for new assets, lower service costs and improve service delivery.

The overall level of effectiveness for the key process area has been assessed as **A2**. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 9.

Table 9: Asset creation and acquisition – observations

Effectiveness criteria	Assessment	Observations and recommendations
Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions	A1	Asset creation/acquisition follows a defined project development and assessment process. The process is governed by a seven gate process of which the first four gates are aimed at alignment with the Network Development Plan (NDP), defining the need, understanding and selecting a preferred option, developing the scope and approving the business case. The process is defined in the Network Planning Standard (NPS) and includes for optimisation and prioritisation of investment following a risk based approach applying the Network Risk Management Tool (NRMT). CutlerMerz has reviewed several business cases, and observed a systematic and rigorous application of project evaluations, including comparative assessments for non-network solutions. As such, it is considered that full project evaluations are undertaken for new assets, including comparative assessment of non-network solutions.
Evaluations include all life-cycle costs	A2	For individual investment decisions, the financial analysis is governed by the Investment Governance Framework and the Business Case Guideline. The project development process includes an assessment of the project lifecycle cost, with progressively increased accuracy aligned with the level of project definition and engineering completed at each gate. These require that lifecycle cost assessments be undertaken using the Investment Evaluation Model (IEM). The IEM appears to be a robust tool that provides for financial evaluation over a 50-year period, across both capex and opex categories. Whilst the process appears robust and rigorously implemented, it is noted that Post Implementation Reviews (PIR) identify variations between business cases and delivery costs (which are to be expected within reason); it is anticipated that Western Power will continually increase its vigilance and accuracy in identifying and applying lifecycle costs.

Effectiveness criteria	Assessment	Observations and recommendations
Projects reflect sound engineering and business decisions	B2	Project definition and engineering are governed through the involvement of relevant stakeholders from across the business. Stakeholders are engaged at the Strategy Alignment lifecycle stage, as a Joint Planning Team (JPT). Over the course of the project development the JPT deliver the Issues briefing paper (IBP), Works planning report (WPR), Cost estimates, and the Business Case. The project development and evaluation process is appropriately designed to allow for sound engineering and business decisions. CutlerMerz has reviewed several business cases, which appeared to demonstrate projects that reflect sound engineering and business decisions. Several PIRs have also been reviewed (which appear comprehensive and outline findings and recommendations), and these do not highlight systemic issues in engineering and business decisions. **[OFI-10/2017]** Western Power undertakes a variety of value analyses in relation to investment decisions. Western Power has a process to review key controlled documents such as design standards, standard designs and material/plant/equipment specifications – either periodically or on an ad-hoc basis if a trigger occurs (e.g. an incident or a change in an industry standard and corporate efficiency drivers). For example, Western Power has a rolling cycle of renewing period contracts for the supply of standard items of plant and equipment (e.g. poles, conductors, transformers, switchgear). The review processes provide opportunity for periodic testing of the market both from a commercial perspective, as well as a technical perspective. The process for review is discussed in the Strategic Planning & Standards and Technology Governance Framework document. Internal design reviews were also observed, for example: automation and control design, LV Protection Relays in Zone Substations, and transformer procurement. Notwithstanding, there is an opportunity to improve by summarising the various design efficiency review processes undertaken and identify requirements within a single source such as the Strategic Planning & Standards and Technology Governance Framework document, including; • Check lists, • Innovation and Continuous Improvement Review committees, • Lessons Learnt (following completion of large projects and procurement events) • Industry feedback • Benchmarking with Peer NSPs. **[OFI-11/2017]** Furthermore, whilst the reviews are comprehensive, the processes are predominantly internal. At peer NSPs, CutlerMerz has observed gains being achieved through external critical efficiency reviews; where the review team is not accustomed to the NSP's established practices. It is noted that Western Power recently commissioned an external review of the most appropriate pole type, with the final recommendation being softwood poles (for the distribution network). There is an opportunity for improvement for Western Power to undertake external critical efficiency reviews of a sample of standard designs, including a targeted selection across (for example) distribution/transmission overhead, substations, and underground assets. For example, for distribution overhead lines it is anticipated that such a review would consider: • General opportunities for efficiency within the Distribution Overhead Line Design Manual;

Effectiveness criteria	Assessment	Observations and recommendations
		• Internal design requirements in excess of AS/NZS 7000:2010 Overhead line design and detailed procedures; and • Review of a sample that includes several recent distribution overhead line designs, in consideration of general efficiency opportunities and whether actual designs are in excess of the requirements specified in the internal and national standards. Should the review identify significant scope for efficiency improvements, Western Power may wish to consider a broader review of standard designs. Generally, Western Power's Technical Rules appear highly prescriptive (as compared to rules applied to peer NSPs). Specifically, the Technical Rules impose prescriptive deterministic criteria to be applied for capacity planning. It is observed that peer NSPs have achieved significant efficiency gains through developing probabilistic risk-based capacity planning approaches with increasing sophistication. Although Western Power's risk- based approach to renewal planning can be considered amongst industry leaders, the prescription of the Technical Rules appears to be constraining it from achieving similar outcomes in relation to capacity planning. The application of a similar mindset (as currently applied to renewal planning) to capacity planning would significantly advance Western Power's maturity in this area. This is an increasing imperative as demand profiles and power flows on the network are altered by emerging technology (as is currently evident in Western Power's trend of increasing maximum demand and reducing energy throughput). It is noted that Western Power has made efforts in this area, and has developed a draft Risk Based Capacity Planning Methodology document; however, the implementation of the methodology requires Western Power to seek exemptions from complying with the Technical Rules. It is understood that Western Power is planning to undertake an internal review of the Technical Rules. **[REC-02/2017]** It is recommended that Western Power undertake an internal review of the Technical Rules, with a specific focus on considering the deterministic planning criteria that are prescribed (predominantly within Section 2.5) to identify areas that constrain it from optimising capacity planning through risk-based probabilistic approaches. The review should identify discrepancies between the Technical Rules and Western Power's Risk Based Capacity Planning Methodology (EDM 41025116) document (also in view of continued evolution of the document with leading industry practice).
Commissioning tests are documented and completed	A1	The project handover document triggers the commissioning process. Commissioning follows a set of standard procedures. All commissioning sheets are stored electronically. All commissioning work is done by Western Power including for work undertaken by contractors. Testing and commissioning processes are described in procedures and manuals including: the Field Protection Services Commissioning Manual Section 1 - Overview and processes, Assurance of Protection Commissioning Work (CAPEX), Handover Procedures & Practices, and Power Transformer Commissioning Manual. Commissioning tests are performed to confirm that the individual items of plant / equipment are installed correctly, performing their intended function and are acceptable for operational service. The implementation of the testing and commissioning processes is evident from work instructions, testing results, commissioning plans, commissioning notices, electrical safety certificates provided for

Effectiveness criteria	Assessment	Observations and recommendations
		recent asset installations including ring main units, isolators, transformers, LV cables, CTs, Circuit Breakers, and relays. Commissioning procedures for "non-conventional" temporary assets have also been observed, including "rapid response transformer", emergency generation, and stand-alone power systems (SPSs).
Ongoing legal/environmental /safety obligations of the asset owner are assigned and understood	A2	A compliance framework exists that includes tools and processes for the ongoing identification, monitoring, training and reporting on compliance requirements and failures. A compliance register was developed in 2006 and is updated quarterly across all compliance categories. A compliance committee is tasked with the ongoing identification and assessment of compliance issues. The Asset Management Objectives Report has a strong focus on ensuring that legal, environmental and safety obligations are understood. The "Compliance Failures" breach register shows the following compliance breaches over the review period: • FY15 – 118 compliance failures; • FY16 – 139 compliance failures; and • FY17 – 112 compliance failures. Notwithstanding the above failures, CutlerMerz notes that the majority of reported failures relate to power supply compliance regulations rather than legal / environmental / safety obligations e.g. "Code of Conduct for the Supply of Electricity to Small Use Customers", the "NQRS Code", and the "Metering Code", and a strong compliance culture is observed within Western Power.

5.3 Asset disposal

The process and outcome for the key process area are as follows:

- Process: Effective asset disposal frameworks incorporate consideration of alternatives for the disposal of surplus, obsolete, under-performing or unserviceable assets. Alternatives are evaluated in cost-benefit terms.
- Outcome: Effective management of the disposal process will minimise holdings of surplus and under-performing assets and will lower service costs.

The overall level of effectiveness for the key process area has been assessed as **B1**. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 10.

Table 10: Asset disposal – observations

Effectiveness criteria	Assessment	Observations and recommendations
Under-utilised and under-performing assets are identified as part of a regular systematic review process	B2	Western Power defines disposal in its Network Management Plan as: *"Asset disposal involves decommissioning and disposing/reusing the asset."* The decision to reuse or dispose of an asset is made on a balance of a series of strategic, tactical and operational factors. The Network Management Plan provide the disposal/reuse strategies. Annual asset renewal, and replacement strategies demonstrates the regular and systematic review process undertaken by Western Power. Asset disposal is incorporated in the Network Development Plan as demonstrated through the consideration of the de-meshing of the 132kV network, reduction of the grid size, voltage conversion of 66kV networks, and non-network solutions as noted in the Network Outlook Summary for 2017-18 (draft version). Western Power's suite of asset management documentation demonstrates a strong approach to defining and monitoring asset performance, and the identification of underperforming assets. However, although Western Power's Asset Management Policy makes a commitment to maximising the utilisation of its assets as a key principle, Western Power does not appear to have a clear view on the utilisation of its network assets in general. In the examples of under-utilisation that were demonstrated, it appeared that under-utilisation was only considered with assets demonstrating performance issues. Traditionally, it may be considered satisfactory to consider asset utilisation predominantly in the following context: • Over-utilised assets as those that are peak-capacity constrained; • Under-utilised assets as those that are redundant, or that are found to not be highly utilised during investigations into other issues that may require an investment or disposal decision. However, a clearer intent with respect to asset utilisation is required in the context of: • Increasing peak demand and reducing average demand;

Effectiveness criteria	Assessment	Observations and recommendations
		• Increasing electricity prices; and • Increasing cost effectiveness of alternate power supplies. Western Power currently considers asset utilisation primarily in relation to peak demand. Peak demand thresholds are defined in relation to over-utilisation; however, under-utilisation does not appear to be clearly defined (although, there are examples of under-utilised assets being rationalised). The average utilisation of assets does not appear to be well understood, and opportunities for rotation / redeployment to achieve a target network utilisation are likely to be available. Further, the Risk Based Planning Methodology document shows the peak of a typical load-duration curve occurring for only a small percentage of time. The difference between the peak and average demand is widening as demand increases and energy throughput decreases. This indicates that considering utilisation based on peak demand thresholds is increasingly unsuitable. **[REC-03/2017]** It is recommended that Western Power define a clearer intent in relation to asset utilisation. This should consider: • Enhance its understanding of asset utilisation and articulating a preferred position based on average demand in addition to peak demand (in view of the demand profiles); • Defining target utilisation rates based on the above understanding for the following: o Maximum and minimum utilisation targets for individual assets or types of assets; and o Target average utilisation rates for the network as a whole. The above should be incorporated into asset strategy, which should consider opportunity for asset rotation and redeployment, and demand management. This should be considered in conjunction with tariff strategy, and transitioning towards risk-based capacity planning.
The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken	B1	As per [REC-03/2017] above, Western Power demonstrates a strong risk-based approach to examining and taking corrective action in relation to underperforming assets, but there is opportunity to enhance its consideration of asset utilisation. CutlerMerz considers that the critical examination of underutilised assets, and any corrective actions, should form part of a strategic approach to demand management, and transitioning from deterministic to probabilistic planning.
Disposal alternatives are evaluated	A1	Western Power has "Asset Disposal Policy Guidelines" for processing the disposal of an asset after the disposal decision has been made. The "Network Management Plan" outlines Western Power's intent to reuse assets where practicable. The plan considers each asset class individually, and considers whether there are options for refurbishment and reuse, strategic spares requirements, before asset disposal is considered. CutlerMerz has reviewed Western Power's distribution transformer reuse criteria and resulting programme, as well as the strategic spares approach for transmission assets. CutlerMerz considers that Western Power has a documented approach to considering disposal alternatives that is consistent with peers.

Effectiveness criteria	Assessment	Observations and recommendations
There is a replacement strategy for assets	A1	Western Power has a comprehensive risk-based strategy for determining asset replacement requirements, particularly in relation to end-of-life considerations. The asset lifecycle is considered within individual asset class strategies, which are consistently developed based on the asset class strategy guidelines. The strategic approach to asset replacement is effected through the "Network Management Plan". Thus, asset replacement is a key aspect of Western Power's asset management strategy. Notwithstanding, CutlerMerz notes that there may be further scope to optimise the risk based replacement strategy in consideration of a strategic approach to demand management, and transitioning from deterministic to probabilistic planning. (Refer to Section 5.2 – Asset creation and acquisition, "Projects reflect sound engineering and business decisions", [REC-02/2017])

5.4 Environmental analysis

The process and outcome for the key process area are as follows:

- Process: Environmental analysis examines the asset system environment and assesses all external factors affecting the asset system.
- Outcome: The asset management system regularly assesses external opportunities and threats and takes corrective action to maintain performance requirements

The overall level of effectiveness for the key process area has been assessed as **A2**. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 11.

Table 11: Environmental analysis – observations

Effectiveness criteria	Assessment	Observations and recommendations
Opportunities and threats in the system environment are assessed	A2	Western Power defines external drivers of threats and opportunities in the system environment through: demand growth, asset condition, geographic location, and compliance requirements. These drivers are then linked to key risks that are categorised under: Reliability & Power Quality, Safety, Environment, and Cost. A risk based asset planning approach identifies the threats and opportunities and informs network investment on the areas of most effective and efficient investment to mitigate risk, and explore opportunities. The network investment is set out in the following four key plans: Network Development Plan, Network Management Plan, Network Plan, and the Network Planning Standard that envelopes the identified opportunities and threat mitigation strategies. A Network Outlook report provides a co-ordinated view on future issues aligning the various parts of Western Power in adopting a consistent and aligned response. CutlerMerz considers that Western Power has a comprehensive approach to identifying and assessing opportunities and threats; particularly as they relate to asset performance and compliance (regulatory, legal, environmental, safety, etc). However, in CutlerMerz' view the capability of the AMS to identify and assess threats and opportunities relating to customer and market trends is less robust. (Refer to Section 5.1 – Asset planning, "Non-asset options (e.g. demand management) are considered", [OFI-06/2017] and [OFI-07/2017])
Performance standards (availability of service, capacity, continuity,	B2	Western Power has a variety of standards and codes that define performance standards, including: • Electricity Industry (Network Quality and Reliability of Supply) Code 2005: Under the Electricity Industry (Network Quality and Reliability of Supply) Code 2005, Western Power issues an annual report, the Annual Reliability and Power Quality Report, that presents Western Power's performance in relation to voltage fluctuations, harmonics, unplanned or planned interruptions and complaints. Reporting on non-compliances with the requirements of the code is included, and in 2016 for example, non-

Effectiveness criteria	Assessment	Observations and recommendations
emergency response, etc.) are measured and achieved		compliances were noted including: 408 customers that weren't notified of a planned interruption 72 hours before the start of the interruption, customers experiencing supply interruptions that lasted longer than 12 hours. • Western Power also reports on its performance against seventeen Service Standard Benchmarks (SSB) under its Access Arrangement. These SSBs covers distribution and transmission reliability and security of supply, call centre and streetlight performance. The Service Standard Performance report is published annually. In FY16 Western Power outperformed all of its SSB targets except for one (Average Outage Duration). In FY17 Western Power outperformed against all of its SSB targets. • Western Power's Technical Rules, developed under the Electricity Networks Access Code 2004, details the technical requirements to be met by: 1) Western Power and 2) by Users who connect facilities to the transmission and distribution systems which make up the Western Power Network. Under the Technical Rules (clause 4.1.4(c)) Western Power is required to institute and maintain a compliance program to ensure that the power system operates reliably and in accordance with its performance requirements. The Legislative Obligations Compliance Plan - Asset Performance demonstrates compliance with this requirement. CutlerMerz has observed Western Power seeking derogations from the ERA where there are non-compliances with the Technical Rules. • Western Power's Asset Performance Management System (APMS) sets out the structure upon which asset performance management activities are designed, and establishes the transparent linkage or "line of sight" between the performance of individual assets or asset systems and the defined asset objectives, facilitating identification of safety risks. The key artefacts produced by the APMS are: Asset information packs (Measure, Analyse and Report stages of the APMS), Quarterly performance reports (Measure, Analyse, and Report stages), Asset Mean Replacement Lives (Report stage), State of the Infrastructure (SOTI) (Report and Forecast stages, and performance forecasts (Forecast stage). • Western Power now centrally defines its overall performance standards for the AMS through the Asset Management Objectives Report (as of June 2017). This document is scheduled for review every three years. It is noted that the objective measures detailed within are captured through numerous different mechanisms throughout the organisation. CutlerMerz considers that it would be beneficial to maintain a central measure that captures and provides a sharp focus on areas where improvement is required holistically for the AMS (possibly as an appendix to the Asset Management Objectives Report), and to reviewing and update the AMS objectives, measures and analysis annually rather than every three years. (Refer to Section 5.1 – Asset planning, "Service levels are defined", [OFI-04/2017])
Compliance with statutory and regulatory requirements	A2	As noted in relation to "Ongoing legal/environmental/safety obligations of the asset owner are assigned and understood" (Section 5.2 – Asset creation and acquisition), Western Power has reported the following "Compliance Failures" over the review period: • FY15 – 118 compliance failures; • FY16 – 139 compliance failures; and • FY17 – 112 compliance failures. As of June 2017, Western Power has directly linked its "compliance with statutory and regulatory requirements" to the performance standards of its AMS through the Asset Management Objectives Report. CutlerMerz has recommended enhancements to the

Effectiveness criteria	Assessment	Observations and recommendations
		monitoring of these measures and continual improvement in achieving them above (refer to Performance standards (availability of service, capacity, continuity, emergency response, etc.) are measured and achieved") above.
Achievement of customer service levels	A2	Western Power's network performance is measured against seventeen service standard benchmark (SSB) measures. Performance against these measures for the 2015/16 period shows that Western Power met sixteen of the seventeen SSBs and therefore was one non-compliance with the Access Code. The benchmark was not met for Average Outage Duration, which applies to the transmission network. Performance indicated a general improvement over the 4-year period 2012/13 to 2015/16. Average Outage Duration measure for transmission indicated a general improvement over the first three years, with a breach in 2015/16 reportedly resulting from transformer and cable failures. For the 2016/17 period Western Power outperformed against all 17 of its SSB targets. As of June 2017, Western Power has directly linked its "compliance with statutory and regulatory requirements" to the performance standards of its AMS through the Asset Management Objectives Report. CutlerMerz has identified enhancements to the monitoring of these measures and continual improvement in achieving them above (refer to Performance standards (availability of service, capacity, continuity, emergency response, etc.) are measured and achieved") above.

5.5 Asset operations

The process and outcome for the key process area are as follows:

- Process: Operations functions relate to the day-to-day running of assets and directly affect service levels and costs.
- Outcome: Operations plans adequately document the processes and knowledge of staff in the operation of assets so that service levels can be consistently achieved.

The overall level of effectiveness for the key process area has been assessed as **A2**. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 12.

Table 12: Asset operations – observations

Effectiveness criteria	Assessment	Observations and recommendations
Operational policies and procedures are documented and linked to service levels required	A2	Network operations is included as an integral part of the scope of the Asset Management Policy. A range of operational procedures and guidelines exists as controlled documents to govern the network operations. These include for example standard operating procedures for the restoration of feeders and reclosers, dispatching fault jobs, and staff/shift management network control room. Controlled documents are reviewed periodically and as a minimum once every three years (the controlled document register demonstrates that Western Power has a process for tracking and monitoring these reviews, including the identification of those documents that have passed the periodic review deadline). Key Performance Indicators (KPI) are identified within applicable Standard Operating Procedures (SOP) for operations, which provides the link between service levels and operational policies e.g. dispatch and response times based on criticality level (where times and criticalities and defined consistent with required service levels). A KPI dashboard tracks the performance of the transmission and distribution networks over a 12-month period and captures measures such as System Average Interruption Duration Index (SAIDI), System Average Interruption Frequency Index (SAIFI), call centre performance, circuit availability, average outage duration, and incident on-site intervals. Records viewed during site the site visit indicated records back to 2011 for both the transmission and distribution networks. The data used to calculate KPI performance is sourced from the Data Warehouse. PowerOn Fusion (PoF) is the software system used to capture performance data such as staged restoration times, i.e. customer fault restoration and timing. Customer counts are based on connections to the 11kV bus, and LV customer counts are based on the distribution transformers. Performance trends are monitored even if not breaching KPIs. Based on trend analysis, measures are put in place to improve performance where appropriate. Western Power has advised that operational documents will be reviewed against the requirements of the Asset Management Objectives Report (June 2017) going forward, and ensure that clear linkages are made to the service levels defined within; it is noted

Effectiveness criteria	Assessment	Observations and recommendations
		that Western Power has already noted in its Asset Management Objectives Report that the objectives will be embedded through: develop objectives at the asset class/system level, develop objectives at other layers of the Performance classification system, define multi - dimensional objectives e.g. the level of safety or reliability performance for a certain cost, and set targets against objectives. (Refer to Section 5.1 – Asset planning, "Asset management plan covers key requirements", [OFI-01/2017])
Risk management is applied to prioritise operations tasks	A1	The Emergency Management Plan provides the plan to prepare for, respond to, and recover from network emergency events. It includes a guide to the alert level based on the number of customers impacted and the expected outage duration. Operations tasks during an emergency event are prioritised based on the alert level. Western Power has developed a "Prioritising Restoration Guideline", which applies risk-based approach to prioritise operations tasks during outage events. Specific controls are in place to manage operations during "fire weather days". Likelihood of failure and consequence of failure assessments are applied in the prioritising of network management activities. These priority ratings and rectification timeframes forms the basis for scheduling network operations requirements.
Assets are documented in an Asset Register including asset type, location, material, plans of components, an assessment of assets' physical/structural condition and accounting data	A2	CutlerMerz observed that Western Power's assets appear fully captured in sophisticated GIS tools including location, equipment, characteristic, performance, condition, and environmental data. Systems vary for Distribution and Transmission: • Distribution Information Systems – SPIDA (Geographical Information system), Ellipse (Equipment register), managed through a custom data portal known as the Asset Management Portal Distribution (AMP DX), COGNOS Equipment and Works Data Warehouse (EWD) package • Transmission Information Systems – Transmission Lines System (TLS), AMP Tx Specifications, AMP Tx Ratings, SPIDA, Transmission Ratings information System (TRIS), Ellipse (Equipment register) & EWD It was evident the systems used for distribution assets are generally more advanced than those used for transmission assets. Distribution systems are updated by centralised editing team in Data Management [Works Program Planning (WPP)] or electronically in-field via Field Mobility Services (FMS) system. Transmission data is entered by a small group of highly skilled and experienced updaters. Notwithstanding, the systems appear suitable for asset registration. Again, it was observed that approaches for managing the collection, validation and quality of data vary between transmission and distribution (although again, both appear adequate): • Data collection: - Distribution – Distribution controls include As-Constructed Drawing Manual, master set of Asset Data Sheets (AMP Dx) , Scanning Process/Procedure for As-Constructed Drawings. - Transmission – Transmission data sources/controls e.g. Construction Manuals, PLScad (clearances), survey data, pole-change-out form etc. are listed in the Information Pack (EDM 6540570). • Data validation:

Effectiveness criteria	Assessment	Observations and recommendations
		- Distribution – AMP DX and SPIDA have configurable validation, which are managed by the Data Governance Team and SPIDA Functional support teams. - Transmission – Transmission system (Ellipse, TLS, AMP TX suite & TRIS) have data validation at the screen input stage e.g. list values and dropdown boxes, field value validation, calculation validation, etc. • Data quality: - Distribution – Distribution Data quality activities include (1) Quality Checking Of Asset Management System Updates, (2) Data Corrections process, (3) Data Quality Monitoring, (4) Improving Legacy Data Issues, (5) Field Verification. - Transmission – Transmission system quality checking includes updaters using Production Interface reports, Application Searches (MSQ600 Plant Number vs Serial Number), Comparison/Exception reports (EWD). It is noted that peer NSPs that operate both transmission and distribution networks have undertaken significant efforts to reduce inconsistencies between the systematic management of their assets (particularly within asset operations). **[OFI-12/2017]** It is noted that the capture of asset information has significantly improved over time; whereas practices relating to updating the Fixed Asset Register (FAR) do not appear to have changed. Western Power may wish to consider, if the level of detail included within the Fixed Asset Register (FAR), and the processes to update it, appropriately capture the level of details within the Asset Management System. Where appropriate, Western Power may wish to pursue enhancements (in FAR details and update process) where commensurate with the benefits gained from such enhancements.
Operational costs are measured and monitored	A1	Operational costs are measured and monitored and included in the 'business support' cost category of the Consolidated Profit and Loss statement provided during the field audit. The Performance Report - April 2017 provided a breakdown of Business Support and Program of Works cost with asset operations making up around 13% of the Business Support expenditure. The network operations monthly finance report was observed which provides a more granular breakdown of the operational costs. Western Power's mechanisms for measuring and monitoring operational costs are primarily through the financial planning processes – refer to Section 5.10 – Financial planning for further detail.
Staff resources are adequate and staff receive training commensurate with their responsibilities	B2	The Control Room currently operates with thirty Distribution Controllers across six desks, and fourteen transmission controllers across four desks, three dispatchers, five team leaders, one training coordinator, and one manager. The team leaders are expected to increase by two in the foreseeable future. Control Room staffing appears to be adequate for business as usual operations and appropriate training is provided in keeping with the responsibilities. However, it is understood that recent reduction in staff numbers have resulted in challenges to support business improvement projects. **[OFI-13/2017]** A range of competencies (including qualifications and training requirements) for the business are systematically managed and monitored (particularly those relating to field qualifications and network access, network operations, compliance training, driver training, etc.). However, there appears to be opportunity to improve the management and monitoring of holistic

Effectiveness criteria	Assessment	Observations and recommendations
		asset management competency and training requirements. For example, Western Power may wish to establish an 'asset management competency framework', and centrally manage all asset management competency and training requirements.

5.6 Asset maintenance

The process and outcome for the key process area are as follows:

- Process: Maintenance functions relate to the upkeep of assets and directly affect service levels and costs.
- Outcome: Maintenance plans cover the scheduling and resourcing of the maintenance tasks so that work can be done on time and on cost.

The overall level of effectiveness for the key process area has been assessed as **A2**. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 13.

Table 13: Asset maintenance – observations

Effectiveness criteria	Assessment	Observations and recommendations
Maintenance policies and procedures are documented and linked to service levels required	A2	Asset maintenance forms a key part of both Western Power's "Key Asset Management Objective Strategies", which relate to reliability, power quality and safety. These are underpinned by Asset Class strategies, which detail maintenance approaches for different asset types. Western Power has also developed specific maintenance strategies for it transmission and distribution networks. The Network Management Plan forms part of the 'Planning' component of Western Power's asset management system. It takes input from the asset management strategies, and develop asset class management plans to deliver on the corporate objectives of safety, reliability, compliance. Western Power's strategy is for both the transmission and distribution networks to maintain network performance within the expected service standards and legislative obligations. Asset failures are monitored by asset class and the impact on reliability and safety performance are recorded, and informs the Network Management Plans. Western Power has advised that maintenance documents will be reviewed against the requirements of the Asset Management Objectives Report (June 2017) going forward, and ensure that clear linkages are made to the service levels defined within; it is noted that Western Power has already noted in its Asset Management Objectives Report that the objectives will be embedded through: develop objectives at the asset class/system level, develop objectives at other layers of the Performance classification system, define multi - dimensional objectives e.g. the level of safety or reliability performance for a certain cost, and set targets against objectives. (Refer to Section 5.1 – Asset planning, "Asset management plan covers key requirements", [OFI-01/2017])
Regular inspections are undertaken of asset performance and condition	A1	Western Power's maintenance approach for both transmission and distribution assets is set out in the Network Management Plan. Preventative maintenance strategies defined at asset class level are used and involve activities primarily relating to the monitoring, maintenance or repair of equipment through visual inspections, testing, lubrication regimes and routine part replacement. Maintenance activities are identified with the aim of optimising the mix of inspection, maintenance and renewal treatments.

Effectiveness criteria	Assessment	Observations and recommendations
		Routine, non-routine, and emergency inspections are undertaken as demonstrated, for example, by the routine inspection programs for transmission poles which includes: • Pole Top Inspections & Line Patrols • Pole Base Inspection • Insulator Washing • Insulator Siliconing • Corrosion Inspection • Overhead Line Maintenance • Corrosion Management – Overhead Lines • Follow Up Corrective Maintenance – Overhead Lines • Car Vs Pole • Emergency Maintenance – Overhead Lines Western Power has an established and well-defined program of risk prioritised annual asset inspections and defect identification.
Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule	A2	Maintenance plans (preventative, corrective, and emergency) are in place for all key asset classes and includes for lines: structures, overhead conductor, underground cable; and for plants: power transformers, primary plant, substation security, protection and control systems, reactive plant, overhead switches and RMUs, and other. Historical asset class performance is recorded in the Network Management Plan and provide input to planned strategies. Maintenance works planning is completed by December of the year prior to when the work required is to be undertaken. The works planning includes resource planning. The works planning is done with input from the internal workforce and contractors. Once work packages have been issued, execution process includes on site scoping, design/constructability issues review, opportunistic works identification. The WSMS system is used to schedule and resource the works packages. The scope is locked down eight weeks ahead of execution, and at seven weeks the works package is handed over to the Depot for execution. Corrective and emergency works are treated separate from scheduled works. The Major Capital Project Delivery Full Project Status Report (All Projects) and Works Program Project Delivery (WPPD) Project Status Report demonstrates the tracking of actual and forecast maintenance cost and volume activities against budget. The field audit investigated contracted maintenance services. Contracted services only apply to those defects that doesn't require immediate rectification. High severity defects are attended to by internal staff. Most defect rectification undertaken by contractors are: cross-arm and conductor defects, followed by pole and label defects.
Failures are analysed and	A2	Western Power has processes for analysing asset performance (including failures) embedded throughout its planning processes and AMS documentation i.e. investigation of asset failures is inherent in Western Power's asset management approach. This is through

Effectiveness criteria	Assessment	Observations and recommendations
operational/maintenance plans adjusted where necessary		the development of: Renewal and Maintenance Requirements Analysis Standard, Asset Performance Management Standard, Key Asset Objective Strategies, Asset Strategies, and the Network Management Plan (NMP). This is also evidenced through investigations resulting in adjustments in asset class strategies noted in the Asset Management Plan. These include investigation of: • Explosion incidents of relatively young CTs; • Distribution reactive plant faults; and • OH HV switchgear faults (e.g. HV disconnectors, Reclosers). This feedback loop was also observed through asset failure incident investigation reports, which made recommendation for Asset Management Strategy to be reviewed in view of failure. Western Power investigates asset failures to inform asset class operational and maintenance plans.
Risk management is applied to prioritise maintenance tasks	A1	The risks of network assets are assessed in accordance with the Network Risk Management Standard (NRMS). Outputs from the NRMS inform Asset Management strategies and assist in the prioritisation of investment. Western Power's approach to managing network risk is set out in the Network Risk Management Standard (NRMS) and is aligned with ISO33001, AS5577 and the Enterprise Risk Management Standard. The Network Risk Assessment Criteria (NARC) produces a qualitative measure of risk which is used to support the development of asset class strategies. The Network Management Plan defines the process whereby defects are identified and assessed by the field inspector for risk by considering likelihood of failure and consequences of failure, and are assigned a priority rating and a time for rectification using Defects Guidelines. Western Power has a well-established and integrated risk assessment approach for prioritising maintenance works.
Maintenance costs are measured and monitored	A1	Western Power reports monthly to the Board and Executives on its operational performance against budget. A 2-year budget is approved by the Board annually. Maintenance costs are captured under the Program of Works and Business Support categories of the Profit and Loss Statement. The Profit and Loss Statement reports on monthly, year to date, and financial year actual versus internal budget expenditures. The Performance Report - April 2017 provided a breakdown of Business Support and Program of Works cost with preventative and corrective maintenance activities making up around 80% of the Program of Works Operational expenditure. The remaining 20% are made up of costs associated with network planning, non-recurring opex, SCADA and communications, streetlights, metering and reliability maintenance activities. Maintenance costs are considered appropriately measured and monitored.

5.7 Asset management information system (MIS)

The process and outcome for the key process area are as follows:

- Process: An asset management information system is a combination of processes, data and software that support the asset management functions.
- Outcome: The asset management information system provides authorised, complete and accurate information for the day-to-date running of the asset management system. The focus of the review is the accuracy of performance information used by the licensee to monitor and report on service standards.

The overall level of effectiveness for the key process area has been assessed as **B1**. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 14.

Table 14: Asset management information system (MIS) – observations

Effectiveness criteria	Assessment	Observations and recommendations
Adequate system documentation for users and IT operators	B1	CutlerMerz has observed a comprehensive range of procedural documentation for users and IT operators that apply to various IT systems. Further, Western Power has an Asset Management Tools and Systems Strategy document, which provides a gap analysis and improvement plan for systems over the period from 2015 to 2020. CutlerMerz understands that, having identified the areas of improvements (as a part of the tools and systems strategy), Western Power has been investing in areas of improvement of its key asset information systems in line with the priorities identified as a part of its corporate asset management strategic theme. Notwithstanding, the gap analysis approach of the Asset Management Tools and Systems Strategy document falls short of what would be expected of a strategy document in the asset management sense. It is noted that the reliance on systems and data for the operation of the AMS and the network has substantially increased. This is evidenced by the increasing sophistication in terms of tools that are being applied through Western Power's rigorous approach to risk-based management of its network assets, for example, NRMT and structured tools. It is noted that peer NSPs with a strong approach in this area have adopted the philosophy of managing AMS data and systems as they would a network asset i.e. with comprehensive "asset class" strategy. It is noted that Western Power is applying a concerted effort to enhance its maturity in the strategic management of its AMS data and information systems. A strategy document is currently under development (ICT STRATEGY (Transmission and Distribution), 2017-2022, Draft document under review 19 July 2017). CutlerMerz anticipates that this will ensure that asset management philosophy is applied to AMS data and information systems, commensurate with that which Western Power applies to the management of its network assets. Although, it is noted that the draft document shows ICT governance as sitting outside the asset management system. **[OFI-14/2017]** In further developing the ICT Strategy, there is an opportunity for Western Power to ensure that the strategy:

Effectiveness criteria	Assessment	Observations and recommendations
		• Will embed asset management philosophy within ICT management – possibly through peer review and contribution to the strategy document from asset management leader; and • Capture consideration of the relevant AMS effectiveness criteria for Asset management information system (MIS) i.e. the overarching requirements in relation to: - Verifying data upon entry, and then monitoring data quality; - To security and access to systems; - Physical security and access to data centres and user interfaces; - Backup of specific systems; and - Processes for generating reportable reliability metrics (SAIDI and SAIFI).
Input controls include appropriate verification and validation of data entered into the system	B2	CutlerMerz has observed numerous procedural documents relating to a variety of verification and validation checks used across Western Power's spectrum of AMS related IT systems. It is noted that there is a data quality assurance and control plan relating to SPIDA and Ellipse; however, there does not appear to be a clear strategic view of the level of accuracy required across the spectrum of AMS related systems (based on the criticality of data and system to the AMS), and hence, the required rigour of validation and checking procedures across the systems. A draft data quality scorecard for monitoring data quality has been developed; however, this does not appear to have been applied to date. There is an opportunity for Western Power to ensure that the overall requirements in relation to verifying data upon entry, and then monitoring data quality (based on the criticality of data and system to the AMS) form a part of the strategy (document currently under development). Refer to "Adequate system documentation for users and IT operators" above. [OFI-14/2017]
Logical security access controls appear adequate, such as passwords	B1	During field interviews the types of security controls were discussed in relation to Western Power's spectrum AMS related information systems. The controls discussed include controlled access and passwords, which is consistent with peer NSPs. There is an opportunity for Western Power to ensure that the overall requirements in relation to security and access to systems (based on the criticality of data and system to the AMS) form a part of the strategy (document currently under development). Refer to "Adequate system documentation for users and IT operators" above. [OFI-14/2017]
Physical security access controls appear adequate	B1	During field interviews the types of physical security controls were discussed in relation to Western Power's information systems, including data centres and user interfaces. The controls discussed include controlled access and swipe cards, which is consistent with peer NSPs. CutlerMerz has observed that Western Power maintains a "Head Office Data Centre Access List". There is an opportunity for Western Power to ensure that the overall requirements in relation to physical security and access to data centres and user interfaces (based on the criticality of data and system to the AMS) form a part of the strategy (document currently under development). Refer to "Adequate system documentation for users and IT operators" above. [OFI-14/2017]

Effectiveness criteria	Assessment	Observations and recommendations
Data backup procedures appear adequate and backups are tested	B1	Western Power has an "ICT Backup and Recovery Standard", which outlines the requirements for backing-up information. Although it is not clear within the standard which systems are covered by the standard, it is understood to cover "critical" information and systems. CutlerMerz has observed the following evidence of data backup procedures and logs for PoF, XA21, as well as "Netbackup". There is an opportunity for Western Power to ensure that the overall requirements in relation to backup of specific systems (based on the criticality of data and system to the AMS) form a part of the strategy (document currently under development). Refer to "Adequate system documentation for users and IT operators" above. [OFI-14/2017]
Key computations related to licensee performance reporting are materially accurate	B2	CutlerMerz has observed performance reports including quarterly compliance reporting and annual reliability and power quality reports. Western Power has developed a "Compliance Failure Reporting Procedure" which appears comprehensive and can be expected to result in materially accurate compliance reporting. However, it is understood that Western Power does not maintain procedural documentation relating to capturing, analysing and compiling reliability and power quality. There is an opportunity for Western Power to ensure that the overall requirements in relation to capturing, analysing and compiling reliability and power quality metrics form a part of the strategy (document currently under development). Refer to "Adequate system documentation for users and IT operators" above. [OFI-14/2017]
Management reports appear adequate for the licensee to monitor licence obligations	A1	All compliance requirements (including those relating to customer connections and timeliness of new connections / energisations) are reported and managed through Western Power's Online Compliance Register (OCR). OCR reports offer transparency to management in relation to monitoring licence obligations, Additionally, Western Power is required to produce performance reports including quarterly compliance reporting and annual reliability and power quality reports. In addition, breach registers are maintained and comprehensive asset performance analysis is undertaken. CutlerMerz has noted in relation to "Performance standards (availability of service, capacity, continuity, emergency response, etc.) are measured and achieved" (Section 5.4 – Environmental analysis) that there is opportunity for Western Power to centrally monitor and manage its scope of requirements through the Asset Management Objectives Report. [OFI-04/2017]

5.8 Risk management

The process and outcome for the key process area are as follows:

- Process: Risk management involves the identification of risks and their management within an acceptable level of risk.
- Outcome: An effective risk management framework is applied to manage risks related to the maintenance of service standards

The overall level of effectiveness for the key process area has been assessed as **A1**. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 15.

Table 15: Risk management – observations

Effectiveness criteria	Assessment	Observations and recommendations
Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system	A1	Making risk management integral to all Asset Management activities is a key principle of Wester Power's Asset Management Policy. The risk management process follows the international standard for risk management (ISO 31000). It is applied across all risk contexts within the organisation including risks associated with the management of assets. A detailed description of the process is laid out in the Risk Management Guideline. Risk management is an integral component of Western Power's asset management framework and is incorporated into all asset management strategies, processes, procedures, plans, delivery and operations activities. Western Power has established a comprehensive and rigorous risk management framework. Notably, its application to managing asset renewal planning appears to be amongst industry leaders.
Risks are documented in a risk register and treatment plans are actioned and monitored	A2	Western Power maintains Operational Risk registers associated with asset management including: Network Performance, Engineering & Design, Planning, Safety, Environment, Quality & Training, System Management, as well as Operational Risk registers associated with network operations including: Operational Maintenance, Works Program Planning, Operational Services, Network Operations, Operational Improvement and Customer Funded. These registers are regularly updated as demonstrated in the version provided that includes updates as recent February 2017. Risk treatments are identified and progress monitored under the following headings: Treatments, Treatment Owners, Treatment due dates, Treatment Status, Target Risk Rating, Comments. Notwithstanding, it is noted that although some issues appear to be recognised as a key risk at the corporate level, CutlerMerz considers that the response to this issue from the asset management system is commensurately insufficient – refer to "Non-asset options (e.g. demand management) are considered" (Section 5.1 – Asset planning), "Projects reflect sound engineering and business decisions" (Section 5.2 – Asset creation and acquisition), "Under-utilised and under-performing assets are identified as part of a

Effectiveness criteria	Assessment	Observations and recommendations
		regular systematic review process" (Section 5.3 – Asset disposal), and "Opportunities and threats in the system environment are assessed" (Section 5.4 –Environmental analysis) [OFI-06/2017] and [OFI-07/2017]
The probability and consequences of asset failure are regularly assessed	A1	Mitigation of the risks associated with its network is a key focus and the probability and consequence of asset failure forms an inherent part of Western Power's approach to asset management. Annual asset management investments are prioritised based on rigorous risk assessments, to provide for a targeted and efficient approach to mitigating the risks. Western Power applies sophisticated tools to assess asset management risks, such as the Network Risk Management Tool (NRMT). A number of other tools are also used, which apply varying degree of sophistication commensurate with the criticality of the risk being assessed. This is demonstrated in Western Power's approach to mitigating the risk of its network causing a bushfire. This is a significant risk and the assessment includes consideration of the probability of asset failures resulting in a bushfire across its asset base. The probability of failure, likelihood of consequence, and cost of consequence is considered in determining and ranking the risk. Western Power appropriately assesses the probability and consequence of asset failure across its asset base on a regular basis.

5.9 Contingency planning

The process and outcome for the key process area are as follows:

- Process: Contingency plans document the steps to deal with the unexpected failure of an asset.
- Outcome: Contingency plans have been developed and tested to minimise any significant disruptions to service standards.

The overall level of effectiveness for the key process area has been assessed as B2. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 16.

Table 16: Contingency planning – observations

Effectiveness criteria	Assessment	Observations and recommendations
Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks	B2	Western Power has placed significant focus on maturing its contingency planning capability over the review period. In general, the efforts in this area appear rigorous and well considered. **[OFI-15/2017]** By nature, contingency plans are not regularly accessed, but need to be readily available when required in emergency situations. Whilst the contingency plans developed in Network Operations are accessible to relevant staff, those produced in Network Planning appear to be categorised within Western Power's document management system and may only be known to select people that have been involved with their development. There is an opportunity for Western Power to ensure that all the contingency plans are readily retrievable and accessible to the workforce that need to apply them when required. Western Power has a "Business Continuity Management Standard" which outlines a proactive preparation and response measures to emergencies through its response hierarchy. The hierarchy provides for escalation from "incident" (managed locally), to "emergency" (managed by the Emergency Management Team – EMT) and to "crisis" (managed by the Crisis Management Team – CMT), which prescribe an increasing response from the organisational levels. The standard includes an Active Management Forum (AMF) that provide collaborative leadership in the management of issues outside the "immediate / active" crisis. The AMF is authorised and led by a nominated Executive Manager to respond to an existing event or emerging threat to Western Power operations. The objectives of the AMF are to: provide active management of issues or emerging threats either to closure, or to escalation to the full CMT, continue to provide ongoing operational management of issues after escalation if required, ensure that the Chief Executive Officer (CEO) and relevant stakeholders are kept informed of status on a regular basis and implement required process or document changes. Western Power's Network Emergency Management Plan provides the emergency levels including a guide to the alert level based on the number of customers impacted and the expected outage duration. The Emergency Management Plan provides a considered and structured process for managing emergency events, and includes requirements to: prepare, respond, recover, close-out and review. This is supported by emergency procedures, managing "known vulnerabilities", and ensuring adequate resourcing and training.

Effectiveness criteria	Assessment	Observations and recommendations
		Known vulnerabilities that "may cause issues during emergency events" include: communications, data collection and record keeping, logistics and accommodation, and staff training. The Management Standard for Contingency Planning provides the operational principles against which operational contingency plans are developed. Western Power has undertaken a comprehensive "cause and effect" analysis to assess contingency scenarios and determine contingency plans that are required. From this analysis, a range of contingency plans have been identified in relation to: electricity supply, people, facilities, communications and environment. It is understood that Western Power undertakes scenario exercises every six months, which include one high-likelihood incident and one low-likelihood incident each year. Control staff are selected on a rotation basis to manage the incident. Western Power has developed a broad suite of contingency plans through what appears to be a well-considered process. CutlerMerz has reviewed contingency plans, and the analysis that supports the development of the plans, and considers the analysis to be comprehensive, and the plans to have been rigorously developed. **[OFI-16/2017]** Western Power has demonstrated a considered process for establishing its contingency planning requirements, and developing subsequent contingency plans. This process results in targeted contingency plans for assets and issues that have been considered as a reasonable contingency risk. For example, targeted terminal substations have been identified and subsequent contingency plans have been developed, strategic spares and rapid response transformers have been identified and developed, targeted switchgear assets at substations. The process appears well considered; however, it is difficult to understand across the breadth of assets how some have been selected and not others. There is an opportunity for Western Power to document the process for identifying and establishing contingency plans across its asset base. Western Power has a detailed procedure which documents the process and precautions for activating its Backup Control Centre (BUCC). Western Power has advised that the next full test of the BUCC is schedules for October 2017.

5.10 Financial planning

The process and outcome for the key process area are as follows:

- Process: The financial planning component of the asset management plan brings together the financial elements of the service delivery to ensure its financial viability over the long term.
- Outcome: A financial plan that is reliable and provides for the long-term financial viability of the services.

The overall level of effectiveness for the key process area has been assessed as **A1**. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 17.

Table 17: Financial planning – observations

Effectiveness criteria	Assessment	Observations and recommendations
The financial plan states the financial objectives and strategies and actions to achieve the objectives	A1	Financial planning at Western Power is managed through an integrated cycle between corporate level of the organisation and asset management. The process is driven by corporate strategy (10 Year Strategic Plan), the network strategies (Network Management Plan and Network Development Plan), the business plan (10 Year Business Plan), and business monitoring and performance (2 year Functional Business Plans and 2 Year Network Delivery Plan, and Monthly Performance Reporting). All investments must pass through the requirements of Western Power's Investment Governance Framework, which provides a structure of "gated" mechanisms for pressure testing proposed investments. The Business Plan is the central plan for all Western Power's financial and portfolio investment plans, and is prepared and issued annually. It includes a section detailing objectives and commitments, which is followed by investment portfolio scenario analysis, and the investment plan to achieve the stated objectives. Strategies for developing the bottom-up build of the investment program are comprehensively captured through the asset management strategies and objectives that underpin the Network Management Plan and the Network Development Plan. The 2016/17 Business Plan has a 10-year (previously 5-6 year) horizon and informs the 2-year internal budget and the 5-year strategic development plan. It also informs the 5-year regulatory submission, the 4-year State budget submission, and the 10-year strategic asset plan. The 2016/17 Business Plan demonstrates alignment to objectives (safe, reliable and affordable). It indicates a substantial reduction in forecast capital expenditure and a capped operations and maintenance investment forecast. The reduced capital expenditure is the result of a significant reduction in non-growth (asset renewal) expenditure. Network risk is expected to be managed with no significant increase in network risk for the first four years of the planning term.
The financial plan identifies the source	A1	Capital and operating investments are funded through revenue and borrowings, limited by the State Budget. The plan details the key financial outcomes against earnings (~revenue) and new debt (~borrowings). Variances in revenue against the State Budget are

Effectiveness criteria	Assessment	Observations and recommendations
of funds for capital expenditure and recurrent costs		discussed in relation to customer capital contributions and variations from tariff revenues received versus the forecasts. Variations in borrowings are discussed in the context of new debt and changes to targeted gearing ratio. Investments are approved in an access arrangement (AA) covering the following expenditure categories: • Network (capital) • Network (operating) • Non-network (capital) • Non-network (operating) Allocation of funds for individual investments is done upon satisfactory appraisal of Business Cases, and the Business Monitoring and Performance process monitors adherence to budgets, forecasts and KPIs.
The financial plan provides projections of operating statements (profit and loss) and statement of financial position (balance sheets)	A1	CutlerMerz confirms that Appendix A of the Business Plan contains: • Operating statements (profit and loss); • Statement of financial position (balance sheet), and • Cashflow statements. For each of the above, single year actuals and 5-year forecasts are provided.
The financial plan provides firm predictions on income for the next five years and reasonable indicative predictions beyond this period	B2	Appendix A of the Business Plan includes: • Profit and loss statement – including a total revenue line item; and • Cash flow statement – including a total inflow of funds line item. For each of the above, single year actuals and 5-year forecasts are provided. However, no predictions on income are provided beyond this period. Notwithstanding, the 2016/17 Business Plan Board Submission covers the 10-year period from 2016/17 through to 2025/26, and provides forecasts for total revenue for a 10-year period.
The financial plan provides for the operations and maintenance, administration and capital expenditure	A1	The Business Plan provides 5-year annualised projections of: • Capital expenditure by funding category; • Capital expenditure by regulatory category; • Operating expenditure by regulatory category; • Regulated Capital Program compared to AA3; • Capital Program compared to Mid-Year Review;

Effectiveness criteria	Assessment	Observations and recommendations
requirements of the services		• Regulated Operating Program compared to AA3; • Non-revenue cap and unregulated profitability by service 2015/16 - 2020/21; • Capital contributions by regulatory category; and • 5 Year revenue projections including for: Reference Service Revenue, Capital Contributions, Non-Reference Service Revenue, Non-Regulated Revenue. It also includes for administration aspects and support services such as e.g. Business Support & IT (including SCADA, Corporate Real Estate, Regulatory Compliance, Reliability Asset Replacement, etc.)
Significant variances in actual/budget income and expenses are identified and corrective action taken where necessary	A2	Western Power utilises business cases to ensure that fully justified, efficient and approved investments are made by the business. Business cases are developed for: • All capital expenditure (including non-Work Program); • Operating expenditure for any unbudgeted activities; • Operating expenditure for non-recurrent or standalone projects; and • Significant increases in operating expenditure through increased volumes of work or changes in recurrent work practice. The business case process with relevant procedures and documentation requirements are set out in the Business Case Guideline. Financial performance monitoring and reporting is done against a board approved 2year internal budget. Operational performance against forecast is reported monthly through Business Performance reports. A business planning and reporting dashboard (busbar) makes the reports available to the Board and Executives.

5.11 Capital expenditure planning

The process and outcome for the key process area are as follows:

- Process: The capital expenditure plan provides a schedule of new works, rehabilitation and replacement works, together with estimated annual expenditure on each over the next five or more years. Since capital investments tend to be large and lumpy, projections would normally be expected to cover at least 10 years, preferably longer. Projections over the next five years would usually be based on firm estimates.
- Outcome: A capital expenditure plan that provides reliable forward estimates of capital expenditure and asset disposal income, supported by documentation of the reasons for the decisions and evaluation of alternatives and options.

The overall level of effectiveness for the key process area has been assessed as **A1**. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 18.

Table 18: Capital expenditure planning – observations

Effectiveness criteria	Assessment	Observations and recommendations
There is a capital expenditure plan that covers issues to be addressed, actions proposed, responsibilities and dates	A1	Western Power's Business Plan encapsulates the proposed investments in the Network. These investments are driven by the network strategies set out in the Network Development Plan (NDP) and the Network Management Plan (NMP). The Business Plan is used as a "portfolio plan" and contains the business cases and forecast of all programs/projects with strategic justifications. The Business Plan feeds into the 5-year strategic development plan and the 2-year internal budget forecast. The investment plans are supported by strategies and business cases. The Business Plan and Business cases provides the capital expenditure plan including the investment justification and appraisal.
The plan provides reasons for capital expenditure and timing of expenditure	A1	The Network Development Plan provides the details on network augmentation works over a 10-year horizon. The plan describes at a high level the investment scope, timing and expenditure. The reasons and timing of capital expenditures are provided in the Business Plan, and are supported by strategies and business cases.
The capital expenditure plan is consistent with the asset life and condition identified	A1	The Network Management Plan mainly considers capital investments associated with asset replacements. The investments are identified and developed applying a risk based approach considering the remaining life of assets. The Network Development Plan is mainly concerned with capital expenditure associated with network augmentation. These investments consider network capacities and constraints and applies an appraisal process whereby network and non-network

Effectiveness criteria	Assessment	Observations and recommendations
in the asset management plan		options are investigated to identify cost efficient investments considering asset utilisation, asset life extensions, and the reuse of assets. The investment plans are supported by strategies and business cases. The capital expenditure plan is aligned with the asset management system approach and expectation of asset life and condition.
There is an adequate process to ensure that the capital expenditure plan is regularly updated and actioned	A1	Planning processes that drive the capital expenditure plans are continual. The Business Plan, and associated documents relating to capital expenditure (Network Management Plan, Network Development Plan, and the Delivery Plan) are produced annually. Actions to deliver capital expenditure programmes are continual.

5.12 Review of AMS

The process and outcome for the key process area are as follows:

- Process: The asset management system is regularly reviewed and updated.
- Outcome: Review of the Asset Management System to ensure the effectiveness of the integration of its components and their currency.

The overall level of effectiveness for the key process area has been assessed as **B1**. Observations, recommendations and opportunities for improvement for the key process area are detailed in Table 19.

Table 19: Review of AMS – observations

Effectiveness criteria	Assessment	Observations and recommendations
A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current	A1	One of Western Power's key principles in undertaking the safe, reliable and efficient Asset Management of its assets is ongoing monitoring and reviewing of performance against Asset Management outcomes and seeking continual improvement, as reflected in the Asset Management Policy. It is noted that the Network Management Plan (NMP) and Network Development Plan (NDP) are reviewed annually, and all AMS documents have a defined review cycle that follow Western Power's record management procedures. Western Power has an appropriate review and continuous improvement policy and process in place, keeping the asset management system current.
Independent reviews (e.g. internal audit) are performed of the asset management system	B1	Western Power's quality assurance process employs a 'four line of defence' approach: • First Line of Defence – Self assessments to be completed by Field Supervisors • Second Line of Defence – Safety, Environment, Quality and Training (SEQT) Compliance Team supporting the business in completing compliance inspections • Third Line of Defence – Risk Audit & Assurance Internal Audit • Fourth line of Defence – External Audit Recent independent reviews that have been undertaken include: • Economic Regulation Authority (ERA) 2014 audit of the Asset Management System (AMS) • Independent review of Asset Management System • Independent review of Network Risk Management Tool (NRMT) • Identification of Opportunities for Improvement – Business Transformation Program – Expert consultants and Subject Matter Experts (SME) from the industry

Effectiveness criteria	Assessment	Observations and recommendations
		• Improvements to achieve high performing business – through identification of opportunities to deliver benchmarked business performance • Ongoing participation in Electricity Networks Australia (ENA), International Transmission Operations & Maintenance Study (ITOMS) and other benchmarking • AMS review for Publically Available Specification 55 (PAS 55), "Asset Management Excellence", and the International Organization for Standardization (ISO) for Asset Management (ISO-55000) certification Western Power also undertake independent internal reviews that includes: • Internal Audit Plan • Internal Safety, Health & Environment (SHE) audits • Inspection audits and QA audits for renewal, maintenance and construction **[OFI-17/2017]** It is noted that Western Power undertakes "self-audits" as part of Functional Plans within AMS processes. These are incorporated in quarterly reporting and aggregated to Business Unit and the Executive. Notwithstanding, there is an opportunity for Western Power to establish a considered internal audit programme for the AMS as a whole, to provide greater assurance on the performance of high risk processes.

6. Recommendations

Detailed recommendations on the actions to be taken by Western Power to address process deficiencies are provided in Table 20. None of the recommendations identified have been resolved at the end of the current review period.

Table 20: Table of current review asset system deficiencies / recommendations – Unresolved at end of current review period

Reference (no./year)	Asset Management System Deficiency	Reviewers' Recommendation	Management action taken by end of audit period
01/2017	**Key Process Area (KPA):** 1. Asset Planning **Effectiveness Criteria (EC):** Asset management plan covers key requirements **Effectiveness Rating (ER):** B2 Whilst the asset management objectives take a strong position on the "safe" and "reliable" organisational objectives, and convert these into "key objective strategies" for the AMS, the organisation's "affordable" objective does not appear to be given commensurate focus by the AMS. The absence of strategic documentation in relation to affordability does not suggest that Western Power hasn't incorporated cost efficiency throughout its AMS processes; only that it has not articulated its approach at the strategic tier of the AMS as robustly as it has for other objectives. The review of cost related elements of the AMS elements demonstrates that these considerations are strongly embedded throughout AMS processes. This includes: <u>Affordability (or price impact):</u> • Assessments undertaken as a part of the Regulatory Submission, and reviewed as a function of Corporate Strategy/ Business Plan; • New Facilities Investment Test (NFIT) Reviews as a part of business cases; and • Ex-Post reviews as a part of regulatory submission. <u>Efficiency assessments:</u> • Top down assessments undertaken as a part of the Corporate Strategy/ Business Plan;	It is recommended that Western Power develop asset management strategy to articulate its delivery on the "affordable" objective, commensurate with the strategies developed to deliver on the "safe and reliable" objectives. It is noted that in the new corporate strategic plan (still under development), the "affordable" objective is likely to be replaced with new objectives. In this case, the above recommendation should consider the new objectives rather than the current "affordable" objective.	Post review action plan prepared.

Reference (no./year)	Asset Management System Deficiency	Reviewers' Recommendation	Management action taken by end of audit period
	• NFIT Reviews as a part of business cases; and • Individual asset class level/ delivery provision efficiency tested through benchmarking, competitive tendering, optioneering for standards and strategy development (includes risk-cost-benefit assessment at asset class level). Notwithstanding these processes, it is appropriate for the AMS to articulate its direction at the strategic tier for how it delivers on the "affordable" objective holistically, commensurate with the robust articulation of its approaches that deliver on the "safe" and "reliable" objectives.		
02/2017	**Key Process Area (KPA):** 2. Asset creation and acquisition **Effectiveness Criteria (EC):** Projects reflect sound engineering and business decisions **Effectiveness Rating (ER):** B2 Generally, Western Power's Technical Rules appear highly prescriptive (as compared to rules applied to peer NSPs). Specifically, the Technical Rules impose prescriptive deterministic criteria to be applied for capacity planning. It is observed that peer NSPs have achieved significant efficiency gains through developing probabilistic risk-based capacity planning approaches with increasing sophistication. Although Western Power's risk- based approach to renewal planning can be considered amongst industry leaders, the prescription of the Technical Rules appears to be constraining it from achieving similar outcomes in relation to capacity planning. The application of a similar mindset (as currently applied to renewal planning) to capacity planning would significantly advance Western Power's maturity in this area. This is an increasing imperative as demand profiles and power flows on the network are altered by emerging technology (as is currently evident in Western Power's trend of increasing maximum demand and reducing energy throughput). It is noted that Western Power has made efforts in this area, and has developed a draft Risk Based Capacity Planning Methodology document; however, the implementation of the methodology requires Western Power to seek exemptions from complying with the Technical Rules. It is understood that	It is recommended that Western Power undertake an internal review of the Technical Rules, with a specific focus on considering the deterministic planning criteria that are prescribed (predominantly within Section 2.5) to identify areas that constrain it from optimising capacity planning through risk-based probabilistic approaches. The review should identify discrepancies between the Technical Rules and Western Power's Risk Based Capacity Planning Methodology (EDM 41025116) document (also in view of continued evolution of the document with leading industry practice).	Post review action plan prepared.

Reference (no./year)	Asset Management System Deficiency	Reviewers' Recommendation	Management action taken by end of audit period
	Western Power is planning to undertake an internal review of the Technical Rules.		

03/2017	**Key Process Area (KPA):** 3. Asset disposal
	Effectiveness Criteria (EC): Under-utilised and under-performing assets are identified as part of a regular systematic review process; The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken
	Effectiveness Rating (ER): B2
	Traditionally, it may be considered satisfactory to consider asset utilisation predominantly in the following context:
	• Over-utilised assets as those that are peak-capacity constrained;
	• Under-utilised assets as those that are redundant, or that are found to not be highly utilised during investigations into other issues that may require an investment or disposal decision.
	However, a clearer intent with respect to asset utilisation is required in the context of:
	• Increasing peak demand and reducing average demand;
	• Increasing electricity prices; and
	• Increasing cost effectiveness of alternate power supplies.
	Western Power currently considers asset utilisation primarily in relation to peak demand. Peak demand thresholds are defined in relation to over-utilisation; however, under-utilisation does not appear to be clearly defined (although, there are examples of under-utilised assets being rationalised). The average utilisation of assets does not appear to be well understood, and opportunities for rotation / redeployment to achieve a target network utilisation are likely to be available.
	Further, the Risk Based Planning Methodology document shows that typical load-duration curves peak for a small percentage of time. The difference between the peak and average demand is widening as demand increases and
		It is recommended that Western Power define a clearer intent in relation to asset utilisation. This should consider:
		• Enhance its understanding of asset utilisation and articulating a preferred position based on average demand in addition to peak demand (in view of the demand profiles);
		• Defining target utilisation rates based on the above understanding for the following:
		  ○ Maximum and minimum utilisation targets for individual assets or types of assets; and
		  ○ Target average utilisation rates for the network as a whole.
		The above should be incorporated into asset strategy, which should consider opportunity for asset rotation and redeployment, and demand management.
		This should be considered in conjunction with tariff strategy, and transitioning towards risk-based capacity planning.
			Post review action plan prepared.

Reference (no./year)	Asset Management System Deficiency	Reviewers' Recommendation	Management action taken by end of audit period
	energy throughput decreases. This indicates that considering utilisation based on peak demand thresholds is increasingly unsuitable.		

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Appendix A. Post-review controls assessment

Western Power's control environment has been reassessed following the review, applying the ERA's framework (refer to Appendix 4 of the Guidelines for a description of the framework). Each asset management process details the desired outcome(s) if the process is being performed effectively, along with a minimum set of effectiveness criteria. The post-review assessment is provided in Error! Reference source not found. and REF _Ref478651537 \h * MERGEFORMAT Error! Reference source not found. below for each of Western Power's licences EDL1 and ETL2.

The tables can be interpreted as follows:

- Controls that were found to be stronger in the post-review are indicated in **green** and those found to be weaker are indicated in **orange**.
- There are no resultant changes to Review Priority due to the revised control strength assessments.

Table 21: Assessment of control environment - Electricity Distribution Licence (EDL1)

Asset management system component		Consequence (1=minor, 2=moderate, 3=major)	Likelihood (A=likely, B=probable, C=unlikely)	Inherent risk (Low, Medium, High)	Adequacy of existing controls (S=Strong, M=moderate, W=weak)	Review Priority					
						1	2	3	4	5	N/A
1	Asset planning	2	C	Medium	S				X		
2	Asset creation and acquisition	2	B	Medium	M				X		
3	Asset disposal	1	B	Low	S					X	
4	Environmental analysis	2	B	Medium	M				X		
5	Asset operations	2	C	Medium	S				X		
6	Asset maintenance	2	B	Medium	S				X		
7	Asset management information system	2	B	Medium	M				X		
8	Risk management	3	B	High	S		X				
9	Contingency planning	3	B	High	M		X				
10	Financial planning	2	C	Medium	S				X		
11	Capital expenditure planning	2	C	Medium	S				X		
12	Review of the asset management system	1	C	Low	M					X	

Table 22: Assessment of control environment - Electricity Transmission Licence (ETL2)

Asset management system component		Consequence (1=minor, 2=moderate, 3=major)	Likelihood (A=likely, B=probable, C=unlikely)	Inherent risk (Low, Medium, High)	Adequacy of existing controls (S=Strong, M=moderate, W=weak)	Review Priority					
						1	2	3	4	5	N/A
1	Asset planning	3	C	High	S		X				
2	Asset creation and acquisition	3	B	High	M		X				
3	Asset disposal	2	B	Medium	S				X		
4	Environmental analysis	2	B	Medium	M				X		
5	Asset operations	3	C	High	S		X				
6	Asset maintenance	2	B	Medium	S				X		
7	Asset management information system	2	B	Medium	M				X		
8	Risk management	3	B	High	S		X				
9	Contingency planning	3	B	High	S		X				
10	Financial planning	2	C	Medium	S				X		
11	Capital expenditure planning	2	C	Medium	S				X		
12	Review of the asset management system	1	C	Low	M					X	

Appendix B. Western Power representatives that participated in the review

Western Power personnel interviewed throughout the course of the review are provided in Table 23.

Table 23: Western Power interviewees

Name	Position	Area
Joint Planning Team (personnel responsible for coordinating the AMS Review)		
Michael Pover	Senior Asset Systems Analyst	Asset Strategies & Risk
Daniel Rossandich	Senior Compliance Specialist	Engineering Services
Rudi James	Regulatory Compliance Manager	Regulatory Compliance
John Paolino	Senior Compliance Specialist	Regulatory Compliance
Ankur Maheshwari	Asset Strategies & Risk Manager	Asset Strategies & Risk
Overview of AMS and Key Process Areas		
Andrew Sherwin	Business Relationship Manager	Information & Communication Technology
Ankur Maheshwari	Asset Strategies & Risk Manager	Asset Strategies & Risk
Rudy Van Den Wall Bake	Operations Development Manager	Networks Operations Development
Steve Kelly	Investment Evaluation Manager	Investment Evaluation
Neil Chivers	Strategic Planning & Standards Manager	Strategic Planning & Standards
Balcatta Depot		
Gavin Norris	Field Operations Team Leader	Metro Planned
John Norman	Field Supervisor	Metro Planned
Jerome Wood	Field Supervisor	Metro Planned
Mick Shackleton	Field Supervisor	Metro Planned
Field Visit		
Andy Stimson	Team Coordinator	Metro Planned
Contract Management		
Hasan Murad	Project Contract Manager	Operational Services
Peter Clements	Project Manager	Power Line Plus (PLP)
Key Process Areas: KPA1, KPA2 and KPA4		
Ankur Maheshwari	Asset Strategies & Risk Manager	Asset Strategies & Risk
Adam Simpson	Corporate Compliance Manager	Corporate Compliance
Michael Chung	Senior Network Planning Analyst	Customer & Plan Optimisation
Matthew Webb	Plan Optimisation Team Leader	Customer & Plan Optimisation
Ben Bristow	Distribution Planning Manager	Distribution Planning
Daniel Rossandich	Senior Compliance Specialist	Engineering Services
Brian Jones	Field Protection & Telecom Manager	Field Protection & Telecom
Charles Crew	Lines & Cables Design Manager	Lines & Cables Design
Douglas Thomson	Transmission Planning Manager	Transmission Planning
Neil Chivers	Strategic Planning & Standards Manager	Strategic Planning & Standards
Key Process Areas: KPA3, KPA6, KPA8 and KPA12		
Amir Sherkat Masoum	Engineering Team Leader	Asset Strategies & Risk
Ankur Maheshwari	Asset Strategies & Risk Manager	Asset Strategies & Risk
Karna Vyas	Senior Asset Strategy Engineer	Asset Strategies & Risk
Michael Fraser	Asset Strategy Engineer	Asset Strategies & Risk
Mohsin Miyanji	Engineering Team Leader	Asset Strategies & Risk
Nirav Shah	Asset Engineer	Asset Strategies & Risk

Name	Position	Area
Matthew Webb	Plan Optimisation Team Leader	Customer & Plan Optimisation
Matthew Veryard	Senior Pricing & Regulation Analyst	Economic Regulation
Doris Tay	Financial Accountant	Financial Accounting
Lisa Thomas	General Ledger Team Leader	Financial Accounting
Nelly Simon	Financial Accounting Manager	Financial Accounting
Ben Jones	Forecasting & Modelling Team Leader	Insight & Analytics
Allan Jouana	Senior Performance Analyst	Planning & Works Allocation
Ian Hord	Risk & Insurance Manager	Risk
Douglas Thomson	Transmission Planning Manager	Transmission Planning
Zane Christmas	Works Manager	Works Maintenance
Neil Chivers	Strategic Planning & Standards Manager	Strategic Planning & Standards
Nelly Simon	Financial Accounting Manager	Financial Accounting
Key Process Areas: KPA5 and KPA9		
Rudy Van Den Wall Bake	Operations Development Manager	Networks Operations Development
Jason Knott	Quality & Compliance Officer	Networks Operations Development
Douglas Thomson	Transmission Planning Manager	Transmission Planning
Key Process Areas: KPA10 and KPA11		
Ankur Maheshwari	Asset Strategies & Risk Manager	Asset Strategies & Risk
Steve Kelly	Investment Evaluation Manager	Investment Evaluation
Neil Chivers	Strategic Planning & Standards Manager	Strategic Planning & Standards
Ivona Okuniewicz	Strategy Manager	Strategy & Business Development

Appendix C. Documentation and information sources reviewed

Information provided by Western Power throughout the course of the review are provided in Table 24.

Table 24: Information provided by Western Power for review

Area	File name
KPA1	10_SIF_Champions_Forum_Output Example 2_April 2016 (12798527).pdf
	11_SIF Champions Forum Output Example 3 June 2016 (12798527).pdf
	12_Optimisation_Forum_Output Example 1_Oct 2015 (12630703).pdf
	13_Optimisation_Forum_Output Example 2_Feb 2016 (12630703).pdf
	14_1st & 2nd Pass Optimisation example_16_17 Consolidated NIP.xlsx
	15_2016-17 Network Investment Plan (13138699)_.pdf
	17_Copy of SIF_Prosight_-_Data_Extract_(12398081).xlsx
	18_DERT Example -_Replace OHSC.xlsx
	19_NRMAT and Examples.xlsx
	1_Network_Planning_Standard.pdf
	2017 AMSR response to RFI from auditor 1.3 Programme optimisation between expenditure categories augex repex opex.pdf
	2_Augmentation and Optimised Asset Replacement Planning Methodology.pdf
	3_SIF Fact Sheet (12222951)_.pdf
	4_SIF Assessment Example (13599392)_.xlsm
	5_JPT Terms of Reference_.pdf
	6_SIF Champions Forum - Terms of Reference (34196687).pdf
	7_Optimisation Forum Terms of Reference (8813951)_.pdf
	8_NIP Review Team Terms of Reference.pdf
	9_SIF_Champions_Forum_Output Example 1_Jan 2016 (12798527).pdf
	AMSR Presentation Pack 2017 (based on EDM42467235)_NP input.pdf
	AMSR_Presentation_Pack_2017_NP_input Network portfolio planning 2.pdf
	Annual_Planning_Report EDM_33360057.pdf
	ASSET MANAGEMENT POLICY.pdf
	Asset_Management_Objectives_Report_(12804096).pdf
	Augmentation and Optimised Asset Replacement Planning Methodology.pdf
	Business_Case_Guideline_(3198881).pdf
	DSLMP Maintenance Renewal Options Analysis.pdf
	Power Transformer end of life options - Abrid....pdf
	T0354029 - MSS Install 3rd Tx - BC - Business Case (13309148).pdf
	Dx-Structures-Asset-Management-Strategy Optio....pdf
	Copy of IEM Conductor Replacement FY1718 34351228_.xlsm
	Corporate Strategy 2017-2022 Caveated version.pdf
	Demand Management Screening Tool for HBK Reinforcement.xlsm
	Demand_Management_& Non-Network_Options Guideline.pdf
	Determination on Application for exemption from certain requirements of the Technical Rules submitted by Western Power.pdf
	Distribution Network Maintenance Strategy_.pdf
	Dx Reliability Strategy (1).pdf
	Dx-Structures-Asset-Management-Strategy.pdf
	ERA - 2017 AMSR - AMS Walk Through .pptx_.pdf
	F Y 17 18 Works Plan Process.pdf
	Forecasting methodology report new connections maximum demand.pdf
	Initiative 4 - Work Packet Requirements (002).pdf
	Issues Briefing Paper-Impacts of Inverter Embedded Generation (IEG) (13384616).pdf

Area	File name
	KPI Dashboard Monthly Results (PDF version)_.pdf
	Network Delivery Strategy - Distribution and Transmission_.pdf
	Network Investment Plan 2017-18(13797337)_.pdf
	NETWORK OUTLOOK SUMMARY FOR 2017-18.pdf
	Network Plan 18_19 Output.pdf
	NETWORK_DEVELOPMENT_PLAN.pdf
	Network_Management_Plan.pdf
	Network_Planning_Standard.pdf
	Network_Risk_Management_Standard.pdf
	Network_Strategy.pdf
	NIEIR Forecast Methodology Review.docx.pdf
	Power_Quality_Strategy.pdf
	Procedure NTWK.1.3.5 Prepare 6 year Network Management Plan (NMP) [APPROVED].docx_.pdf
	Renewal and Maintenance Requirements Options Analysis Methodology.pdf
	Review of western power's application for a technical rules exemption for meadow springs zone substation.pdf
	RISK BASED CAPACITY PLANNING METHODOLOGY_.pdf
	Risk_Based_Renewal_Methodology_(Dx_OH).pdf
	Strategic Plan 2013-2017 for communication_.pdf
	Structured_Tools_Overview (DM 12632665) Signed 29_09_2015.pdf
	T0354029 - MSS Install 3rd Tx - BC - Business Case (13309148)_.pdf
	Technical Rules-1 December 2016.pdf
	Transmission Network Maintenance Strategy_.pdf
	TX Reliability_Strategy.pdf
	WC DM NRO BC - Defer T0417971 - [refer to EDM 42342749 for WORD doc].pdf
KPA2	806 isolator.doc
	Administrative Quality Assurance of Protection Commissioning Work (CAPEX) (11229353)_.pdf
	AMSR KPA2 Commissioning Information File_.pdf
	AMSR Presentation Pack 2017 (based on EDM42467235)_NP input.pdf
	AMSR_Presentation_Pack_2017_NP_input Network portfolio planning 2.pdf
	ASSET MANAGEMENT POLICY.pdf
	Bernard Giles.pdf
	BSN RRST 415vac through injection test 7UT513 commissioning test results .pdf
	BSN RRST 415vac through injection test 7UT513 operational measured values test results.pdf
	BSN RRST operating manual commissioning protection.pdf
	BUSINESS CASE - RELOCATE MRT T1 TO MUJA BTT2 & FIX OIL LEAK - NRO PROJECT_.pdf
	Business_Case_Guideline_(3198881).pdf
	Collgar NAS-Business Case -Non Recurring Opex - March 2017.do....pdf
	Automation and Control Design optimisation.pdf
	relays initiative_v2.pdf
	T0354029 - MSS Install 3rd Tx - BC - Business Case (13309148).pdf
	T0410271 - West Kalgoorlie SVC Replacement - Business Case.docx_.pdf
	Transformer Loss Capitalisation Update.pdf
	Commissioning Notice - Busselton - BSN_20 - T0433764 - TT033488 - Rapid Response Spare Transformer (RRST) Deployment.pdf
	COMMISSIONING PROGRAM SHENTON PARK - SP_4 - T0348702 - TT028051 - SUBSTATION REINFORCEMENT - STAGE 2 TRANSFORMER 2 AND 3.pdf
	Completed Emergency Response Generator Operating Instruction LV Network ....pdf
	CPO-Business Case Distribution Overhead Corridor FY1718 40428298.pdf
	CT-MRR-81 REMOVAL OF POLES 121 - 124.pdf
	CT-MSS-PNJ-81 TX RELOCATION POLES 121 TO 124.pdf
	Distribution Commissioning Data Sheets 26th May 2017.pdf

Area	File name
	Distribution Conductor Asset Class Strategy - AMSR.pdf
	Dx - Overhead Conductor Failure Summary Strategy (11762572)_.pdf
	Dx_Reloc__Gnanagara_Road_Lexia_Phase_2_Business Case.pdf
	Electricity (Supply Standards & System Safety) Regulations Review.xls
	Emergency Response Generator Operating Instruction LV Network Connection....pdf
	Emergency Response Generators Operations Manual EDM 40216383.pdf
	Field Protection Services Commissioning Manual Section 1 - Overview and processes.pdf
	Handover Procedures & Practices (8497265)_.pdf
	injection test.docx
	Investigating Suitability of Current material selection practice for poles - Final Report by PB_.pdf
	JOEL TERRACE SUBSTATION CABLE TERMINATIONS JT BUS_.pdf
	Location of LV Protection Relays in Zone Substations -PIR.pdf
	MANAGING DIM CONTENTS (4773760)_.pdf
	N0384707 - MOR Mitig Under Fault Rated COND - BC - Business Case.pdf
	Nedlands_ Voltage Conversion - BC Report (13653022)_.pdf
	Network Framework - Strategic Planning & Standards and Technology Governance Framework._.pdf
	NETWORK_DEVELOPMENT_PLAN.pdf
	Network_Planning_Standard.pdf
	Network_Strategy.pdf
	NOR Emergency 66 kV Relay Room Remediation Business Case.docx_.pdf
	NOR Upgrade Single Phase Batch BUSINESS CASE (13843804)_.pdf
	Owen Grahame.pdf
	P140 secondary Equipment TX2.doc
	P141 secondary Equipment Field Cubicle TX2.doc
	P141 secondary Equipment P2 TX2.doc
	P141 secondary Equipment TX2.doc
	P143 TX2 field cubicle relay tests.doc
	P143 TX2 relay tests.doc
	P144 TX2 functioning.doc
	P16 - COMMISSIONING NOTICE QVS (1133153)_.pdf
	P30 CTs.doc
	P31 CTs.doc
	P40 CB806.docx
	P41 CB806.doc
	P60 TX2 and NEC LV1.doc
	P60 TX2 and NEC LV2.doc
	P61 TX2 cooling and tap chenger.doc
	P62 TX2 protective deveces.doc
	P64 TX2 control and metering KF31.doc
	P64 TX2 control and metering KF41.doc
	RAV-001 As built dimension of site equipment.pdf
	RAV-001 Commissioning Plan.pdf
	RAV-001 Final Inspection Checklist.pdf
	RAV-001 Paint and galvanising inspection.pdf
	RAV-001 Screwpile load testing.pdf
	RAV-001 Sunny Island Parameter Checklist.pdf
	RAV-006 As built dimension of site equipment.pdf
	RAV-006 Commissioning Plan.pdf
	RAV-006 Final Inspection Checklist.pdf
	RAV-006 Paint and galvanising inspection.pdf
	RAV-006 Screwpile load testing.pdf

Area	File name
	RAV-006 Sunny Island Parameter Checklist.pdf
	RAV-1 AC Low voltage cable test and Visual.pdf
	RAV-1 Assembly sign off sheet.pdf
	RAV-1 DC Low voltage cable test and visual.pdf
	RAV-1 Generator Set Test.pdf
	RAV-1 Master checklist.pdf
	RAV-1 Operation checklist.pdf
	RAV-1 Point to point test.pdf
	RAV-1 Sony Batteries checklist.pdf
	RAV-1 Sunny Boy checklist.pdf
	RAV-1 Sunny Island checklist.pdf
	RAV-6 AC Low voltage cable testing and visual.pdf
	RAV-6 DC Low voltage cable testing and visual.pdf
	RAV-6 Master checklist.pdf
	RAV-6 Operation checklist.pdf
	RAV-6 Point to point test.pdf
	RAV-6 Sony Batteries checklist.pdf
	RAV-6 Sunny Boy checklist.pdf
	RAV-6 Sunny Island checklist.pdf
	Revised WP Demand Management Screening Tool v2.4 - final amended.xlsm
	SECTION 6-POWER TRANSFORMER COMMISSIONING MANUAL (1137941)_.pdf
	Simon Capper.pdf
	Smartwire MH-PNJ resolve overloading Stage 1 & 2 .pdf
	SPK 805 P1 & P2 PNL P141 SECONDARY EQUIPMENT INSPECTIONS 3NOV15.doc
	SPK 805 P1 7 P2 PNL P144 FUNCTION AND DC TRIP CHECKS 3NOV15.doc
	SPK 805 P140 P1 SECONDARY EQUIPMENT SEQUENCE 3NOV15.doc
	SPK 805 P140 P2 SECONDARY EQUIPMENT SEQUENCE 3NOV15.doc
	SPK 805 P143 P1 RELAY DEVICE TEST RESULTS 3NOV15.doc
	SPK 805 P143 P2 RELAY DEVICE TEST RESULTS 3NOV15.doc
	ST-BYF-SNR-81 POLE RELOCATION 185 - 188 SNR-WGP-APJ POLE 21 - 30.pdf
	T0348702 copy certificate of routine test SPK806.0 CB Tx 2.pdf
	T0358656 - South Metro Reconfiguration - Business Case (12467971)_.pdf
	T0371495 - MARGARET RIVER -REPLACE 66-22KV T1 AND T2 TRANSFORMERS- BUSINESS CASE_.pdf
	T30 TX2 CTs checks list.docx
	T31 TX2 Marsh Box CT.docx
	Terry Grahame.pdf
	Tim Foster.pdf
	Tom Capper.pdf
	Tx__Dx_Network_Consolidated_Business_Rules_for_NP_Asset_Integrity_Investments Version 4.pdf
	VTs test.docx
	West Kalgoorlie SVC Replacement - Business Case.docx_.pdf
	WP response to recommendation 08-2017.docx
KPA3	ASSET DISPOSAL POLICY GUIDELINES_.pdf
	ASSET MANAGEMENT POLICY.pdf
	Distribution Transformer Reuse criteria.pdf
	Distribution Transformer ReUse Program CEVA Communication.pdf
	Dx Reliability_Strategy.pdf
	EDM 12677724 Strategic Spares transformers-Position Paper.pdf
	EDM 13088813 SPS PILOT - WORKS PLANNING REPORT.pdf
	EDM 13757658 Western Power 66 kV Rationalisation Strategy.pdf
	EDM 27302120 Augmentation Optimised Asset Replacement Planning Methodology figures.pdf

Area	File name
	EDM 28122277 ICAT spreadsheet Metro example.pdf
	EDM 34207128 Western Power Transmission Network Overview Report - 2015_16 Update .pdf
	EDM 40998149 Redundant Distribution Lines and Assets - Simplified removal process (Visio 40515278; Acrobat 40998149)_.pdf
	EDM 41025116 RISK BASED CAPACITY PLANNING METHODOLOGY.pdf
	EDM 42961984 Substation Load Duration Curves examples.pdf
	ERA - 2017 AMSR KPA3 - Asset Disposal.pptx_.pdf
	Network Safety Strategy_1.pdf
	NETWORK_DEVELOPMENT_PLAN.pdf
	Network_Management_Plan.pdf
	Network_Risk_Management_Standard.pdf
	Network_Strategy.pdf
	North Fremantle Substation De-energisation - BC Report (13777427)_.pdf
	T0376054, T0416418, N0375265 - RAN Est 3rd Transformer, DUR Decommissioning GTN NW Reconfig - Business Case (13288519)_.pdf
	TX Reliability_Strategy.pdf
KPA4	AMSR Presentation Pack 2017 (based on EDM42467235)_NP input.pdf
	AMSR_Presentation_Pack_2017_NP_input Network portfolio planning 2.pdf
	Annual Reliability and Power Quality Report for the year ending 30 June 2015 (13019660).pdf
	Annual Reliability and Power Quality Report for the year ending 30 June 2016.pdf
	ASSET MANAGEMENT POLICY.pdf
	Breach Register Financial Year Ending 30 June 2015.pdf
	Breach Register Financial Year Ending 30 June 2016.pdf
	Breach Register Financial Year Ending 30 June 2017 - as at 27 April 2017.pdf
	COMPLIANCE FAILURE REPORTING PROCEDURE.pdf
	COMPLIANCE STANDARD & FRAMEWORK (3877655)_.pdf
	Compliance training enrolments 2016 - Metering (SALT).XLSX
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	Compliance_training_enrolments_2016_-_OP_Licences,_NQRS,_Obg_to_Connect,_Transfer_Code.xlsx
	Dx Reliability_Strategy (1).pdf
	Initiative 4 - Work Packet Requirements (002).pdf
	Issue Briefing Paper-E-NF 71 and E-NF 72 Fluid Filled Cable_.pdf
	Issues Briefing Paper-Impacts of Inverter Embedded Generation (IEG) (13384616).pdf
	Legislative Obligations Compliance Plan - Asset Performance (11876876).xlsx
	Letter from ERA re Pole Failure Target received on 1 April 2015_.pdf
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	N0413745 - Bridgetown Reliability Hotspot - Reliability Report_.pdf
	Nedlands - Issues Briefing Paper_.pdf
	NETWORK OUTLOOK SUMMARY (FOR 17.pdf
	NETWORK_DEVELOPMENT_PLAN.pdf
	Network_Risk_Management_Standard.pdf
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	Response to ERA ESL Review Request.pdf
	Review_of_western_powers_compliance_with_order_no._01-2009.pdf
	RISK BASED CAPACITY PLANNING METHODOLOGY_.pdf
	Service Standard Performance Report year ending 30 June 2015 (13019643).pdf
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	Submission to PUO- Metering Code Further Consultation Report (1 Aug 16).pdf
	Technical Rules-1 December 2016.pdf

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	TX Reliability_Strategy.pdf
	WC DM NRO BC - Defer T0417971 - [refer to EDM 42342749 for WORD doc].pdf
	Western Power letter re Meeting with EnergySafety 10 March 2015_.pdf
KPA5	02a Training & Competency Matrix.pdf
	2017 AMSR_Presentation for KPA 5 and 9.pdf
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	Copy of Network Operations EMT on call Roster (12958283).xlsx
	Copy of Network Operations Monthly Finance Report.xlsx
	G 151 eNAR User Instructions.pdf
	G 342 Transmission Benchmark Reporting Guideline (13069153).pdf
	INC1024961 - L3 Incident Report.pdf
	INC1025270 Clashing of HV Conductor with Running Earth conductor resulting in ground fire Dumberning Rd Highbury Incident Report.pdf
	INC1025566 Bird Made contact With Overhead Conductor Resulting in a Ground Fire.pdf
	INC1025969 - Conductor failed resulting in ground fire.pdf
	INC1026133 Earth Lead Came into Close Proximity to a Energised Voltage Transformer 20_03_2017.pdf
	INC1026151 - Incident Report.pdf
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	Individual WRAP Instructions.pdf
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	ISO 9001 Audit Report Dec 2016_.pdf
	KPI Dashboard FYE2017.pdf
	Maunder, Richard - Bluegem Report.pdf
	Maunder, Richard - Report - Training Results of Trainee(s).pdf
	Maunder, Richard - Student Transcript-170602094805.pdf
	Network Safety Performance Outcomes - FY 2016-17 Q1_.pdf
	NOC L11 Network Operations Controller Distribution Assessment Paper.pdf
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	Project Summary Report - Maintenance (12941261).pdf
	Project Summary Report - Major Works(13825617)_.pdf
	R 019 Network Operations Training Matrix.pdf
	Roby, Daniel - Bluegem Report .pdf
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	SHE MS Incident Management Procedure - PUBLISHED (13658244).pdf
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	Stimson, Andrew - Bluegem Report.pdf
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	Western Power 2016 Electrical System Safety Rules.pdf
	XA21 System Overview.pdf
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	Board submission (with resolution) - Combined Asset Replacement Program 14-15 to 16-17 (Resolution 23069-2014-BD)_.pdf
	Business Case-Combined Asset Replacement Program BC 14-15 to 16-17 Approved by Board 4 March 2014.pdf
	COMBINED ASSET REPLACEMENT PROGRAM 14-15 TO 16-17 - DELIVERABILITY CHECK_.pdf
	Copy of NRMAT and Examples.xlsx
	Copy of PROJECT AND PROGRAM CONTROL REGISTER - HV CONDUCTOR CLASHING (12204020)_.xlsm
	Copy of Work Order.xlsx
	DERT Example_Replace OHSC.xlsx
	Dx Reliability_Strategy (1).pdf
	End of Financial Year Closure Form - N0393760 - FY1516 - Metro - Mitigate HV Conductor Clashing - 34403846 version 2.pdf
	END OF FY 14-15 CLOSURE - N0393760 - METRO - HV CONDUCTOR CLASHING_.pdf
	ERA - 2017 AMSR - KPA 6 - Asset Maintenance.pptx_.pdf
	INC1024757-Incident Investigation Report-Unplanned outage for 2017 AMSR.pdf
	Major Capital Project Delivery Full Project Status Report (All Projects) (13825617).pdf
	Network Safety Strategy_1.pdf
	Network_Management_Plan.pdf
	Network_Planning_Standard.pdf
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	Operational Delivery Performance - April 2017.pptx
	Performance Report - April 2017 (MS Word version).pdf
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	PROJECT MANAGEMENT PLAN - HV CLASHING FY 14-17_.pdf
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	Works Program Project Delivery (WPPD) Project Status Reports (Produced by Enterprise Portfolio Management Office) (12941261)_.pdf
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	745- TPP – High Level Business Requirements 34275985.pdf
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	Asset_Management_System.pdf
	Backup and Recovery Standard - Western Power (13886040).pdf
	BCP ICT Function 12100079.pdf
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	Copy of CHECKLIST 2016 - Backup of DMS SHD (Non SAN) (13663763)_.xlsx
	Copy of Western Power - Backup Catalogue v1.4 - Netbackup.xls
	DRAFT Asset Data Quality Scorecard.pptx
	ECONOMIC_REGULATION_AUTHORITY_(ERA)_ASSET_MANAGEMENT_AUDIT_-_AUDIT_CRITERIA_7_–_DATA_MANAGEMENT_INFORMATION_PACK 6540570.pdf
	ERA Audit Information Pack 2017.pdf
	Head Office Data Centre Access List (10464675)_.pdf
	IA 245 - Cyber Security -Final Audit Report docx_.pdf
	Network Metrics 2015 - 2016.pdf
	POF BackUp SetUp.pdf
	SAFETY WORK PRACTICES DATA CENTRE 1333576.pdf
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	Western Power IT Disaster Recovery Plan (8392172).pdf
	Western Power IT Disaster Recovery Plan 8392172.pdf
	XAJUMP BKRC Back up and Recovery.pdf
	385304 CREATING, MAINTAINING AND DISPOSING OF TRANSMISSION FACILITIES IN ELLIPSE (EQUIPMENT REGISTER - MSQ600) - TAB INSTRUCTION 22 (385304).DOC
	385307 FITTING AND DEFITTING PLANT ITEMS TO MIMS LOCATIONS (EQUIPMENT TRACING - MSQ650) - TAB INSTRUCTION NUMBER 23 (385307)
	725809 TLS USER GUIDE.DOC
	1457334 PROCEDURE FOR ADDING OR MODIFYING PRIMARY EQUIPMENT IN MIMS (1457334).DOC
	1843608 TRANSMISSION ASSET REGISTRATION PROCESS (1843608).DOC
	2291062 SPIDAEdit - Streetlight Faults (2291062).VSD
	2399848 AS-CONSTRUCTED PACKAGE MANUAL .pdf
	2443187 Data Governance - _Feeder Pillar_ (2443187).DOC
	2454244 SPIDAEdit - Equipment Relocation.DOC
	2505444 ASSET PERFORMANCE - TRIS PROCESS - CREATING A NEW CONDUCTOR IN TRIS (2505444).DOC
	2529832 TRIS - PROCEDURE CALCULATING THE RATING OF A NEW CONNECTOR (2529832).DOC
	2654118 TRIS USER MANUAL.DOC
	2802442 IT STANDARDS AND GUIDELINES FOR USERS OF COMPUTING AND NETWORK FACILITIES.doc
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	3098578 ASSET PERFORMANCE - ADD, UPDATE AND DELETE A LINE IN TRIS.VSD
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	3347982 Scanning of Project Data Packages.doc
	3626224 Pole Change Out form Non-project Work.pdf
	4093082 PROCEDURE FOR UPDATING ELLIPSE FOR NEW OR REPLACED SUBSTATION EQUIPMENT.DOC
	4726495 ADDING CABLE SECTION INSTALLATIONS, SOIL READINGS AND FAULT RATINGS INTO TRIS.DOC
	4917111 DATA MANAGEMENT PROCEDURE - INSTALLATION DATA SHEET MANAGEMENT .DOC
	5233960 TLS ADD-IN (MS EXCEL) USER GUIDE.DOC
	5586288 TLS RENUM USER MANUAL_.doc
	8392172 Western Power IT Disaster Recovery Plan.docx
	9045135 WR3425 - ISAM - AMP Transmission - View Users Quick Ref Guide.DOC
	9128707 WR3425 - ISAM - SPIDAWeb 2 User Guide September 2012.DOC
	9167777 EWDW Training Manual - Packaging for Transmission Plant & Case Studies Reporting.DOC
	9209425 WORK INSTRUCTION - DGT - AMP TX - SPECIFICATION - UPDATE PROCESS.DOC
	9471696 WR3425 - ISAM - SPIDAView Activities Guide.DOC
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	9697232 SPIDAWeb Detailed User Guide.DOC
	9798227 WR3425-ISAM-Asset Viewer Report Training Manual.DOC
	9853086 SPIDA Symbology.PDF
	9932585 SPIDAEdit - Pole Replacements (9932585).DOC
	9937329 SPIDAEdit - Asset Disposal.DOC
	9948393 SPIDAEdit - Cadastral Survey Data(CSD) Upload process (9948393).DOC
	10113662 SPIDAEdit - Unmetered Point of Supply (UMS) (10113662).DOC
	10183338 SPIDAEdit Detailed User Guide.DOC
	10185813 SPIDAEdit - Streetlight Updating (10185813).DOC
	10369280 SPIDAEdit - State Underground Power Project (SUPPs) (10369280).DOC
	10407600 Data Governance Asset Detailing Requirements.DOC
	10464675 Head Office Data Centre Access List.doc
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	10583680 SPIDAEdit - Life Support Customers (10583680).DOC
	10623584 SPIDAEdit - Environmentally Sensitive Areas.DOC
	11344811 DST-Resources for Missing Information Datasheets Index.DOC
	11377105 Work_Planner_Create_Adhoc_Defect_Guide - Transformers (11377105).DOC
	11648704 WR3425 - ISAM - AMP Tx Ratings User Manual.DOC
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	12100079 BCP ICT Function_.doc
	12851357 CAD Converter Tool Work Instruction.DOCX
	13012917 Record and Maintain Asset Data and Designs - Structure Assets.DOCX
	13077227 Record and Maintain Asset Data and Designs - Low Voltage Underground Assets (13077227).DOCX
	13077280 Record and Maintain Asset Data and Designs - Low Voltage Overhead Assets (13077280).DOCX
	13077317 Record and Maintain Asset Data and Designs - Miscellaneous.DOCX
	24676044 CYBER SECURITY STANDARD.PDF
	27440737 BACKUP AND RECOVERY POLICY.PDF
	28795213 Western Power - Backup Catalogue v1.4 - Netbackup.XLS
	32304188 INFORMATION & COMMUNICATION TECHNOLOGY AND RECORDS MANAGEMENT FRAMEWORK.PDF
	32537635 ICT GOVERNANCE STANDARD.PDF
	32538828 ICT INFORMATION MANAGEMENT STANDARD.PDF
	32539598 ICT SERVICE MANAGEMENT STANDARD.PDF
	33571758 ENTERPRISE ARCHITECTURE STANDARD - PDF VERSION.PDF
	34049528 RECORDS MANAGEMENT STANDARD.PDF
	34171883 INFORMATION AND COMMUNICATION TECHNOLOGY POLICY.pdf
	34242917 INFORMATION CLASSIFICATION STANDARD (13457761).PDF
	40079286 Data Services Quality Assurance and Quality Control Plan.docx
	40092673 VisualQC_Tracking_Form.xlsx
	40163036 Automated Data Reviewer Process.docx
	40513429 Running Weekly Automated Checks.docx
	ICT Strategy v2.0.pdf
	INDEX - NETWORK ASSET DATA SHEETS (2015201)_.pdf
	PROCESS DOCUMENT - DELETE LINE DATA IN TRIS (3098372).doc
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	Asset Attributes and Maintenance Summary for Pole S55840.pdf
	Asset Management - Engineering and Design - Business Plan 2015-2016 (Signed)_.pdf
	ASSET MANAGEMENT POLICY.pdf
	BUSHFIRE_MITIGATION_STRATEGY 34360815.pdf
	Business Continuity Management Standard_.pdf
	Copy of Western Power - Strategic Risks (12331850)_.xlsx
	Enterprise Risk Assessment Criteria (6242026)_.pdf
	ENTERPRISE RISK MANAGEMENT FRAMEWORK (PUBLISHED VERSION)_.pdf
	Enterprise Risk Management Standard_.pdf
	ERA - 2017 AMSR - Presentation for KPA 8 - Risk Management.pdf
	ERA - AMSR2017 - response to NRMT question.docx.pdf
	Initiative 4 - Work Packet Requirements (002).pdf
	Issue Briefing Paper-E-NF 71 and E-NF 72 Fluid Filled Cable_.pdf
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	N0413745 - Bridgetown Reliability Hotspot - Reliability Report_.pdf
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	Network Asset Risk Issues Register (3528771)_.pdf
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	NRMT Showcase EDM 42635262.pdf
	Operational Risk Registers - Asset Management (13143175).xlsx

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	Organisational Resilience Framework 5f.pdf
	RISK BASED CAPACITY PLANNING METHODOLOGY_.pdf
	Risk_Management_Guideline.pdf
	WC DM NRO BC - Defer T0417971 - [refer to EDM 42342749 for WORD doc].pdf
KPA9	2017 AMSR_Presentation for KPA 5 and 9.pdf
	330kV multiple line contingency Analysis Network Planning Recommendations_.pdf
	ASSET MANAGEMENT POLICY.pdf
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	Copy of 330 kV Multiple lines Contingencies_.xlsx
	Criticality Framework for Terminal Substations (12630799)_.pdf
	Enterprise Risk Assessment Criteria (6242026)_.pdf
	Enterprise Risk Management Standard_.pdf
	Enterprise Risk_Management_Guideline.pdf
	F 317 Fire Weather Day and Total Fire Ban Risk Management Form (Distribu....pdf
	G 245 Prioritizing Network Restoration Guideline (NWI 117) (8482502).pdf
	G 315 Pandemic Epidemic Guideline (NWI 059) (3250482)_.pdf
	G 367 Contingency Plan - Earthquake_.pdf
	G 368 Contingency Plan - Flood_.pdf
	G 369 Contingency Plan - Major Storm including Cyclone_.pdf
	G 370 Contingency Plan_ Type 4 Transmission Network Contingencies (12989134)_.pdf
	G 371 Contingency Plan - Distribution Network Contingencies_.pdf
	MOBILE SWITCHBOARD VS RMU SOLUTION - DURLACHER - A0 SUBSTATION DESIGN ADVICE (13618170)_.pdf
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	MS 026 Management Standard - Contingency Planning_.pdf
	NETWORK STANDARD - TRANSMISSION STRATEGIC SPARES.pdf
	NETWORK_DEVELOPMENT_PLAN.pdf
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	PIR Report for Waroona Complex Fire January 2016 (13858207).pdf
	Site or Scenario based Contingency Plan Quick Reference.pdf
	SOP 104 Network Operations Backup Control Centre Activation (NWI 043) (1994223)_.pdf
	SOP 124 Pole Top Fires Contingency Plan (NWI 097) (3323911)_.pdf
	SOP 377 Restoration of Transmission Lines (13521581)_.pdf
	Strategic Spares transformers for Zone substations -Position Paper.pdf
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	Technical Report - Rapid Response Switchboard Investigation (13344871)_.pdf
	West Kalgoorlie Terminal_Contingency Plan (12450111)_.pdf
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KPA10	2014-15 Business Plan_.pdf
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	AMSR_2017_Presentation for KPA10 and 11.pdf
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	Benefits Management Framework (8841552)_.pdf
	Business_Case_Guideline_(3198881).pdf
	Capital Contributions_Policy_for_AA3.pdf
	Enterprise PMO 'Change Control Guidelines' (7030476)_.pdf
	Executive IRC Meeting 13 Jan 2016.pdf
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	Investment Evaluation Model (IEM) - Template (7206870)_.xlsm
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	SPINE DIAGRAM (13597691).vsd
	Strategic Plan - AMS Auditor Briefing.pdf
	WE_n11690104_Investment_Framework_Manual.pdf
KPA11	AMSR_2017_Presentation for KPA10 and 11.pdf
	Benefits Management Framework (8841552)_.pdf
	Business_Case_Guideline_(3198881).pdf
	Cost and Revenue Allocation Method (CRAM) 2016.pdf
	Draft report PIR Dx Plant and Eqpt 1213 - 1314 business case.pdf
	Draft_report_post_implementation_review_ZBAM.pdf
	Enterprise PMO 'Change Control Guidelines' (7030476)_.pdf
	Final report - WR3914 DM Upgrade health check_.pptx
	Final report Post Implementation Review T0201863 Munday Substation .pptx
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	NETWORK OUTLOOK SUMMARY FOR 2017-18.pdf
	NETWORK_DEVELOPMENT_PLAN.pdf
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	Post Implementation Review (PIR) - T0285447 Collgar Windfarm - Final Report_.pdf
	Post_Implementation_Review_FINAL report_-_Balcatta_substation_T0162548_N0259672.pptx
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	Extract from AMSIP for 2017 AMSR audit.xlsx_.pdf
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REC-01/2014	Contents of DM12930760 AM Summary Strategy Workspace (1).docx
	DM10120113 Asset Management Framework - Building Blocks Overview.pdf
	DM10399003 Key Considerations for Strategy Development Guideline Template.ppt
	DM12718165 Asset Management Strategic Theme - Strategy Development Approach Template.docx
	DM13469782 2014 AMSR Recommendation 2014-1 Audit Action Completion Form.pdf
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REC-03/2014	2014 AMSR Action Completion Form for 03-2014.pdf
	2014 AMSR Action Completion Form for recommendation 03 - 2014(b).pdf
	DM13322968_Network_Reliability_Strategy_-_Asset_Management_Strategic_Theme_(AMST).pdf
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	Asset Performance Quarterly Report - FY 2016-17 - Q3_.pdf
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	WE_n12799722_ALTERNATIVE_(NNS)_OPTIONS_MANAGEMENT_STANDARD.pdf
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	WE_n7471555__7_2_-_ASSET_MANAGEMENT_POLICY.pdf
REC-05/2014	05-2014 Review Action Completion Form AMS 2014.pdf
	2016 Strategic Spares Review Presentation – Power Transformers (13446824).pptx
	Criticality Framework for Terminal Substations (12630799)_.pdf
	Draft AMSR Report Extract for 2014 Recommendations.msg
	NETWORK STANDARD - TRANSMISSION STRATEGIC SPARES.pdf
	Strategic Spares Analysis Tool (13248897).xlsm
	Strategic Spares transformers-Position Paper (12677724)_.pdf
	SUPP 5.3.90 Manage materials replenishment.pdf
	West Kalgoorlie Terminal_Contingency Plan (12450111)_.pdf
REC-06/2014	Copy of DM12936257_Structure_Objectives.xlsx
	DM10399003_Key_Considerations_for_Strategy_Development_Guideline_Template.ppt
	DM12718165_Asset_Management_Strategic_Theme_–_Strategy_Development_Approach_Template.docx
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	DM12831157_Asset_Performance_Management_Framework.pdf
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	WE_n13045791_Managing_defects_on_Western_Power's_distribution_network_assets.pdf
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	Letter to EnergySafety re wood poles.pdf
	WE_n12827023_Letter_to_the_ERA_Power_Pole_Failure_Target_-_2015.docx
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	WE_n12794821_Close_out_Form_for_AMSR_Ref_09_2014_-_Stakeholder_Engagement_to_consider_the_overall_impact_of_any_proposed_change_to_t...ce_is_undertaken.pdf
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	WE_n12811024_Asset_failure_investigations_-_information_required_to_support_review_of_inspection,_remediation_&_residual_management_...ndicators,_AMSR.xlsx
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REC-13/2014	DM13021575_Muja_BTT2_Transformer_Failure_Review_-_Implementation_Plan.pdf
	DM13070599_2014_AMSR_-_Transformer_Management_PDF_Signed_Copy.pdf
	DM13322882_AMSR_2014_Agreed_Actions_to_Complete_Management_Action_13_2014_(action_4).xlsx
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	CLOSE OUT REPORT COLLIER SUBSTATION SWITCHBOARD REPLACEMENT.PDF

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	Email from Executive Manager confirming Board presentation of PIR.pdf
	Gate Compliance Report - October 2014.ppt
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	PIC003_C - CLOSEOUT - PICTON CIVIL WORKS AND FIRE SYSTEM UPGRADE - PROJE....pdf
	PROJECT CLOSURE FORM - N0357799 - SOUTH COUNTRY - MITIGATE HV CLASHING BUSHFIRE ZONES (AA3).PDF
	T0356532 - MORLEY SWITCHBOARD REPLACEMENT - CLOSE OUT REPORT.DOC
	WE_n11809730_Portfolio_Assurance_and_Compliance_Framework.pdf
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REC-15/2014	2014 AMS 15-2014 (2) Post_Implementation_Review_FINAL report_-_I0393153 WR3914 DM Upgrade.pptx
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	Draft_report_post_implementation_review_ZBAM.pdf
	Signed AMSR action completion form 15-2014 Action 2.pdf
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	WE_n11646357_Risk_Tracking_-_Operational_Q3_2014.xlsx
	WE_n12331850_Western_Power_Strategic_Risks_-_FINAL.xlsx
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REC-17/2014	2014 AMSR Action Completion Form for 17-2014.pdf
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REC-18/2014	Review & Exercise Register_.xls
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	WE_n12901595_G_367_Contingency_Plan_-_Earthquake.pdf
	WE_n12908533_G_368_Contingency_Plan_-_Flood.pdf
	WE_n12935402_G_369_Contingency_Plan_-_Major_Storm_including_Cyclone.pdf
	WE_n13028958_Management_Standard_-_Contingency_Planning.pdf
	WE_n13052250_Scanned_signed_version_-_2014_Asset_Management_System_Review_(AMSR)_-_Summary_of_response_to_recommendation_19_2014_rel..._MS_Word_version.pdf
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	WE_n13062905_AMSR_19_2014_4_Signed.pdf
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	WE_n2072196_Western_Power_Network_Operations_Emergency_Management_Plan.pdf
	WE_n2123938_SOP_224_EMERGENCY_RESPONSE_GENERATORS_(LV)_(NWI-073).pdf
	WE_n2530887_R_008_CONTROLLED_DOCUMENT_INDEX.xlsx
	WE_n8482502_G_245_Prioritizing_Network_Restoration_Guideline_(NWI_117).pdf
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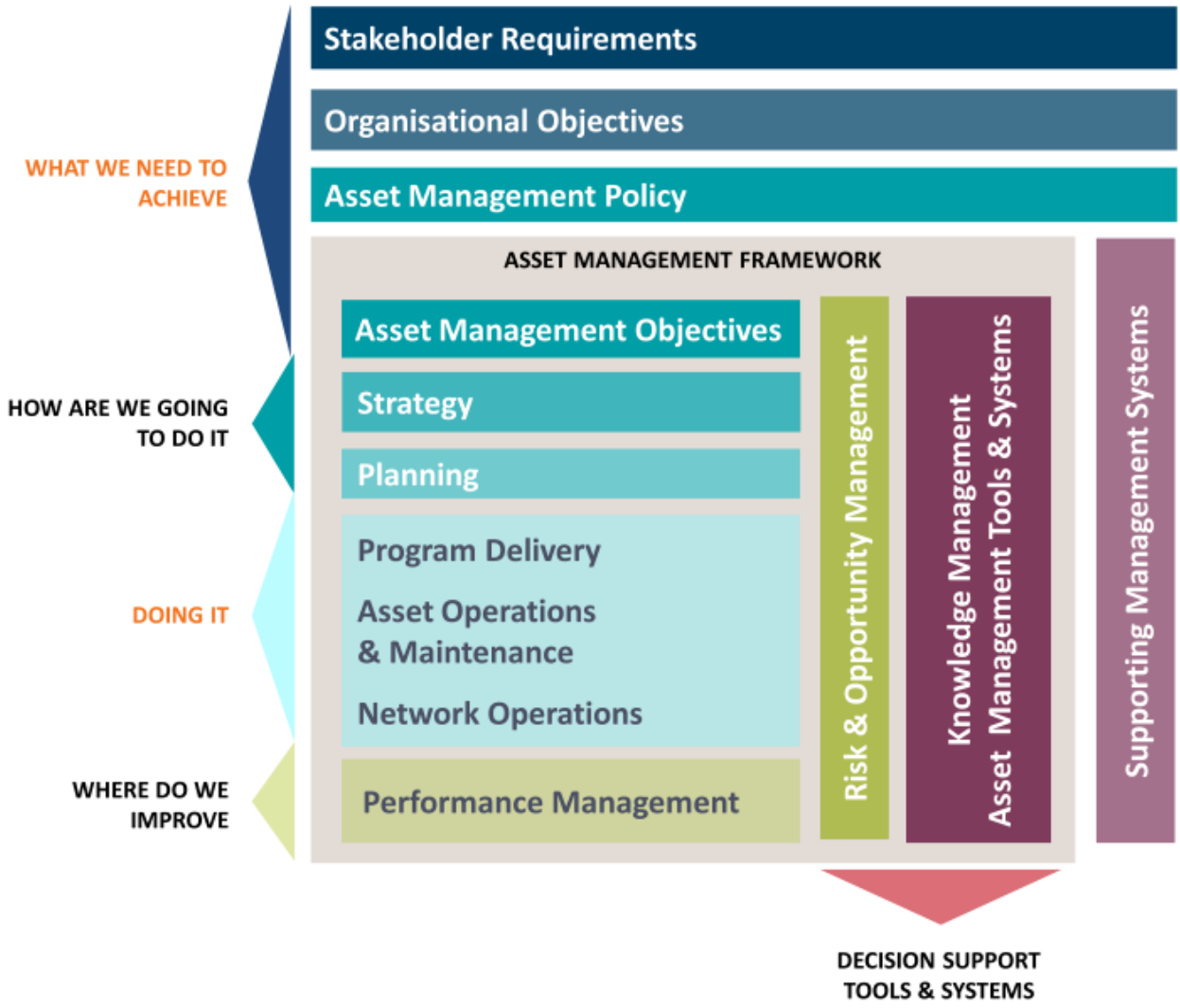
Appendix D. Western Power's "AMS Artefact"

Western Power's AMS is illustrated by the 'AMS Artefact" in Figure 1.

Figure 1: Western Power's "AMS Artefact"



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