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2016 Bushfire Mitigation (Line Condition) and Electric Line Clearance (Clearance to Code) Audits

ESV Reference

BFM – CM4204
ELC - CM4210

Audit Report: Jemena

28th October 2016 to 4th November 2016

Version	Date	Change	Author	Reviewed	Approved
1.0	19/1/17	Initial Draft submitted to ESV.	██████	██████	██████
1.1	3/2/17	General updates post ESV feedback	██████	██████	██████
Final	21/2/17	Minor updates following closeout presentation to Jemena (16/2/17)	██████	██████	██████

Audit Report Details:

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Auditee Network:	Jemena (JEN)
Audit No:	MEC BFM & ELC Audits – EOI 2016
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Audit Team	<div>██████████ ERP Senior Technical and Audit Consultant</div> <div>██████████ ERP Field Auditor (BFM)</div> <div>██████████ ERP Field Auditor (ELC)</div>
Sites Visited	Various Sites across Jemena Electrical Distribution network. Selected sites from following feeders: <ul style="list-style-type: none">- COO11 (Coolaroo)- SBY11 (Sunbury)- SBY14 (Sunbury / Clarkefield)- SBY32 (Gisborne)

Signatories			
Title	Name	Signature	Date
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1. Executive Summary

This report presents findings and recommendations for the 2016 Bushfire Mitigation (Line Condition) and Electric Line Clearance (Clearance to Code) Audits conducted by Electrical Resource Providers on Jemena on behalf of Energy Safe Victoria.

The scope of the 2016 Bushfire Mitigation and Electric Line Clearance Audits was limited to:

- A general desktop review of relevant elements of the nominated MECs Bushfire Mitigation Plan (BFMP) and Electric Line Clearance Management Plan (ELCMP); and
- Field auditing of a number of sites selected by ESV against the requirements of the Electricity Safety (Bushfire Mitigation) Regulations 2013 and Electricity Safety (Electric Line Clearance) Regulations 2015, in particular asset condition and clearance to code.

A desktop review of Jemena's Bushfire Mitigation Plan, ELCMP and BFM and ELC sample database information was conducted by [REDACTED] of ERP in November 2016 and field based audits were conducted by [REDACTED] (BFM) and [REDACTED] (ELC) of ERP in conjunction with Jemena representatives between the 28th October and 4th of November 2016.

Desktop Review – Key Findings:

- The desktop review of BFM and ELC reference documents provided at the time of audit found Jemena to have detailed and comprehensive management procedures in place to complement both its Bushfire Mitigation and Electric Line Clearance Management Plans.
- Database extracts for both BFM and ELC provided sufficient information for field auditors to validate recorded information against in-field asset assessments.

Field Audit – Asset Condition:

- Field audits were carried out on 90 poles across the Jemena network.
- The field auditor validated the information recorded for each of the 90 poles from the database extract as accurate and confirmed the condition of the assets observed to be generally consistent with the data provided and maintenance items completed post their previous audit.
- The field audit identified 8 sites where previously recorded maintenance items appeared to have been recorded as completed (per database descriptions) however the items remained in the field. Jemena feedback indicated 6 items remain as open notifications (non-priority), 1 item (cover guard) has been repaired and appeared to be damaged post its previous inspection and 2 deteriorated LV crossarms at one site were changed following the field audit. Follow-up recommendations are provided below.
- The field audit identified additional minor maintenance items at 10 sites including 5 instances of low LV service cables. Jemena have confirmed maintenance notifications exist for one item and the audit noted it was possible five items could have occurred post the previous inspection. Follow-up recommendations are provided below.
- Positive feedback was received from the field auditor in relation to observations conducted on an active asset inspector and the knowledge and co-operation of the Jemena audit representative.

Field Audit – Clearance to Code:

- Field audit data was captured for 125 spans across the Jemena network.
- All spans audited were HBRA with a latest assessment date between July and September 2016.
- The field auditor noted six spans containing noncompliant vegetation. Jemena was assessed as responsible for managing the noncompliant vegetation in each of these spans. These spans were previously assessed as either PT180 (3), PT30 (1) and PT720 (2). Jemena have provided details of management strategies that are in place for each of these spans which includes planned hedge

trimming prior to the fire season at two sites, trimming of small individual branches on the fringe of the clearance space at two sites and trimming of high up vegetation at two sites.



- Some minor differences between the latest span code data and the field auditor's assessment were recorded at four currently compliant sites. Two spans coded as "PT365" were assessed as "PT720" i.e. vegetation was likely to remain outside the clearance space until the next annual assessment, one span coded "PT720" was assessed as "CC" (unlikely to require action for two years) and one span coded "PT720" was assessed as "PT365" (currently compliant but likely to encroach the minimum clearance space prior to the end of the declared fire season).
- The field audit results indicate for the spans audited Jemena responsible vegetation is in general well managed with clearance spaces being maintained. Database information appears to be maintained to a high level in terms of accuracy and currency.
- Positive feedback in relation to the knowledge, competence and high level of role ownership demonstrated by Jemena representatives observed and consulted during the field audit process.

The audit recorded the following conclusions and recommendations:

Audit Criteria and Grading:

Compliant		Noncompliant	
Minor Noncompliance		Opportunity for Improvement	


BFM Audit Recommendations:

<ul style="list-style-type: none"> • Physical state of the assets <ul style="list-style-type: none"> - It is recommended that Jemena conduct a review of the field audit information in relation to previously recorded outstanding maintenance items (that were indicated as rectified in the data provided) and determine whether any corrective actions are required and report the findings to ESV (initial feedback received 12/1/17). (Request for further information) - In terms of the deteriorated LV crossarms replaced at one LBRA site (A067682) following the audit it is recommended that Jemena review whether the crossarms should have been replaced at an earlier stage (post their previous P3 assessment in June 2013) and determine whether any further corrective actions are required and report the findings to ESV. (Request for further information) - It is recommended that Jemena review whether the timeframe for replacement of a crossarm bearing a FFB (A002805) recorded in April 2013 is in line with its maintenance policies and provide clarification to ESV. (Request for further information) - It is recommended that Jemena conduct a review of the field audit findings for additional maintenance items recorded (in particular low service cables and deteriorated service cable) and determine whether any corrective actions are required and report findings to ESV. (Request for further information) - It is recommended that Jemena review initial feedback at site A022979 (loose kingbolt) as the assessment appears to be inconsistent with AIM Section 8.3 "nut less than a full nut on bolt". (For Consideration) - It is recommended that Jemena also consider reviewing its guidance within its AIM in relation to vibration damper installation to ensure it is consistent with its expectations (i.e. 14 sites were observed where dampers were not installed as per Jemena AIM descriptions). (For consideration) 	
<ul style="list-style-type: none"> • MEC's knowledge about the state of the system <ul style="list-style-type: none"> - The field audit validated the site location information and previously recorded defects and required actions recorded for each of the poles inspected. - It is recommended that Jemena conduct a review of the field audit information in relation to previously recorded outstanding maintenance items (that were indicated 	

<p>as rectified in the data provided) and determine whether any corrective actions are required and report the findings to ESV (initial feedback received 12/1/17). (Request for further information)</p> <ul style="list-style-type: none"> - It is recommended that Jemena conduct a review of the field audit findings for additional maintenance items recorded (in particular low service cables) and determine whether any corrective actions are required and report the finds to ESV. (Request for further information) - The audit recommends Jemena continues to utilise and develop procedures to ensure asset inspection programs are completed efficiently and asset database management is maintained to a high level of currency and accuracy. (Observation) 	
<ul style="list-style-type: none"> • Compliance with current BFM plan <ul style="list-style-type: none"> - The audit found that Jemena was managing its inspection cycles and asset inspection processes as per its current BFM plan. - The audit observed that the version of the AIM provided for reference was dated July 2012. Jemena have indicated an updated manual has been prepared for release. - The audit recommends that Jemena continue to manage and monitor defect and maintenance items per its current procedures and processes to ensure ongoing compliance with its BFMP. (Observation) 	●

ELC Audit Recommendations:

<ul style="list-style-type: none"> • The accuracy of inspection data and work recommendations <ul style="list-style-type: none"> - The field auditor recorded that in his opinion, taking into account his observations at the time of the audit, the previously recorded Inspection Code for the spans he observed was in general accurate in relation to Jemena responsible vegetation. - Evidence within the database extract indicates inspection coding to be the catalyst for cutting activity with a number of spans recently coded either "PT30", "PT180" and "PT365" indicating a post inspection cut date and latest recorded code indicating additional clearance space had been achieved. - Comments contained within the database extract also confirmed identification of ORP related vegetation requiring management. - Jemena continues to utilise and develop procedures to ensure annual inspection programs are completed efficiently and vegetation database management is maintained to a high level of currency and accuracy. (Observation) 	●
<ul style="list-style-type: none"> • Vegetation clearance standards and compliance with the Code of Practice for electric line clearance <ul style="list-style-type: none"> - 6 spans containing non-code compliant vegetation were assessed by the field auditor – 4 related to vegetation around the fringe of the minimum clearance space and re-growth and 2 related to vegetation in the clearance space high up. - There were no ORP responsible noncompliance issues identified during the audit (noting that all spans audited were in HBRA). - The audit recommends that Jemena manage the identified noncompliant spans as per its ELC procedures i.e. the spans are monitored and actioned as appropriate. (Observation) - Jemena continues to utilise and develop procedures to ensure annual inspection programs are completed efficiently and vegetation clearance activities are undertaken to ensure ELC clearance standards are maintained. (Observation) 	●

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|--|---|
| <ul style="list-style-type: none"> • Vegetation management data reflects the status of field observations made at the time of the audit. <ul style="list-style-type: none"> - 8 spans were audited where there was a difference between the current span code and that recorded by the field auditor. - In general the management data provided by Jemena reflected the field observations made at the time of the audit with isolated spans where discrepancies were recorded. - Jemena continues to utilise and develop procedures to ensure annual inspection programs are completed efficiently and vegetation database management is maintained to high levels of currency and accuracy. (Observation) |  |
|--|---|

Full descriptions of key findings and recommendations are found in Section 3 and 4 of this report.

2. Audit Description

2.1 Context

Energy Safe Victoria (ESV) is responsible for the safety and technical regulation of electricity, gas and pipelines in Victoria. The role and functions of ESV are specified by the Energy Safe Victoria Act 2005.

An element of this responsibility is to regularly audit compliance of the Victorian Major Electricity Companies (MECs) to the various regulatory requirements. This particular audit focusses on compliance with the Electricity Safety (Bushfire Mitigation) Regulations 2013 and Electricity Safety (Electric Line Clearance) Regulations 2015.

2.2 Scope

The scope of the 2016 Bushfire Mitigation and Electric Line Clearance Audits is limited to:

- A desktop review of relevant elements of the nominated MECs Bushfire Mitigation Plan (BFMP) and Electric Line Clearance Management Plan (ELCMP); and
- Field auditing of a number of sites selected by ESV against the requirements of the Electricity Safety (Bushfire Mitigation) Regulations 2013 and Electricity Safety (Electric Line Clearance) Regulations 2015.
- The BFM audit will focus on:
 - o The physical state of the assets;
 - o The MEC's knowledge about the state of the system; and
 - o The MEC's compliance with their current BFM plan.
- The ELC audit will focus on:
 - o The accuracy of inspection data and work recommendations;
 - o Vegetation clearance standards and compliance with the Code of Practice for electric line clearance; and
 - o Vegetation management data reflects the status of field observations made at the time of the audit.

This particular audit report relates to the Jemena (JEN) distribution network.

The key elements of the audit include:

- A desktop review of BFMP and ELCMP and associated data;
- Confirm asset and span inspections were completed as per the MEC plans;
- Validate the priority rating of both maintenance and line clearance items observed;
- Confirm that maintenance and/ or cutting activities were completed as per priority timeframes and work order expectations; and
- Validate the level of competency and understanding of field operatives engaged in BFM and ELC assessment and inspection activities.

2.3 Duration

Field auditing of the Jemena distribution network was conducted between 28th October 2016 and 4th November 2016. A total of 3 days field auditing of both BFM and ELC activities was completed.

Desktop review and analysis of field audit data in relation to the Jemena distribution network was conducted between 7th November 2016 and 21st November 2016.

This process included the submission of an interim summary report to ESV on 7th November 2016.

2.4 Methodology

The audit of Jemena compliance in relation to the Electricity Safety (Bushfire Mitigation) Regulations 2013 and Electricity Safety (Electric Line Clearance) Regulations 2015 was undertaken in accordance with the following methodology:

- Desktop review of Jemena BFMP and ELCMP and associated samples of asset inspection and electric line clearance database extracts;
- Field site audits across the Jemena distribution network accompanied by nominated Jemena representatives;
- Field observations conducted on active asset and vegetation inspectors;
- Submission of an interim audit summary report; and
- Detailed review of 2016 field audit data and compilation of audit report.

2.5 Audit Criteria and Grading

The following audit criteria and grading has been applied to the outcomes and recommendations of the field audit data and comparison to the BFMP and ELCMP as submitted by Jemena:

- **Compliant (C):** The audit found evidence of compliance with the applicable process or procedure and the process or procedure meet statutory and business requirements.
- **Noncompliance (NC):** A noncompliance is an action (or lack thereof) that could directly lead to an adverse impact relating to the reliability of electricity infrastructure or safety.
- **Minor Noncompliance (MNC):** A minor noncompliance is an action (or lack thereof) that could indirectly lead to an adverse impact relating to the reliability of electricity infrastructure or safety.
- **Opportunity for Improvement (OFI):** These findings do not indicate noncompliance and so do not require corrective action. They are offered as potentially beneficial feedback and an opportunity to improve performance.

2.6 Limitations

The purpose of this report and the associated services performed by ERP, is to provide an audit of Jemena compliance with their submitted BFMP and ELCMP and the associated regulations as described within the above scope in accordance with the Terms and Conditions of ESVs document titled "Perform Audits of Major Electricity Companies Bushfire Mitigation (Asset Condition) and Electric Line Clearance (Clearance to Code)" reference: MEC BFM & ELC Audits – EOI 2016.

Field site auditing was limited to observations of a sample of sites from packages as determined by ESV, by undertaking physical observations. Additional information was obtained from Jemena (Distribution) responsible officers and via conducting field observations on active asset and line clearance inspectors.

It is noted that reporting of asset related defects on poles or spans outside the sites audited was outside of the scope of this audit although arrangements were made with Jemena should any of these issues be observed.

3. Audit Report

3.1 Bushfire Mitigation (Asset Condition)

As a requirement of the Electricity Safety Act 1998 Jemena is required to submit, for approval by ESV, a Bushfire Mitigation Plan (5-yearly). The bushfire mitigation plan, in part, describes the procedures in plan to manage the requirements as set out in the Electricity Safety (Bushfire Mitigation) Regulations 2013. At the date of the audit it was noted that the version of the plan provided for reference was version 3.1 of document Jemena PL 0100 (19/4/2016).

Section 2.7 of the BFMP describes the strategy used by Jemena to monitor asset condition. An extract of Section 2.7 is provided below:

Asset condition monitoring – the condition of the assets shall be closely monitored through a program of inspections, testing and recording. Systems shall be put in place to:

- *Monitor and audit the effectiveness of inspections carried out under the plan;*
- *Ensure that any training necessary for persons assigned to perform functions under the plan is provided; and*
- *Monitor and audit the competence of the persons assigned to carry out inspections under the plan.*

The BFMP contains a procedure, BFM5, detailing the activities monitored via the Bushfire Mitigation Index (BMI) and the timeframes for completion of identified works.

The following provides an overview of the key aspects of the Jemena BFMP as they relate to the specific requirements of the BFM audit scope.

3.1.1 BFM Inspection Cycles and Priority Coding

Jemena BFMP describes pole inspection cycles in attachment BFM18.

- HBRA assets are subject to a routine three year inspection cycle with no inspection interval to exceed 37 months.
- HBRA limited life poles that haven't been replaced or staked are re-inspected within 12 months.
- LBRA assets are subject to a routine four year inspection cycle with no inspection interval to exceed 61 months.

Each pole inspected is subject to a ground based test (soundness) and treatment and a visual inspection of pole top assets and attachments.

ERP was provided with a copy of Jemena "Asset Inspection Manual" (JEN MA 0500, July 2012) which provided both summaries of maintenance codes allocated by asset inspectors and the corresponding action required (AIM Section 4 to Section 14). The BFMP, attachment BFM15, describes the actions required for each of the codes recorded by the asset inspector i.e. rectification action and timeframe.

The AIM manual was utilised by the field auditor to validate information contained within the Jemena database extract provided and also any further observations made by the inspector during the field audits. The Jemena representative accompanying the field auditor also had access to maintenance information for sites visited via a PDA which was also cross-checked during the audit.

3.1.2 Training and Competency of Asset Inspectors

Jemena's BFMP and Asset Inspection Manual reference the training and competency requirements for personnel required to undertake inspection of assets on their network. In relation to asset inspectors there are appropriate references to ESV approved courses and the VESI Skills and Training matrix implying asset inspectors are trained as indicated below:

- 22109VIC - Certificate II in Asset Inspection (up to 30th June 2015); and
- UET20612 - Certificate II in ESI – Asset Inspection (after 30th June 2015).

This is consistent with the Training Approval Statement issued by ESV on 20th May 2015.

Although not considered a critical issue under this audit an opportunity for improvement would be for Jemena to include a statement describing the actual course codes within their BFMP and AIM for the current approved asset inspection course i.e. UET20612.

The audit team was made aware by Jemena Management during preparations for the field audit that an updated AIM is currently being developed for release in the short term.

3.1.3 BFM Database Extract (Desktop Review)

ESV provided ERP with a sample of the Jemena BFM Database inclusive of 134 randomly selected sites across 4 feeders. The selected sites for detailed assessment were located on both roadside easements and within private property. The feeders audited were located in the Coolaroo and Sunbury areas of Jemena's network.

Figure 1 below provides a summary of database information provided by ESV and the field audit sequence completed across the Jemena network.

FEEDER	No. POLES – AUDIT SAMPLE	Audit Order	ZSS
COO11	43	4	Coolaroo
SBY11	21	2	Sunbury
SBY14	31	3	Sunbury
SBY32	39	1	Sunbury
Total	134		

Figure 1 – Summary of Jemena BFM Database for Audit Purposes

The following summary (Figure 2) provides an overview of findings relating to the desktop review of the sample of Jemena Bushfire Mitigation Management database as provided by ESV.

Desktop Audit Results – Audit Sample Profile	Total	%
HBRA poles within sample	93	69%
LBRA poles within sample	41	31%
Total poles within sample	134	100.0%
HBRA poles (defects) allocated current priority code	93	100.0%
LBRA poles (defects) allocated current database code	41	100.0%
Total poles (defects) allocated a current priority code	134	100.0%

Figure 2: Jemena Vegetation Management Database Information Summary

The database sample contained 93 HBRA poles and 41 LBRA poles. The 134 poles within the ESV provided data had had defects reported at their most recent inspection. The database provided by Jemena contained priorities aligned with the following definitions for each of the records audited (Figure 3):

Priority Rating	
Items reported are recorded in a SAP notification and given a priority as defined in SAP, from 1 to 9.	
Priority 1:	Item has failed – corrected within 24 hours.
Priority 2:	Imminent to fail – corrected within one week.
Priority 6:	May fail if not attended to within two weeks.
Priority 7:	Failure possible – attend within four weeks.
Priority 8:	Requires assessment by planner or rectified within eight weeks.
Priority 3:	Requires assessment by planner or rectified within 12 weeks.
Priority 4:	Requires assessment by planner or rectified within six months.
Priority 5:	Requires assessment by planner or rectified with 12 months.
Priority 9:	Requires assessment by planner or rectified within an inspection cycle.

Figure 3: Jemena Asset Maintenance Priority Codes

All serviceable HBRA poles within the Jemena audit sample database had a previously recorded inspection date between April 2014 and April 2016. All serviceable LBRA poles within the database extract had previous inspection dates between April 2013 and May 2015. These findings are consistent with Jemena inspection cycles.

Limited life poles identified within the audit database extract had previously recorded inspection dates between February and April 2016. These findings are consistent with Jemena inspection cycles.

Five poles listed as unserviceable were contained within the selected sites database.

- Three poles contained records indicating they had been staked.
- Two poles contained records indicating they had been replaced.

These findings are consistent with Jemena management procedures for unserviceable poles.

In summary the information contained within the database extract provided was generally easy to follow and contained sufficient information, supported by PDA data during the field audit, in relation to pole details, location, maintenance items and priorities.

3.1.4 Overview Field Audit and Sites Inspected

Field Audits commenced in Coolaroo on Friday 28th October 2016 and concluded in the Sunbury area on Friday 4th November 2016. A total of 3 field auditing days were undertaken during this period. The Field Auditor was accompanied by David Fulop (Asset Inspection Team Leader, Select Solutions) for the duration of the audit.

The field audits were undertaken as a non-invasive visual inspection of poles from ground level using typical asset inspection equipment and techniques, including a pole mounted camera to validate pole top asset and crossarm assessment details as required. Jemena's representative also provided electronic records of the poles audited to assist the field auditor in validating field findings against Jemena database information.

Figure 4 provides a summary of the poles attended and inspected during the field audit phase. A total of 90 poles were audited as part of the field audit process representing 67.2% of the audit sample provided. The field audit concentrated on validating pole information, previously recorded maintenance and defect items and recording additional items not contained within the database extract provided. The poles audited were located on both private and public land and spread across the feeders selected for audit.

FEEDER	No. POLES – AUDIT SAMPLE	No. POLES – Detailed Inspection	Audit Order	ZSS
COO11	43	34	4	Coolaroo
SBY11	21	17	2	Sunbury
SBY14	31	12	3	Sunbury
SBY32	39	27	1	Sunbury
Total	134	90		

Figure 4 – Summary of BFM Database for Audit Purposes

67 poles audited were in HBRA and 23 poles audited were in LBRA.

Field audit observations indicate that for both HBRA and LBRA the information provided clearly described location, inspection, maintenance and priority code information, including relevant dates. The field auditor validated the location and pole details for each pole audited.

Of the sites attended in the field the information was generally verified as accurately recorded in the sample BFM Database across the categories of inspection assessment, priority listing and inspection date data. The auditor also confirmed the most recent inspection date by checking the pole inspection label at each site. Comments within the database provided also reflected the works required to rectify the main maintenance items identified and recorded.

The following is a summary of the field auditor's assessment of the data recorded for the 90 poles audited from the extract of the database provided by ESV:

- The audit findings validated maintenance items and priority ratings recorded within the database for each of the poles audited i.e. 100% of the sample.
- The field audit findings agreed with the recorded defect findings and priority assigned the 90 poles audited although 10 of these poles had additional maintenance items recorded against them during the audit that didn't appear to have been previously recorded.
- The field audit identified eight poles (from the sample of 90 audited) where previously recorded defect items had not been actioned as indicated by the "activity meaning" field e.g. secured or replaced. At two LBRA sites previously recorded deteriorated crossarms were called in by the Jemena representative at the time of the audit (a total of three LV crossarms). One site had a visible fungal fruiting body and another site had two LV crossarms showing signs of heavy deterioration. Both sights had been previously inspected in 2013.
- 14 poles were observed where the installed dampers were not as per the Jemena standard i.e. installed one hand width beyond the end of the armour rod or other fittings. Jemena asset maintenance representatives indicated prior to the audit that this situation had been observed during previous audits but was considered as being technically sound. The audit has recommended that Jemena consider providing further guidance within its AIM in relation to its expectations should they differ from the current AIM guidance notes.
- Three 50kVA substations were observed without surge diverters fitted. This item has been clarified as "Jemena Policy" for small transformers.

The following table (Figure 5) provides details of the additional items recorded or noted by the field auditor as requiring monitoring or follow-up during the recent field audit (excluding dampers and surge diverters on 50kVA transformers). A summary of Jemena feedback received on 12/1/17 has been included in the comments section of Figure 5.

Pole # / Fire Zone	Feeder	Date Insp.	Date Audited	Additional Item or Field Audit Note	Comments
A002623 / LBRA	COO11	19/5/15	4/11/16	Damaged poly insulators not replaced / dress down xarm kingbolt nut loose / deteriorated dress down xarm.	Database indicated damaged poly insulator had been replaced. Jemena indicated current open notification within system (12/1/17) – low priority.
A021930 / HBRA	COO11	10/2/15	4/11/16	Not replaced / ug guard installed at 1.5mt above ground line.	Database indicated cover guard had been replaced. Jemena indicated work now complete (12/1/17). Indications damage reported occurred post previous work completion.
A021901 / LBRA	COO11	17/2/15	4/11/16	Termination on lv pin not replaced.	Database indicated lv pin had been replaced. Jemena indicated current open notification within system (12/1/17) – low priority.
A021905 / LBRA	COO11	17/2/15	4/11/16	Termination on lv pin not replaced.	Database indicated lv pin had been replaced. Jemena indicated current open notification within system (12/1/17) – low priority.
A021911 / LBRA	COO11	17/2/15	4/11/16	Termination on lv pin not replaced.	Database indicated lv pin had been replaced. Jemena indicated current open notification within system (12/1/17) – low priority.
A022979 / LBRA	COO11	13/2/15	4/11/16	Loose kingbolt not secured.	Database indicated kingbolt previously secured. Jemena indicated kingbolt tightened – no further action (12/1/17) – may require further follow-up as appears to be inconsistent with AIM Section 8, 3 Hardware Assessment (i.e. “nut less than a full nut on bolt”).
A035211 / HBRA	COO11	12/3/15	4/11/16	Missing junction box cover.	Possibly occurred post previous inspection.
A003414 / LBRA	SBY11	4/4/13	31/10/16	Broken watchman light.	Possibly occurred post previous inspection.
A067682 / LBRA	SBY11	7/6/13	31/10/16	X2 lv xarms not replaced.	Called in by D Fulop on day of audit – spreadsheet indicated previous replacement. Jemena feedback confirmed 2 x crossarms since replaced (12/1/17).
A001854 / LBRA	SBY11	7/6/13	31/10/16	Low service = 2.95mt @ driveway.	Not previously recorded.

A002805 / LBRA	SBY14	22/4/13	31/10/16	Xarm baring fungal fruit not replaced.	Called in by D Fulop on day of audit – spreadsheet indicated previous replacement. Jemena indicated current open notification within system (12/1/17) – low priority.
A018267 / HBRA	SBY14	12/3/15	31/10/16	Low service = 5.05mt @ 2mt strip not noted.	Not previously recorded.
A053653 / HBRA	SBY32	16/2/16	28/10/16	Pole leaning 7deg toward roadway / dented lv guard / low service = 4.5mt @ 2mt strip.	Not previously recorded. Possibly occurred post previous inspection (see dented LV guard comment).
A055355 / HBRA	SBY32	18/2/16	28/10/16	Burnt hv bushing cover.	Possibly occurred post previous inspection.
A054927 / HBRA	SBY32	11/2/16	28/10/16	Low service = 5.2mt @ 2mt strip / lv ug guard not installed to spec = 1.8mt above ground line.	Not previously recorded.
A053637 / HBRA	SBY32	12/2/16	28/10/16	Low service = 4.35mt @ 2mt strip / deteriorated grey twisted service.	Not previously recorded.
A055372 / HBRA	SBY32	18/2/16	28/10/16	Damaged hv bushing cover.	Possibly occurred post previous inspection.

Figure 5: Additional Items and Notes Recorded by Field Auditor

Complete field audit records are attached as Appendix 3 to this report. Photographs of the additional items recorded by the field auditor are also attached within Appendix 3 of this report.

A total of 17 sites audited had either additional items (10 sites – 7 HBRA, 3 LBRA) or defect items remaining (8 sites – 1 HBRA, 7 LBRA) where data provided indicated they had previously been completed. Note one site had both additional items recorded and an item listed as previously rectified observed.

Additional Maintenance Items Identified

Of the 10 sites summarised in Figure 5 where additional maintenance items were recorded:

- Jemena feedback (12/1/17) indicated deteriorated dressing down crossarm and loose kingbolt at one site (A002623) had an open notification raised to be completed within the coming 12 months.
- Five sites indicated additional maintenance items where it was considered plausible that the observed defects could have occurred post the previous inspection. These related to 2 x damaged HV bushing covers, a missing junction box cover, a broken watchman light and a leaning pole with a dented cable cover and low service attached.
- Four sites where low service cables were recorded. Three services relate to clearances under 5.5m for services crossing centre strips greater than 2m wide. One service cable was measured at 2.95m above a driveway (4.6m minimum required). One of the low services (A053637) also showed signs of insulation deterioration.

In summary of the 10 sites where additional items were recorded Jemena have indicated there maintenance system contains open notifications for one site and it was deemed probable that defects at a further five sites occurred post their previous inspection. The remaining four sites (3 x HBRA, 1 x LBRA) contained LV service cables measured as under height and one site also had a cable cover guard installed at 1.8m rather than the required 2.4m.

Taking into consideration the small sample size and the audit findings the presence of five sites (from a sample of 90) containing low service cables (including one site that could have occurred post the previous inspection cycle), one of which showed signs of deteriorated insulation, is a trend that should be reviewed by Jemena to determine whether any corrective actions are required and provide ESV with a summary of their findings.

14 sites were recorded where dampers were not installed as per Jemena policy i.e. installed one hand-width beyond the end of armour rods or other fittings. Jemena asset maintenance representatives indicated prior to the audit that this situation had been observed and followed up as a result of previous audits but was considered as being technically sound. The audit recommends that Jemena consider providing further guidance within its AIM in relation to its expectations should they differ from the current AIM guidance notes.

Previously Recorded Defects Not Actioned as Indicated

Jemena provided feedback on the 12/1/2017 in relation to the previously identified maintenance items at eight sites where information within the data provided indicated they had been rectified. Jemena's feedback indicated:

- Two deteriorated LV crossarms at one site (A067682) have been replaced as a result of the audit report. The field audit found the crossarms, previously assessed in June 2013, to be in poor condition.
- One crossarm (A002805) bearing a fungal fruiting body has an open maintenance notification raised on it to be completed within the coming 12 months (considered a low priority).
- A cover guard (A021930) has been replaced since the audit with Jemena indicating an assessment that it appeared the site had suffered damage post the completion of previous works.
- Three sites where incorrect LV terminations were present were reported as having open notifications (low priority) within the Jemena system.
- One site (A002623) with a damaged polymeric insulator was reported as having an open maintenance notification (low priority) within the Jemena system.
- One site with a loose king bolt was reported as having been tightened by Jemena with no further action required as the LV crossarm is sitting hard against the pole.

It is unclear why the defective items listed above appeared to be coded within the database as rectified when follow-up information, received 12/1/17, indicates at least five of the sites have open notifications within the Jemena maintenance system. It is recommended that Jemena review each of the items listed above to determine why they appeared to be recorded as rectified within the asset management data provided for audit and determine whether any corrective actions are required and report the findings to ESV.

In terms of the deteriorated LV crossarms replaced at one LBRA site following the audit it is recommended that Jemena review whether the crossarms should have been replaced at an earlier stage (post their previous P3 assessment in June 2013) and determine whether any further corrective actions are required and report the findings to ESV.

The field audit also recorded one LV crossarm bearing a fungal fruiting body (FFB) (the presence of which *"indicate rot – usually deep"*, Jemena AIM Section 8). Feedback from Jemena on 12/1/17 indicated the item is recorded in its system but not considered a high priority (to be replaced within the coming 12 months). As the defect was initially recorded against the site in April 2013 it is recommended that Jemena review whether this timeframe for replacement of a crossarm bearing a FFB is in line with its maintenance policies and provide clarification to ESV.

In general the field audit findings indicate that inspection records and information relating to the general state of the assets audited reflects their condition. The information contained within the database extract provided, including asset details, recorded defects and maintenance priorities, was validated at each site audited.

Field observations in HBRA identified a number of minor maintenance items with low services not previously recorded being the most prominent finding (four sites). At one site signs of insulation deterioration on one of the LV services (grey twisted) and it is recommended Jemena follow up this finding.

In general the field results indicate that field inspection activities are completed as per the requirements of the Jemena BFMP and AIM with all poles within their expected inspection timeframe and all recorded maintenance items validated in terms of the initial priority assignment. The audit has made recommendations for Jemena to review the findings in relation to low services identified and the installation of dampers per their policy.

It is expected that Jemena will follow-up each of the additional maintenance items recorded during the field audit and ensure they are captured within their maintenance system and assigned the appropriate priority and action coding.

3.1.5 Active Asset Inspector Observations and Findings

The field auditor was able to observe an active asset inspector undertaking inspection works as part of the recent field audit. In addition to the observation the Jemena Representative accompanying the field auditor was able to provide detailed descriptions of how inspection and maintenance items are assessed, recorded and managed within the Jemena asset management system. The following asset inspector was observed by the field auditor:

- Jason West (Yarraville)

In the auditors opinion the asset inspector observed and Jemena representative, David Fulop, were very knowledgeable about the requirements of the Asset Inspection role, demonstrated a great work ethic and took pride in the work that they did. The auditor reported that the asset inspector observed completed all tasks required at the assets being inspected, identified and recorded relevant information and had all relevant equipment to complete the tasks observed.

The field auditor reported no concerns in this area of the audit process.

A copy of the checklist used by the field auditor to undertake the Asset Inspector observations is attached in Appendix 5.

3.1.6 Summary of BFM Audit

BFM field audit findings by feeder:

Feeder	Summary of Findings
COO11 Coolaroo	<i>Audit Sample: Total – 34 (24 HBRA, 10 LBRA)</i> The field audit recorded six poles where previously recorded defect items appeared to have not been actioned - one HBRA and five LBRA priority 4 items. It is recommended in this report that Jemena follow-up the status of these items. Additional minor maintenance items were recorded at three poles. The field audit validated priority coding and/ or completed maintenance for 28 of the poles assessed.
SBY11 Sunbury	<i>Audit Sample: Total – 17 (5 HBRA, 12 LBRA)</i> The field auditor identified one pole with two deteriorated LV crossarms recorded in the data provided as being “replaced”. These items were called through on the day of the audit due to their state of deterioration. The auditor validated the information recorded for the other 16 poles audited and recorded additional minor maintenance items for follow-up on two LBRA poles.
SBY14 Sunbury / Clarkefield Area	<i>Audit Sample: Total – 12 (11 HBRA, 1 LBRA)</i> The field auditor identified one pole with a deteriorated LV crossarm (FFB) recorded in the data provided as being “replaced”. This item was called through on the day of the audit due to the observed condition. The auditor validated the information recorded for the other 11 poles audited and recorded an additional maintenance item for follow-up on one HBRA pole (low service).
SBY32 Gisborne Area	<i>Audit Sample: Total – 27 (27 HBRA)</i> The field auditor agreed with the recorded maintenance status for each of the 27 poles audited. Additional maintenance items were recorded against four poles within the sample including a deteriorated LV grey twisted service that may warrant further investigation by Jemena.

The field audit observed eight poles where previously recorded maintenance items, recorded as completed (per “activity meaning” field), had not been rectified. Two poles had deteriorated crossarms which were called through on the day of the audit by the Jemena representative. Jemena has provided initial feedback in relation to these items which have been included in these summary provided above.

The field audit recorded additional maintenance items not recorded in the information provided for 10 sites. The audit concluded that it was possible that items at five sites could have become defects post their previous inspection cycle and Jemena feedback indicated items at one site were recorded within their system (refer feedback received 12/1/17). Non-recorded defects at the remaining four sites related to low LV service cables.

The data provided indicated that Jemena was managing its inspection cycles as per its BFM and AIM requirements. Limited life poles assessed during the recent audit all had been re-inspected in the previous 12 months and unserviceable poles had been actioned as expected (e.g. staked or replaced).

Observations conducted on an active Select Solutions asset inspector and interaction with the Jemena representative confirmed a high level of knowledge and competence in relation to asset inspection requirements. No issues were reported by the field auditor.

In general the audit observations support a conclusion that Jemena is managing its BFM and asset maintenance program in line with the requirements of its BFMP and AIM. Isolated instances of outstanding maintenance works and additional maintenance items were recorded during the audit.

3.2 Electric Line Clearance (Clearance to Code)

As a requirement of the Electricity Safety (Electric Line Clearance) Regulations 2015 [Clause 9. Management Plans] Jemena submitted its *“Electric Line Clearance Management Plan 2016-2017”* to ESV for review in March 2016. At the date of the audit it was noted that the version of the plan referenced was dated 31st March 2016, Version 1 (2nd Re-submission).

At the time of the audit Jemena engaged the services of Select Solutions as their Vegetation Management Company (VMC).

The following provides an overview of the key aspects of Jemena ELCMP as they relate to the specific requirements of the ELC audit scope.

3.2.1 ELC Activity Cycles and Priority Coding

Jemena maintains clearance spaces surrounding distribution powerlines through cutting and pruning cycles with varying intervals according to location and anticipated regrowth rates. The maintenance intervals (ELCMP, Section 8.2.3) have the following ranges:

- HBRA (Hazardous Bushfire Risk Areas)

The implementation of a biannual program which consists of a “code cut” component which includes code assessing and cutting of HBRA spans in the early part of the year and a pre-summer inspection, cutting and removal program for the entire HBRA sample to be completed and maintained after the declared fire danger period or before the 1st November (whichever comes first).

- LBRA (Low Bushfire Risk Areas)

The implementation of a two-year cyclic program for the inspection, cutting or removal of trees (50% of the LBRA network annually). An inspection and cutting or removal of trees cycle is carried out on the other 50% of the LBRA network annually to action any unexpected growth. Essentially 100% of the LBRA network is assessed and/ or cut annually either as part of the “cyclic” or “maintenance” programs in place.

Clause 8.2.3 “Specific Requirements” described the above expectations and is supported by Attachment D “LBRA and HBRA Cutting Schedules 2016” within Jemena’s ELCMP.

Jemena also describe bushfire preparedness auditing programs (pre and during declared fire seasons) in procedure BFM19 “Electric Line Clearance Management Procedure”.

There are no exemptions described within the Jemena ELCMP.

Jemena describes assessment codes in its document titled VEM 20-50 “Assessment Procedures”. Assessment codes are described as “Action Codes”, “Non-Action Codes” and “ORP Action Codes”.

3.2.2 Training and Competency of ELC Assessors

Jemena’s ELCMP (Section 11.2) describes the training and competency requirements for vegetation assessors, in particular the qualifications “Certificate II ESI – Powerline Vegetation Control (UET20312)” and “Assess vegetation and recommend control measures in an ESI environment’ (UETDRVC24A).

3.2.3 Vegetation Database Extract (Desktop Review)

ESV provided ERP with a sample of Jemena Vegetation Management Database including 174 randomly selected spans across 4 feeders. The selected spans for detailed assessment were located on both

roadside easements and within private property. The feeders audited were located in Coolaroo, Sunbury, Clarkefield and Gisborne and surrounding areas.

Figure 6 below provides a summary of database information provided by ESV and the field audit sequence as completed across the Jemena territory.

FEEDER	No. SPANS – AUDIT SAMPLE	Audit Order	ZSS
COO11	52	1	Coolaroo
SBY11	47	2	Sunbury
SBY14	32	3	Sunbury
SBY32	43	4	Sunbury
Total	174		

Figure 6 – Summary of Jemena Vegetation Management Database for Audit Purposes

The following summary (Figure 7) provides an overview of findings relating to the desktop review of the sample of Jemena Vegetation Management database as provided by ESV.

Desktop Audit Results – Audit Sample Profile	Total	%
HBRA Spans within sample	174	100%
Total Spans within sample	174	100%
HBRA Spans allocated current database code	174	100%
Total Spans allocated a current database assessment code	174	100%
HBRA Spans within ELCMP inspection guidelines	174	100%
Total Spans within ELCMP inspection guidelines	174	100%

Figure 7: Jemena Vegetation Management Database Information Summary

The data audited indicated that 100% of the spans contained within the sample had an inspection date recorded within the previous 12 month period aligning with the requirements of Clause 8.2.3 of the Jemena ELCMP in relation to Inspection Cycles.

All spans within the sample provided by ESV were zoned HBRA and had most recent assessment dates recorded between July and September 2016.

Span codes within the database are allocated a prefix of either “PT” (indicating the code priority) or “C” (indicating the span has been cut to the particular code). Assessment codes are also segregated into “Action Codes” and “Non-Action Codes” indicating whether re-assessment or cutting activity is required or whether the span is expected to remain compliant until the next assessment cycle.

In summary the information contained in the sample database was easy to follow, contained sufficient detail to identify spans, inspection, cutting and database coding and outstanding works.

It should be noted that the database information audited was provided to ERP on 27th September 2016 with the field audit being conducted between the 2nd and 4th November 2016 and therefore the following field audit observations in some cases may not be reflective of the current Jemena master vegetation management database if records contained within the sample have been recently updated.

3.2.4 Overview of Field Audit and Sites Inspected

Field Audits commenced in Coolaroo Wednesday 2nd November 2016 and concluded in the Sunbury area on Friday 4th November 2016. A total of 3 field auditing days were undertaken during this period. The Field Auditor was accompanied by Neil McIntosh (Field Officer, Select Solutions) for the duration of the audit.

Figure 8 provides a summary of the spans attended and inspected during the field audit phase. A total of 125 spans were attended as part of the field audit process representing 72% of the audit sample

provided. Compliance and span coding data was captured for these spans. During the field component of the audit a significant amount of travel was involved, including between selected spans given the dispersed nature of the sample provided. This allowed the field auditor to sample spans across a wide area.

FEEDER	No. SPANS – AUDIT SAMPLE	No. SPANS – Detailed Inspection	Audit Sequence	ZSS
COO11	52	36	1	Coolaroo
SBY11	47	35	2	Sunbury
SBY14	32	19	3	Sunbury
SBY32	43	35	4	Sunbury
Total	174	125		

Figure 8: Jemena Spans Attended During Field Audit Cycle

All spans audited were HBRA.

The field audit objective was to assess clearance to code via a detailed line clearance inspection across a wide geographic area. The field audit achieved the objective gathering data from a sample of spans from each feeder within the sample database.

Of the 125 sites attended in the field the information was generally verified as accurately recorded in the sample Vegetation Management Database across the audit categories of inspection, cut and span compliance information. The results indicate that the information provided clearly described location, inspection, cutting and span code information, including relevant dates.

Eight spans were audited where there was a difference between the current span code within the database and that recorded by the field auditor.

- 4 of these spans refer to the coding given to non-code compliant spans. These spans are discussed further in Section 3.2.5.
- 2 spans with a latest span code of “365” were assessed by the field auditor as “720”.
- 2 spans currently coded as “720” were assessed as “365” and “CC” respectively by the field auditor.

In relation to Current Span Code discrepancies the field audit results indicate very few spans where there was an obvious discrepancy between the recorded inspection data and the field observation and assessment undertaken by the field auditor. Including the spans identified with non-code compliant vegetation it is expected that Jemena will review the span coding differences recorded by the field auditor and manage actions as per their ELC management plans.

The audit evidence indicates that Jemena inspection and data recording processes provide an effective basis for determining vegetation management compliance requirements with few spans audited where there were discrepancies between the recorded codes and field observations.

3.2.5 Current Code Compliance Assessment

The current code compliance assessment of each of the spans audited provides a summary of the Field Auditors ground observation of the current vegetation clearance against the requirements of the Code of Practice “Minimum Clearance Space” required taking into account the area Fire Rating, voltage, expected re-growth, conductor / asset type and span distances.

The field auditor also assessed whether the responsibility for managing vegetation within the audited span was Jemena, a local council or other responsible person.

The field auditor observed six spans as containing noncompliant vegetation. In each case responsibility for trees identified within the 6 spans was assessed as Jemena.

- Two of the spans assessed by the field auditor as containing noncompliant vegetation were coded within the database extract as “PT30” and “PT180” respectively which were validated by the field auditor.
- The remaining four spans assessed as “PT30” by the field auditor were currently coded as “PT720” (2 spans) and “PT180” (2 spans) respectively.

Note: Code “PT180” is used when an assessment cannot be definitely made that vegetation is within the clearance space and also indicates that there is little or no risk to assets within a 180 day period. It is also used in LBRA to indicate spans where there are concerns relating to fast growing vegetation. “PT30” is used when vegetation is clearly inside the clearance space.

As described in Figure 10 below the noncompliant spans related to small individual branches getting to and just inside the clearance space (2 sites), wet access where hedger required (2 site) and vegetation to the side and high above in clearance space (2 sites).

A review of data within the database extract did note that vegetation which belonged to other responsible persons (ORPs) was identified. This information is considered valuable to ensure vegetation assessed as “ORP responsibility” is identified and flags when notifications may be required.

Figure 9 provides a summary of the audit findings in relation to current span compliance.

Spans audited in the field	Audited	Noncompliant Spans	%	Noncompliant Span - DB Responsible	Noncompliant Span - ORP
HBRA					
Undeclared	125	6	4.8%	6	-
Total	125	6	4.8%	6	0

Figure 9: Jemena Field Audit Span Compliance Assessment Summary

The following table (Figure 10) provides a summary of the observed non-code compliant spans. Photographs of the non-code compliant spans identified are also attached in Appendix 4 along with a complete set of field notes recorded for all spans audited.

As described in Figure 10 below the noncompliant spans related to small individual branches getting to and just inside the clearance space (4 sites) and vegetation to the side and high above in clearance space (2 sites). Wet access where hedger required was also a contributing factor at two of the sites. The field auditor noted on the day of the audit on SBY32 it was extremely windy which contributed the vegetation observed encroaching on the clearance space high above the line.

TREE_ID	CAMMNO	FEEDERNAME	SUBURB_TOWN	VOLTAGE	Was span compliant (y/n)	Noncompliance description (# Hard Contact - HC # Inside Clearance - IC # Regrowth - RG)	Photo number	DB responsible for noncompliance (y/n)	Council responsible for noncompliance (y/n)	Property owner/occupier responsible for noncompliance (y/n)	GENERAL COMMENTS AND OBSERVATIONS
932858	A039714	COO11	Wildwood	HV	N	IC	1699	Y			Cypress tips midsapan, sag and sway
922214	A055111	SBY32	Gisborne	HV	N	RG,IC	1702	Y			CYPRESS TIPS IN CLEARANCE SPACE
922513	A055584	SBY32	Gisborne	HV	N	RG,IC	1703	Y			OAK TIPS GETTING INTO CLEARANCE SPACE
1010434	A055598	SBY32	Gisborne sth	HV	N	IC	1705	Y			GUM TOPS IN CLEARANCE SPACE ABOVE
1010437	A055599	SBY32	Gisborne sth	HV	N		1707	Y			BRANCH TIPS GETTING INTO CLEARANCE SPACE
1010438	A017718	SBY32	Gisborne sth	HV	N		1708-1709	Y			GUM TOPS IN CLEARANCE SPACE ABOVE

Figure 10: Non-code Compliant Spans – Jemena Distribution

Note: A summary of the DB non-code compliant spans was forwarded to Jemena via ESV on 7th November 2016 as part of the Interim Audit Summary Report.

Jemena provided a response to the field audit findings on 16th November 2016. Jemena's response indicated agreement with the field audit assessment for 5 of the six sites identified with non-code compliant vegetation. Four spans were already being managed as code "PT30" or code "PT180" spans. The fifth span previously coded as "PT720" that was observed as having vegetation encroaching on the clearance space high above the line during extremely windy conditions has since been cut.

Jemena disagreed with the field audit assessment for span ID A05584 (Oak tips getting into clearance space). It is noted that conditions were extremely windy on the day of the audit. Jemena did however confirm that the span in question has been cut since the ESV audit and was scheduled for a further BFM audit in November 2016.

The field auditor's observations supported by an analysis of the audit data indicate that the processes Jemena have in place to manage ELC are in general effective in managing clearance to code requirements. Isolated instances of non-code compliant spans were observed within the sample audited however this finding did not reflect a systemic issue in the management of electric line clearance.

The field auditor commented that whilst in transit between nominated audit sites within Jemena spans appeared to be well clear of vegetation with clearance spaces maintained. Note that detailed inspections to confirm actual clearance was only performed at 125 sites and this comment is to be read as general observation only and not an assessment of code compliance.

3.2.6 Active Vegetation Assessor Observations

The field auditor was accompanied on the audit by a Select Solutions Vegetation Assessment expert (Field Officer). During the course of the audits the field auditor took the opportunity to observe the Select Solutions representatives conduct a number of span assessments.

During the audit the following experienced vegetation assessment operative (Field Officer) assigned for the duration of the field audit was consulted on aspects of the Jemena vegetation assessment process the field auditor:

- Neil McIntosh (Field Officer, Select Solutions)

In the auditors opinion the Field Officer/ assessor was very knowledgeable with the requirements of the Vegetation Assessment role, demonstrated a great work ethic and took pride in the work. The field auditor also made comment that the Field Officer showed a genuine concern for the work they were undertaking and recognised the critical role they played.

The field auditor reported no concerns in this area of the audit process.

A copy of the checklist referenced by the field auditor to support these observations is attached in Appendix 5.

3.2.7 Summary of ELC Audit

ELC Field Audit Findings per Feeder:

Feeder	Summary of Findings
COO11 Coolaroo	<i>Span Audit Sample: Total – 36 (36 HBRA)</i> The field audit observed 1 noncompliant relating to a cyprus hedge requiring mid-span trimming. The span had previously been coded “PT180” and it was confirmed that hedge trimming was planned for the span before the fire season (access for machinery delayed due to ground conditions). All other spans were reported to be well cleared and compliant. Travelling between spans the field auditor commented that he observed the general condition of vegetation within the area appeared to be well maintained and reported no issues of immediate concern.
SBY11 Sunbury	<i>Span Audit Sample: Total – 35 (35 HBRA)</i> No non-code compliant spans were observed within the audited sites. All other spans were reported to be well cleared and compliant. Travelling between spans the field auditor commented that he observed the general condition of vegetation within the area appeared to be well maintained and reported no issues of immediate concern. Two minor current code discrepancies were recorded.
SBY14 Sunbury / Clarkefield Area	<i>Span Audit Sample: Total – 19 (19 HBRA)</i> No non-code compliant spans were observed within the audited sites. All other spans were reported to be well cleared and compliant. Travelling between spans the field auditor commented that he observed the general condition of vegetation within the area appeared to be well maintained and reported no issues of immediate concern. Two minor current code discrepancies were recorded.
SBY32 Gisborne Area	<i>Span Audit Sample: Total – 35 (35 HBRA)</i> Five noncompliant spans were observed with the field auditor noting they were not likely to present an immediate threat to electrical assets. The five noncompliant spans included small individual branches just entering the clearance space at three sites and two sites with vegetation to the side and above starting to enter the clearance space. Conditions on the audit day were reported as extremely windy. Travelling between spans the field auditor commented that he observed the general condition of vegetation within the area appeared to be well maintained. Four current code discrepancies were recorded (relating to four of the five noncompliant spans recorded).

The field audit observed 6 spans where, in his opinion, vegetation was within the clearance space that require follow-up action. Jemena has provided a response to these findings. Although Jemena’s re-assessment of one span (A05584) indicated a view the vegetation reported was outside the minimum clearance space they have taken proactive steps to clear the vegetation and noted that the span was scheduled for a BFM audit in during November 2016 (post the audit).

It has been noted that during the field audit conditions were extremely windy which may have contributed to the field audit findings, particularly for SBY32. Jemena’s assessment procedure, VEM 20-50, Section 6.2, does include instruction for assessors when considering clearance spaces during windy conditions and allowances for sag and sway e.g.

“While windy conditions may provide the assessor with an appreciation of the sag and sway potential of conductors, all assessments and subsequent code selection shall be assigned by the assessor based upon static (zero or little movement) position of the conductors and vegetation. It is acknowledged that it can be difficult for the assessor to estimate the static position of the conductors and vegetation in order to assign an assessment code. Therefore to ensure any subsequent audits allow for the conditions at the time of the assessment the assessor shall place in the ‘Comments’ field of the PDA tree edit record, ‘Windy at time of assessment’.”

The audit was completed on HBRA spans only and there were no ORP related vegetation issues reported.

There were isolated instances where the auditors span code assessment differed from the latest recorded span code. There were no major concerns identified as a result of this analysis.

Consultation during the field audit with the assigned Select Solutions Field Officer responsible for the assessment of vegetation on the Jemena network were extremely positive with the auditor very complimentary of the knowledge, skill and attitude of the individual observed.

The audit observations support the conclusion that Jemena is managing its line clearance as per the requirements of its ELCMP. The observations of the field auditor and analysis of the data provided indicated that Jemena are progressing well with pre-summer auditing of HBRA spans and there was clear evidence in the audited areas of both good pruning practices and well maintained vegetation clearance spaces.

4. Audit Findings and Recommendations

4.1 BFM Audit Recommendations

- **Physical state of the assets**

- In general the field audit findings indicate that inspection records and information relating to the general state of the assets audited reflects their condition.
- The information contained within the database extract provided, including asset details, recorded defects and maintenance priorities, was validated at each site audited.
- The audit observed eight previously recorded Priority 3 and Priority 4 maintenance items (inspected between 2013 and 2015) that weren't rectified or there were no comments provided reflecting whether assessment by a planner had consider them to be non-urgent or to be rectified via opportunity maintenance.
- Defective LV crossarms (LBRA) at two sites were called in by the Jemena representative on the day of the audit – these arms had been assessed as Priority 3 items in 2013 (their previously recorded inspection date).
- The audit found five sites where there were low LV service cables which weren't recorded in the data provided and additional minor maintenance items at a further five sites.
- It is recommended that Jemena conduct a review of the field audit information in relation to previously recorded outstanding maintenance items (that were indicated as rectified in the data provided) and determine whether any corrective actions are required and report the findings to ESV (initial feedback received 12/1/17).
- In terms of the deteriorated LV crossarms replaced at one LBRA site (A067682) following the audit it is recommended that Jemena review whether the crossarms should have been replaced at an earlier stage (post their previous P3 assessment in June 2013) and determine whether any further corrective actions are required and report the findings to ESV.
- It is recommended that Jemena review whether the timeframe for replacement of a crossarm baring a FFB (A002805) recorded in April 2013 is in line with its maintenance policies and provide clarification to ESV.
- It is recommended that Jemena conduct a review of the field audit findings for additional maintenance items recorded (in particular low service cables) and determine whether any corrective actions are required and report the findings to ESV.
- It is recommended that Jemena also consider reviewing its guidance within its AIM in relation to vibration damper installation to ensure it is consistent with its expectations (i.e. 14 sites were observed where dampers were not installed as per Jemena AIM descriptions).

- **MEC's knowledge about the state of the system**

- The field audit validated the site location information and previously recorded defects and required actions recorded for each of the poles inspected.
- The audit identified additional maintenance items not recorded at 10 sites including five sites where there were low LV service cables not recorded in the data provided.
- It is recommended that Jemena conduct a review of the field audit findings for additional maintenance items recorded (in particular low service cables) and determine whether any corrective actions are required and report the finds to ESV.
- The audit concluded that systems and processes in place should provide Jemena with reliable knowledge of the state of their system and the assets audited.
- The audit recommends Jemena continues to utilise and develop procedures to ensure asset inspection programs are completed efficiently and asset database management is maintained to a high level of currency and accuracy.

- **Compliance with current BFM plan**
 - The audit found that Jemena was managing its inspection cycles and asset inspection processes as per its current BFM plan.
 - The audit observed that the version of the AIM provided for reference was dated July 2012. Jemena have indicated an updated manual has been prepared for release.
 - The audit recommends that Jemena continue to manage and monitor defect and maintenance items per its current procedures and processes to ensure ongoing compliance with its BFMP.

4.2 ELC Audit Recommendations

- **The accuracy of inspection data and work recommendations**
 - The field auditor recorded that in his opinion, and taking into account his observations at the time of the audit, the previously recorded Inspection Code for the spans he observed was in general accurate in relation to Jemena responsible vegetation.
 - Evidence within the database extract indicates inspection coding to be the catalyst for cutting activity with a number of spans recently coded either "PT30", "PT180" and "PT365" indicating a post inspection cut date and latest code indicating additional clearance space had been achieved.
 - Comments contained within the database extract also confirmed identification of ORP related vegetation requiring management.
 - Jemena continues to utilise and develop procedures to ensure annual inspection programs are completed efficiently and vegetation database management is maintained to high levels of currency and accuracy.
- **Vegetation clearance standards and compliance with the Code of Practice for electric line clearance**
 - Information within the database indicated Jemena was advancing with its pre-summer HBRA inspection program.
 - The field auditor made comment that Jemena managed vegetation in the areas audited was generally maintained to a high standard with clearance space being maintained.
 - 6 spans containing non-code compliant vegetation were assessed by the field auditor – none were considered by the field auditor to pose an immediate threat to assets with 4 related to vegetation around the fringe of the minimum clearance space and re-growth and 2 relating to vegetation in the minimum clearance space high up.
 - There were no ORP responsible noncompliance issues identified during the audit (noting that all spans audited were in HBRA).
 - The audit recommends that Jemena manage the identified noncompliant spans as per its internal ELC procedures i.e. the spans are assessed and actioned as appropriate.
 - Jemena continues to utilise and develop procedures to ensure annual inspection programs are completed efficiently and vegetation clearance activities are undertaken to ensure ELC clearance standards are maintained.
- **Vegetation management data reflects the status of field observations made at the time of the audit.**
 - 8 spans were audited where there was a difference between the current span code and that recorded by the field auditor.
 - In general the management data provided by Jemena reflected the field observations made at the time of the audit with only isolated examples where discrepancies were recorded.
 - Jemena's database information was validated as accurate, easy to follow and contained information consistent with the requirements of Jemena's ELCMP.
 - Jemena continues to utilise and develop procedures to ensure annual inspection programs are completed efficiently and vegetation database management is maintained to high levels of currency and accuracy.

5. Acknowledgement

Electrical Resource Providers would like to thank the Jemena Distribution Representatives who have assisted throughout this audit process by providing information, advice and their time to assist in a productive and co-operative manner.

Particular thanks is forwarded to the following Jemena employees and representatives:

- David Fulop (for assisting with each day with the BFM field audits).
- Neil McIntosh (for assisting with each day with the ELC field audits).
- Mohammed Hersi, Tom Ruzeu, Alan Schu (for assisting with audit preparations, follow-up and ensuring the required resources were available for the field audit to be efficiently executed).

Appendices

Appendix 1 – Document Register

Appendix 2 – Jemena Audit Plan

Appendix 3 – Jemena BFM Database & Photos (Field Audit Notes) (Separate Attachments)

Appendix 4 – Jemena ELC Database & Photos (Field Audit Notes) (Separate Attachments)

Appendix 5 – Sample Asset Inspection and Vegetation Assessor Audit Checklist

Appendix 1 - Document Register

The following key documents were collected, examined and / or reviewed during the audit:

Document Description	Document Source	Date Sourced
Invitation for expression of interest – PERFORM AUDITS OF DISTRIBUTION BUSINESS ELECTRIC LINE CLEARANCE (DB ELC Audits – EOI 2015)	ESV – [REDACTED]	5 th August 2016
Electricity Safety (Electric Line Clearance) Regulations 2015 Version: 28 th June 2015	www.esv.vic.gov.au	1 st September 2016
Electricity Safety (Bushfire Mitigation) Regulations 2013 Version: 1 st May 2016	www.esv.vic.gov.au	1 st September 2016
2016 Safety Performance Report on Victorian Electricity Networks Version: 30 th September 2016	www.esv.vic.gov.au	1 st November 2016
Various Jemena Reference Documents, including: - Bushfire Mitigation Plan - ELCMP - Asset Inspection Manual - Various operational procedures	ESV – [REDACTED]	5 th October 2016
Extract of Jemena Vegetation Management Database Version: ESV Modified	ESV – [REDACTED]	28 th September 2016
Extract of Jemena Asset Management Database Version: ESV Modified	ESV – [REDACTED]	28 th September 2016
Interim Reports submitted to ESV: Version: 1	ERP – [REDACTED]	7 th November 2016

Appendix 2 – Jemena Audit Plan

Hi [REDACTED]

As per our telephone discussion today please find attached our proposed dates for both BFM and ELC Audits:

Bushfire Mitigation:

- 28th October (Coolaroo)
- 31st October (Sunbury)
- 4th November (Sunbury)
- Feeders: COO11, SBY11, SBY14, SBY32
- Field Auditor: [REDACTED]

Electric Line Clearance:

- 2nd November to 4th November (Coolaroo, Sunbury)
- Feeders: COO11, SBY11, SBY14, SBY32
- Field Auditor: Mark Griffin

Additional Information:

- At your earliest convenience could you please provide contact details for the Jemena representative/s that will be accompanying our Field Auditors – this will enable both parties to make contact and agree meeting locations and times for each of the audits
- During the coming week we will provide you with information relating to the assets/ spans identified for auditing to enable your representatives to gather any relevant data to assist the field audit process
- ESV will re-confirm expectations regarding the scope of the audit and expectations prior to the commencement of the audit
- As a critical aspect of this year's audit is for our Field Auditor to observe actual asset inspection and line clearance assessment tasks in the field (expectation is 2 x observations on different field personnel by audit stream) could you also confirm whether this will be possible/ practical within the locations (or close by) that have been indicated above)

We look forward to hearing from you and working efficiently to complete this year's audit program.

Regards

[REDACTED]
Senior Technical & Audit Consultant

Electrical Resource Providers

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Appendix 3 – Jemena BFM Database & Photos (Field Audit Notes) (Separate Attachments)

Appendix 4 – Jemena ELC Database & Photos (Field Audit Notes) (Separate Attachments)

Appendix 5 – Sample Asset Inspection and Vegetation Assessor Audit Checklist

ASSET INSPECTION QUALITY AUDIT CHECKLIST 2016 ESV ASSET INSPECTION PROGRAM



Date:		Time:		Location:	
DB:					
LIS/ Pole Reference:				Auditors:	

Asset Inspection Compliance		Compliance				Action / Comments
		N/A	Yes	Corr. Ast.	Non Conf	
1	Is species of pole recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2	Is disc year recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3	Is location description correct?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Is LIS number fitted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5	Is pole disc data recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6	Are important structures recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7	Are surge diverters recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8	Are HV fuses recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9	Are voltages recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10	Are other users recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11	Is staking information recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12	Is inspection tag dated/ fitted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13	Has 300mm excavation been undertaken?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
14	Has a pole top inspection been undertaken using stabilised binoculars and telescopic camera?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
15	Has sounding been undertaken? (to be completed from 2m above ground line into excavation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16	Has below ground inspection been undertaken? (If pole has signs of decay all deteriorated material should be removed to see extent of decay)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
17	Is there an inspection hole?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
18	Has a 12mm inspection hole been drilled?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
19	Has back fill been completed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
20	Has wood preservation been completed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
21	Have private lines been inspected?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
22	Agree with Inspector on maintenance found?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
23	Are appropriate manuals and reference information available onsite?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
24	Other?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Work Quality		Compliance				Action / Comments
		N/A	Yes	Corr. Ast.	Non Conf	
25	Has correct amount of pole preserver been used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
26	Have plugs been fitted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
27	Has bio-guard been fitted correctly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
28	Was work site clean and tidy?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Document No.: 1216-1216-01
Revision: 1
Review Date: 23/09/2016

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General Comments:

Work Party Members & Qualifications (Verified Onsite)

Asset Inspection Personnel	Qualifications/ Authorities

Definitions:

N/A	Not Applicable.
Yes	The item was found to be compliant (correct).
Corr. Act.	Corrective Action, corrective action was required to be taken at the time of the Field Inspection.
Non Conf.	Non Conformance - does not meet the minimum standard.

Photo's (attach photographs of site inspected)

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Document No.: EIR-BPM-01
Revision: 1
Review Date: 25/9/2016

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**ELECTRIC LINE CLEARANCE INSPECTION QUALITY AUDIT
CHECKLIST**
2016 ESV ELECTRIC LINE CLEARANCE PROGRAM



Date:	Time:	Location:
DB:		
LIS/ Pole Reference:		Auditors:

Electric Line Clearance Assessment Compliance		Compliance				Action / Comments
		N/A	Yes	Corr. Act.	Non Conf	
1	Is correct location verified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2	Is location description correct?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3	Is LIS/ Pole number fitted?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Is correct voltage/ s recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5	Are DB spans identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6	Are Council spans identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7	Are PELs identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8	Has all vegetation within the effected span (including customer services) been identified and recorded?					
9	Is vegetation type correctly identified?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10	Is the assessed vegetation code correct?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
11	Agree with Assessor on inspection findings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
12	Are appropriate manuals and reference information available onsite?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
13	Have any general pole or asset defects been identified and recorded?					
14	Other?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Work Quality		Compliance				Action / Comments
		N/A	Yes	Corr. Act.	Non Conf	
15	Has the clearance between vegetation and electric lines been validated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
16	Has all required information been recorded?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
17	Have appropriate customer notifications been carried out?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

General Comments:

Work Party Members & Qualifications (Verified Onsite)	
Assessment Personnel	Qualifications/ Authorities



Definitions:	
N/A	Not Applicable.
Yes	The item was found to be compliant (correct).
Corr. Act.	Corrective Action, corrective action was required to be taken at the time of the Field Inspection.
Non Conf.	Non Conformance - does not meet the minimum standard.



Photo's (attach photographs of site inspected)