

# 2017 Major Electricity Company BFM and ELC Audit

## Audit Report



---

### **Jemena** **September - October 2017**

CM-7240 (BFM)

CM-7249 (ELC)

### Audit Report Details:

<b>Client:</b>	Energy Safe Victoria (ESV)
<b>Auditee Network:</b>	Jemena
<b>Audit No:</b>	MEC BFM & ELC Audits – EOI 2017
<b>Regulation:</b>	Electricity Safety (Bushfire Mitigation) Regulations 2013 Electricity Safety (Electric Line Clearance) Regulations 2015
<b>Audit Topics</b>	MEC Line Condition MEC Electric Line Clearance
<b>Audit Date</b>	25 <sup>th</sup> September 2017 and 4 <sup>th</sup> October 2017 (Field Audits) 5 <sup>th</sup> October to 18 <sup>th</sup> October (Desktop Review)
<b>Audit Team</b>	██████████ ERP Senior Technical and Audit Consultant ██████████ ERP Field Auditor (BFM) ██████████ ERP Field Auditor (ELC)
<b>Sites Visited</b>	Various Sites across the Jemena Electrical Distribution network. Selected sites from following substations: COO, STO, WT, AW

### Document Approval:

Signatories			
Title	Name	Signature	Date
Lead Auditor	██████████		
ERP Operations Manager / Project Director	██████████		

### Document Control:

Version	Date	Change	Author	Reviewed	Approved
Draft	9/10/17	Draft Report	██████	██████	██████
V1.1	4/12/17	Report update post Jemena presentation 1/12/17	██████	██████	██████

### Disclaimer:

The information contained in this report is based on conditions observed and information provided during the 2017 audit of Major Electricity Companies Bushfire Mitigation (Asset Condition) and Electric Line Clearance. This report is confidential and distribution is limited to the author (Electrical Resource Providers) and Energy Safe Victoria.

Within the limitations of the agreed scope of services, this work has been undertaken and performed in a professional manner, in accordance with generally accepted practices, using a degree of skill and care ordinarily exercised by members of its profession and consulting practice. No other warranty, expressed or implied, is made.

This report is solely for the use of Energy Safe Victoria and any reliance on this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties or for other uses. This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval with comments are provided by the author/ s.

# Table of Contents

---

<b>Executive Summary</b>	<b>5</b>	3.6 Code Compliance Assessment	25
<b>1. Audit Overview</b>	<b>10</b>	3.7 Active Vegetation Assessor Observations	27
1.1 Audit Context	10	3.8 Non Vegetation Defects Identified	27
1.2 Audit Scope	10	3.9 Summary Observations and Recommendations	28
1.3 Audit Duration	10	<b>4. Acknowledgement</b>	<b>30</b>
1.4 Audit Methodology	11	<b>Appendices</b>	<b>31</b>
1.5 Audit Assessment Criteria, Findings and Recommendations	11	Appendix 1: Key Documents and References	32
1.6 Audit Limitations	11	Appendix 2: Audit Plans	33
<b>2. Audit Report – Bushfire Mitigation (Asset Condition)</b>	<b>12</b>	Appendix 3: Jemena BFM Field Audit Database and Photo's	34
2.1 Overview	12	Appendix 4: Jemena ELC Field Audit Database and Photo's	35
2.2 Bushfire Mitigation Inspection Cycles and Priority Coding	12	Appendix 5: Asset Inspector Checklist	36
2.3 Training and Competency of Asset Inspectors	13	Appendix 6: Vegetation Assessor Checklist	37
2.4 BFM Database Extract (Desktop Review)	13		
2.5 Overview of Field Audits and Sites Assessed	14		
2.6 Active Asset Inspector Observations	18		
2.7 Asset Defects Recorded During ELC Audit	18		
2.8 Summary Observations and Recommendations	18		
<b>3. Audit Report – Electric Line Clearance (Clearance to Code)</b>	<b>21</b>		
3.1 Overview	21		
3.2 3.2 ELC Activity Cycles and Priority Coding	21		
3.3 Training and Competency of Vegetation Assessors	22		
3.4 ELC Database Extract (Desktop Review)	22		
3.5 Overview of Field Audit and Spans Inspected	23		

# Executive Summary

---

This report presents findings and recommendations for the 2017 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 2017 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] and [REDACTED] of ERP in September 2017 and field based audits were conducted by [REDACTED] (BFM) and [REDACTED] (ELC) of ERP in conjunction with Powercor representatives between the 25<sup>th</sup> September 2017 and the 4<sup>th</sup> October 2017.

## 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 compliment 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.
- The desktop review did note the absence of vegetation code "PT180" from both the current EMCMP and BFMP however is still appears to be an active code used in the vegetation assessment database.
- The desktop audit noted that the field audit for vegetation clearance for LBRA declared spans was to occur prior to their annual assessment. The BFM audit

noted a number of both LBRA and HBRA poles audited are due for inspection in early 2018. Where relevant this has been noted in the report findings.

## Field Audit – Bushfire Mitigation (Asset Condition):

- Field audits were carried out on 454 poles across four substations on the Jemena distribution network.
- The field auditor validated the location and previous inspection date information recorded for 448 poles from the database extract and PDA information on site as accurate. LIS# had changed at three sites, one was missing an LIS# and another an inspection date tag.
- The field audit recorded 75 observations or additional defects across 68 sites visited. A POEL missing an LV spreader was recorded during the ELC audit and referred to Jemena for follow-up. 15 items related to general observations and admin items (e.g. signage) and five related to a query regarding fitting of vibration dampers to HV copper conductor. 15 observations and 34 defect items related to poles due for inspection in early 2018.
- The audit found isolated instances of BFM (11) related maintenance items not previously recorded which were allocated a priority code between "Fault" and "P4". Of these items 6 related to conductor/ ground clearance, 2 related to LV spreaders, 2 to missing bird covers and 1 a defective LV insulator. The "fault" item related to a broken LV spreader.
- 21 additional BFM related items have been allocated a "P5" code for further assessment by Jemena to determine actions required. 20 of these items relate to missing or dislodged bushing covers and one deteriorated LV crossarm was referred for assessment (noting the crossarm is due for inspection in early 2018).
- 23 minor maintenance or non-BFM items were recorded and assigned various codes between "Fault" (1), "P4" (4) and "P5" (18) for follow by Jemena. The "fault" item related to a defective neutral screen service in LBRA.
- Positive feedback was received from the field auditor in relation to observations conducted on two active asset inspectors.

### Field Audit – Electric Line Clearance (Clearance to Code):

- Field audits were conducted on 533 (466 HBRA, 67 LBRA) spans across four substations on the Jemena distribution network with the field verifying the accuracy of location data for each of the sites visited.
- The auditor recorded that the latest recorded assessment code for 450 (84%) was most likely accurate at the time of assessment. The auditor recorded, based on his observation, what he believed was the most likely span assessment code for the remaining 83 (16%) of spans at the time of assessment taking into account current span coding, regrowth and evidence of cutting/ pruning.
- The field auditors assessment of the current span code (either post assessment or post cut) aligned with the recorded latest span code for 423 (79%) spans assigning a different code to 110 spans based on his observations.
- The field audit assigned a code to 15 spans indicating vegetation was inside the minimum clearance space. One HBRA span on COO (latest code “180” with fast growing tree noted) and 14 LBRA Declared spans on WT (currently due for assessment). Trees in these spans were assessed as Jemena responsibility.
- 21 currently compliant spans (16 x “720”, 4 x “365”, 1 x “CC”) were assigned a code “180” by the field auditor indicating vegetation may enter the clearance space earlier than previously anticipated. One span assigned a “180” code had a latest code of “NC” but was previously assessed as “180” indicating works were still required to be completed.
- 73 spans were recoded either “365”, “CC” or “720” by the field auditor indicating they would most likely remain compliant until their next annual pruning or assessment.
- Positive feedback was received from the field auditor in relation to observations conducted on two active vegetation assessors.

### Summary Observations and Recommendations:

The audit recorded the following observations and recommendations based on the information provided by Jemena and the observations recorded during field

auditing:

### **Bushfire Mitigation (Asset Condition)**

The audit has recorded 14 observations and 4 recommendations in relation to the Bushfire Mitigation (Asset Condition) audit.

### ***Physical state of the assets:***

- In general the audit found that Jemena assets audited were in a serviceable condition reflective of the data provided at the time of audit. Two items were reported as faults (deteriorated NS service in LBRA and a broken spreader in HBRA) with the audit findings validating information for over 85% of assets visited (nearly 90% taking into account 20 items related to general observations, policy queries or miscellaneous reportable items). **(Observation)**
- The audit found in general that previously recorded BFM related defect items were reflective of the asset condition, accurately recorded and coded for action as required. This was crossed check onsite with electronic database information. **(Observation)**
- A total of 55 additional defect items were recorded during the audit (assigned priority “Fault” to “P5”). 34 of these items are due for inspection in early 2018. **(Observation)**
- A number of defects recorded during the audit (16) have been allocated priority ratings for follow-up (“Fault” to “P4”) and Jemena have indicated appropriate actions have been implemented to address these items. 11 of these items have been classified as BFM items. **(Observation)**
- A further 21 items classified as BFM items were allocated a “P5” code (20 x bushing cover issues, 1 x deteriorated LV crossarm) for further assessment by Jemena to determine actions required. **(Observation)**
- It is recommended Jemena review the additional 32 BFM items recorded to determine corrective actions required and advise ESV of actions undertaken. **(Recommendation)**

- A number of non-BFM defect items recorded during the audit (23) have been allocated priority ratings for follow-up (“Fault” to “P5”) and Jemena have indicated appropriate actions have been implemented to address these items. It is recommended Jemena provide details confirming corrective actions to ESV. **(Recommendation)**
- It is recommended Jemena review the POEL line defect reported during the ELC audit and rectify as per their asset maintenance policies confirming details of corrective actions to ESV. **(Recommendation)**

***MEC’s knowledge about the state of the system:***

- The audit found in general that for BFM related maintenance items the systems and processes provide Jemena with a reliable knowledge of the state of their system. **(Observation)**
- Site location, pole identification and inspection information was validated for 448 of the 454 sites audited. Two sites (LIS# 58295 and 54311) were missing LIS numbers and the LIS# for three sites didn’t match the recorded LIS # (LIS # 35237, 35236, 25636). LIS# 77764 was missing its latest inspection tag. **(Observation)**
- Defects recorded at four HBRA sites during the audit had previously closed out notifications against them (A046809, A003769, A021466, A003769). It is recommended Jemena follow up each of these items to determine the reasons the notifications were closed with the defect remaining and report findings to ESV. **(Recommendation)**
- The audit observed 20 sites with bushing covers missing or dislodged (2 x HV, 18 x LV). It is recommended that Jemena consider reviewing this finding to determine whether these observations reflect general wear and tear, incorrect fitting / equipment or policy application. As an opportunity for improvement Jemena may consider reviewing its construction guideline (SP/4/2/39 B) to reflect that LV bushing covers are required on all live LV terminals (ref. AIM) as the current description references terminal links rather than the status of the bushing terminal. **(Observation)**

- 8 sites were recorded with bird damage to HV polymeric insulator sheds. Whilst not uncommon it is expected Jemena will continue to monitor via its inspection processes to ensure damage is highlighted and items rectified prior to impacting the integrity of the insulators. **(Observation)**

***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. **(Observation)**
- The audit found in general that maintenance items recorded within Jemena’s database aligned to current priority ratings and requirements. Defect items and rectification dates appeared to be being monitored and managed as per Jemena’s BFMP and AIM. **(Observation)**
- The audit found isolated instances of BFM (11) related maintenance items not previously recorded which were allocated a priority code between “Fault” and “P4”. Of these items 6 related to conductor/ ground clearance, 2 related to LV spreaders, 2 to missing bird covers and 1 a defective LV insulator. Jemena have provided initial feedback indicating the items have been assessed and allocated appropriate actions as per their internal maintenance processes. **(Observation)**
- 21 additional BFM related items have been allocated a “P5” code for further assessment by Jemena to determine actions required. 20 of these items relate to missing or dislodged bushing covers and one deteriorated LV crossarm was referred for assessment (noting the crossarm is due for inspection in early 2018). **(Observation)**
- 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)**

### **Electric Line Clearance (Clearance to Code)**

The audit has recorded 9 observations and 5 recommendation in relation to the Electric Line Clearance (Clearance to Code) audit.

#### ***The accuracy of inspection data and work recommendations***

- Jemena's database information was in general validated as accurate, easy to follow and contained information consistent with the requirements of Jemena's ELCMP. **(Observation)**
- It was the auditors opinion that the latest recorded assessment code for 450 (84%) was most likely accurate at the time of assessment. The auditor recorded, based on his observation, what he believed was the most likely span assessment code for the remaining 83 (16%) of spans at the time of assessment (refer Appendix 4). **(Observation)**
- There was evidence within the full dataset information provided, and the sample selected for audit, to indicate that assessment activity is a catalyst for cutting activity with a number of records previously assessed as either "P180" or "P30" having a completed compliant cut code assigned post their assessment date. **(Observation)**
- Jemena review the audit observations for compliant spans assigned a different current span code by the auditor to determine whether any further action is required to ensure spans remain compliant and data accurately reflects span conditions (in particular 85 HBRA sites with a latest recorded date between May-August 2017). **(Recommendation)**

#### ***Vegetation clearance standards and compliance with the Code of Practice for electric line clearance***

- Information within Jemena's database indicates it was progressing with its annual and pre-summer assessment program. Annual assessments were yet to be completed on LBRA declared spans linked to Sub WT at the time the field audit was undertaken. **(Observation)**
- 1 HBRA span (assessed and coded "180" 40 days prior to the audit) and 14 LBRA

Declared spans were assigned a code indicating vegetation was within the minimum clearance space (2.8% of the sample). The audit noted that the spans within the LBRA Declared were yet to have annual inspections completed. It is expected Jemena will manage the spans identified with vegetation inside the minimum clearance space per its ELC management processes. **(Observation)**

- It is recommended Jemena provide confirmation to ESV that P30 vegetation in 1 HBRA span has been managed as per its ELC management processes and cleared prior to the bushfire season. **(Recommendation)**
- It is recommended that Jemena review the audit finding in relation to LBRA Declared vegetation assigned "PT30" codes during the audit to confirm assessment activities are accurately identifying and coding Jemena responsible vegetation within declared areas requiring action to ensure vegetation remains clear. **(Recommendation)**

#### ***Vegetation management data reflects the status of field observations made at the time of the audit***

- The field audit verified the span identification information was accurate for all sites audited and each of the records provided contained previous inspection date, cutting information (where applicable) and span coding details. **(Observation)**
- The field auditor assigned a different current span code to 110 spans based on his observations at the time of the audit. 44 spans had a latest recorded span code greater than 154 days prior to the audit which may account for some of the code differences. 66 spans had a latest recorded code within 78 days of the audit. **(Observation)**
- Taking into consideration the timing of the audit and the ongoing Jemena annual assessment and cutting programs (noting Sub WT LBRA Declared annual assessments were not completed as yet), variability of factors such as growth rates and challenges relating to making visual assessments of span clearances for "long spans" the analysis indicates, in general, that current assessment and span code recording reflects the status of the assets in the field. **(Observation)**



- 
- It is recommended that Jemena review the data for 22 (15 x HBRA, 7 x LBRA Declared) spans where the field auditor assigned a code “180” (currently coded “720 x 16, “365” x 4, “CC” x 1, “NC” x 1) to confirm the spans will remain compliant via it’s ELC management processes. **(Recommendation)**
  - The desktop review did note the absence of code “PT180” from both the current EMCMP and BFMP however is still appears to be an active code used in the vegetation assessment database. It is recommended Jemena provide confirmation to ESV in relation to whether code “PT180” remains an active code for span assessment processes. **(Recommendation)**
  - The audit recommends that Jemena continue to utilise and develop its ELC procedures to ensure annual inspection programs are completed efficiently and vegetation database management is maintained to a high level of currency and accuracy. **(Observation)**

A complete analysis of audit observations and findings is contained in Section 2 (Bushfire Mitigation) and Section 3 (Electric Line Clearance) of this report. Field audit findings and observations are documented in the attached Appendices.

# 1. Audit Overview

---

## 1.1 Audit 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.

## 1.2 Audit Scope

The scope of the 2017 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 Bushfire Mitigation (BFM) audit will focus on:

- The physical state of the assets;
- The MEC's knowledge about the state of the system; and
- The MEC's compliance with their current BFM plan.

The Electric Line Clearance (ELC) audit will focus on:

- The accuracy of inspection data and work recommendations;

- Vegetation clearance standards and compliance with the Code of Practice for electric line clearance; and
- Vegetation management data reflects the status of field observations made at the time of the audit.

This particular audit report relates to the Jemena distribution network.

The key elements of the audit include:

- A desktop review of Bushfire Mitigation Plan and Electric Line Clearance Plan expectations and associated data;
- Confirm asset and span inspections were completed as per the auditees 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.

## 1.3 Audit Duration

Audit information was provided to ERP between the 30<sup>th</sup> August and 5<sup>th</sup> September 2017.

Field auditing of the Jemena distribution network was conducted between 25<sup>th</sup> September and 4<sup>th</sup> October 2017. A total of 5 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 5<sup>th</sup> October and 18<sup>th</sup> October 2017.

---

## 1.4 Audit 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 distribution representatives;
- Field observations conducted on active asset and vegetation inspectors:
- Review of 2017 field audit data and submission of a draft audit report for review; and
- Submission of final audit report.

## 1.5 Audit Assessment Criteria, Findings and Recommendations

The audit report describes elements of the regulations pertaining to bushfire mitigation and electric line clearances as it relates to various asset management activities of the auditee including: asset inspection, vegetation assessment, data accuracy and completion of various works.

The audit report does not contain specific assessment criteria or grading's against each of the elements assessed but rather provides a synopsis of the desktop and field based audit observations.

The report is structured to provide:

- A summary of desktop and field based audit and assessment observations;
- Commentary in relation to the desktop and field based observations in relation to relevant regulations and the MECs own documented plans and strategies; and
- Where relevant, recommendations for follow-up or consideration with a focus on addressing identified issues or potential improvement opportunities.

## 1.6 Audit 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 as described in 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 2017.

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 responsible officers and via conducting field observations on active asset and line clearance inspectors.

Database information audited was provided to ERP between the 30th August 2017 and 5th September 2017 with the field audit being conducted between the 25th September 2017 and 4th October 2017. It is noted that the following field audit observations in some cases may not be reflective of the current Jemena master asset and vegetation management databases if records contained within the sample have been recently updated.

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.

## 2. Audit Report – Bushfire Mitigation (Asset Condition)

### 2.1 Overview

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 (BFMP), 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 “Version 1.0” of document JEN PL 0100 (30<sup>th</sup> June 2017).

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.

### 2.2 Bushfire Mitigation 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.

ERP was provided with a copy of Jemena “Asset Inspection Manual” (JEN MA 0500, June 2016) 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, observations during the audit and additional records provide by the Jemena representative on a PDA.

**Table 2.1: Jemena Asset Inspection Priority Codes**

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.

## 2.3 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. Qualifications listed for Asset Inspectors are:

- 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.

## 2.4 BFM Database Extract (Desktop Review)

ESV provided ERP with a sample of the Jemena BFM Database inclusive of asset inspection information covering randomly selected sites across 4 substations. The dataset contained inspection records for in excess of 18,000 assets (10,400 excluding public lighting poles). ERP in consultation with ESV randomly selected 670 assets for field audit. The selected sites for detailed assessment were located on both roadside easements and within private property. Poles randomly selected for audit were a mixture of poles that had recorded defects and those that didn't.

Table 2.2 provides a breakdown of the selected audit sample.

The assets audited were located between the Watsonia, Craigieburn, West Meadows and Greenvale areas of Jemena's network.

The database sample selected for field assessment contained 670 poles, or approximately 6.5% of the database sample (excluding public lighting poles). Of the 670 poles selected for field audit:

- 561 were in HBRA fire zones; and
- 109 were in LBRA fire zones.

MEC & Audit Reference:		Jemena (CM-7240)		
Audit Sample	Location	Substation	Assets in Sample	# Sites Audited
	Bulla / Greenvale	COO	293	241 (82%)
	Craigieburn	STO	164	80 (49%)
	Watsonia / Macleod	WT	104	49 (47%)
	Westmeadows	AW	109	84 (77%)
TOTAL			670	454 (68%)

TABLE 2.2: JEMENA BFM AUDIT SAMPLE SUMMARY

Of the 670 poles selected for audit a desktop assessment indicated:

- Where a defect item was recorded against an asset each item (100% of data provided) was allocated a priority code consistent with those provided in Table 2.1.
- All serviceable HBRA poles within the Jemena audit sample database had a previously recorded inspection date between February 2015 and August 2017. All serviceable LBRA poles within the database extract had previous inspection dates between June 2013 and July 2017. These findings are consistent with Jemena inspection cycles.
- Inspection cycles based on the database information for poles selected indicate each pole had a recorded last inspection date aligned with the requirements of Jemena's BFM Plan and AIM documented cycles.
- Limited life poles identified within the audit database extract had previously recorded inspection dates between October 2016 and August 2017. These findings are consistent with Jemena inspection cycles.

In summary the information contained within the database extract was generally easy to follow and contained sufficient details in relation to pole details, location, maintenance items and priorities and associated dates.

## 2.5 Overview of Field Audit and Sites Assessed

Field audits commenced in Bulla on Monday 25<sup>th</sup> September 2017 and concluded in the West Meadows area on Wednesday 4<sup>th</sup> October 2017. A total of 5 field auditing days were undertaken during this period. The Field Auditor was accompanied by [REDACTED] (Asset Inspection Team Leader, Select Solutions) for the duration of the audit.

It was noted that the Jemena representative also provided electronic confirmation of previously recorded asset information via a hand-held PDA device which was utilised during the audit to further validate asset related information and location.

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.

Table 2.3 provides a summary of the poles attended and assessed during the field audit phase.

**TABLE 2.3: JEMENA BFM FIELD AUDIT SUMMARY – SITES ATTENDED**

MEC & Audit Reference:		Jemena (CM-7240)		
Field Auditor	[REDACTED]	Audit Dates	25/9/17 – 4/10/17	
Audit Sample	Date	Location	Sub	Audit Sample
	25/9 – 4/10	Bulla / Greenvale	COO	241
	25/9 – 26/9	Craigieburn	STO	80
	3/10	Watsonia / Macleod	WT	49
	4/10	Westmeadows	AW	84
<b>TOTAL</b>				<b>454</b>

- A total of 454 poles were audited as part of the field audit process representing 68% of the sample selected and 4.5% of the complete database sample provided. (excluding public lighting poles)
- 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.
- 404 HBRA poles and 50 LBRA poles were audited.

Table 2.4 below provides a further breakdown and summary of relevant database information relating to poles audited in the field.

Field Audit Results – Audit Sample Profile	Total	%
HBRA Poles within sample	404	90%
LBRA Poles within sample	50	10%
<b>Total poles audited</b>	<b>454</b>	<b>100%</b>
HBRA Pole defects allocated current defect code	121	100%
LBRA Pole defects allocated current defect code	19	100%
<b>Total pole defects allocated a current defect code</b>	<b>140</b>	<b>100%</b>
HBRA poles within BFMP inspection guidelines	404	100%
LBRA spans within BFMP inspection guidelines	50	100%
<b>Total poles within BFMP inspection guidelines</b>	<b>454</b>	<b>100%</b>

**TABLE 2.4: JEMENA BFM FIELD AUDIT SUMMARY – DATABASE OVERVIEW**

Site location, pole identification and inspection information was validated for 448 of the 454 sites audited. Two sites (LIS# 58295 and 54311) were missing LIS numbers and the LIS# for three sites didn't match the recorded LIS # (LIS # 35237, 35236, 25636). LIS# 77764 was missing its latest inspection tag.

The following analysis is provided to further explain the overall findings in relation to recorded outcomes of the field assessment. Table 2.6 provides a numerical representation of the field auditors finding.

TABLE 2.5: JEMENA BFM FIELD AUDIT SUMMARY – FINDINGS SUMMARY

Sub	Poles Assessed	Audit Aligned with Database (100%) or Items Rectified	Additional Defects / Obs. - # Sites	Additional Defects / Obs.
COO	241	59	44	48
STO	80	71	5	5
WT	49	23	9	10
AW	84	96	10	12
<b>Total</b>	<b>454</b>	<b>386</b>	<b>68</b>	<b>75</b>

In summary the field auditors findings agreed with the recorded database information for 386 (85%) of the poles assessed. The auditor listed observations, additional defects or items for follow-up at the remaining 68 (15%) of sites.

The following section of the report provides further analysis and context in relation to the additional defects and observations recorded by the field auditor.

A complete list of all recorded audit findings is provided in Appendix 3 including a summary of recorded items and action per Jemena's AIM.

- Of the 454 poles audited the Jemena representative had the most recent pole defect data and information available on site.
- 20 of the 75 items recorded related to either admin items (5 LIS numbers missing or incorrect), general observations or policy queries (5 x dampers not fitted to long copper conductor spans and 3 x items on AusNet poles) and minor reportable items (1 x SD cut away, 1 x leaning LV insulator, 2 x GT service incorrectly terminated and 3 x POEL items).

- Two items (deteriorated neutral screen service in LBRA and a broken spreader in HBRA) were classified as "faults" as per the Jemena AIM.
- One HBRA site was missing an LV spreader which was assigned a "P4" notification for follow-up by Jemena.
- Low conductors were reported at seven sites (1 x LV conductor and 6 x service cables). These items have been allocated a "P4" (assessment or rectification with 6 months). Six items were in HBRA and one service was LBRA.
- 20 defects reported related to transformer bushing covers missing or dislodged (2 x HV and 18 x LV sites). Typically these would be allocated a "P5" priority.
- Bird damage to HV insulators was recorded at eight sites. These items would typically be allocated a "P5" per Jemena's AIM, Section 8 (3.7.4). One other site was observed with a HV insulator with a damaged shed and was also assigned a "P5" priority per the Jemena AIM.
- Loose or missing nuts were recorded at seven sites (5 x LBRA, 2 x HBRA). These items would typical be assigned a "P5" priority for assessment or rectification within 12 months.
- Three deteriorated low voltage crossarms were noted, two of which were non-load bearing fuse arms. These items have been assigned a "P4" or "P5" for further assessment or rectification between 6-12 months.
- Two HBRA sites were missing animal protection (2 x bird cover on a concrete pole with 5 shed HV insulators). A "P3" priority review by maintenance planners (based on previous notification examples).
- Two sites were recorded with POEL's leaning greater than 10° and have been assigned a "P4" for follow-up including associated service cable issues.
- Four items previously reported had closed out notifications however the defects remained. A leaning LV insulator at one site (detached from the pin but still supporting the conductor – P4), two twisted grey service terminated using a clamp (no reported insulation damage) and one site missing LV bushing covers.

Table 2.6 on the following page provides a summarised version of the above analysis inclusive of interim feedback provided by Jemena on 27<sup>th</sup> October 2017.



**TABLE 2.6: JEMENA FEEDBACK RELATING TO ITEMS RECORDED DURING THE FIELD AUDIT (Table to be read in conjunction with information provided in Appendix 3)**

<b>Audit observation / defect category</b>	<b>Number of observations</b>	<b>Jemena review / response</b>
Animal Proofing - Missing	2	Jemena will rectify all identified defects.
Vibration Damper Missing on Copper Conductors	5	Jemena distribution design standard does not require vibration dampers to be installed for copper conductors (refer to the attached Jemena distribution design standard for installation of vibration dampers). No further action required.
HV Bushing Covers - Missing / Defective	2	Jemena will rectify all identified defects.
HV Insul - Bird Damage	8	Jemena will rectify all identified defects.
HV Insul - Damaged	1	Jemena will rectify all identified defects.
Low LV Conductor	1	Jemena will rectify all identified defects.
Low Service Cable	6	Jemena will rectify all identified defects. Note: For those in the LBRA area, Jemena will attend to these in accordance with the plan described in ESMS for service compliance.
LV Bushing Cover - Missing / Defective	18	Jemena distribution design standard does not require bushing covers where an un-insulated terminal link is attached to the bushing (refer to the attached Jemena distribution design standard for LV bushings). Jemena will install/correctly fit LV bushing covers where this condition does not apply.
LV Crossarm - Deteriorated	3	Currently, the photos do not provide adequate information of the overall condition of the crossarms (or a fuse bracket in some cases). Jemena will request an asset inspector to take additional photos and assess the overall condition and integrity of the crossarms in question. Jemena will rectify the defects after conducting a further condition and integrity assessment of the crossarms.
LV Crossarm - Kingbolt Missing	1	Jemena will rectify all identified defects.
LV Crossarm - Loose Strap	2	Jemena will rectify all identified defects.
LV Insul - Leaning	1	Minor insulator lean. LV insulator is not leaning excessively (i.e. bottom shed of the insulator is not resting on the crossarm) and there are no conductor clearance issues. No action required as per Asset Inspection Manual.
LV Insul - Loose Nut	3	Jemena will rectify all identified defects.
LV Insul - Mech Failure	1	Jemena will rectify all identified defects.
LV Kingbolt - Loose	1	Jemena will rectify all identified defects.
LV Service - Deteriorated NS	1	Jemena will rectify all identified defects.
LV Service - Incorrect Term (Previously reported and closed out)	2	Jemena will rectify all identified defects.
LV Service - Tight	1	Jemena will rectify all identified defects.
LV Spreader - Missing / Broken	2	Jemena will rectify all identified defects.
Obs - Admin Only	6	No action required.
Obs - AusNet Pole	2	No action required.
POEL - Leaning (<10 degrees)	1	No action required. The lean is not over the carriageway and is less than 10 degrees.
POEL - Leaning (>10 degrees)	2	Jemena will follow defective POEL process to rectify all defects.
POEL - Pole Cap Missing	1	Jemena will follow defective POEL process to rectify all defects.
POEL - Support Attached to Pole (Not Noted)	1	The support is acceptable. No action required.
Surge Diverter - Cut Away	1	Jemena will rectify the defect.



Excluding the 15 items listed as general administration or observations there were five spans (HBRA Cu conductor) where the field auditor recorded a query as to whether dampers were required. Jemena have responded indicating dampers are not required on Cu conductor within their distribution system.

The remaining 55 items recorded by the field auditor have been assigned priority codes as described in Jemena's Asset Inspection manual.

- Seven LBRA items previously inspected in 2014 (due for re-inspection in 2018) were allocated priorities "P5" (5), "P4" (1) and "Fault" (1 deteriorated NS service – insulation damaged). It is likely these items have deteriorated post their previous inspection and with the exception of the deteriorated service would be expected to be recorded at their next inspection in early 2018.
- 27 HBRA items previously inspected in early 2015 (due for re-inspection early in 2018) were allocated priorities of either "P4" (1 x leaning POEL, 3 x Low Services, 1 x Low LV conductor) or "P5" (22 items). 20 of the "P5" items related to bushing covers or minor bird damage on HV polymeric insulators and two related to deteriorated LV crossarms (inclusive of one non-load bearing LV fuse arm). It is likely these items could have deteriorated or been damaged post the previous inspection.
- 10 HBRA items with a previously recorded inspection date in early 2016 were allocated priorities of either "P4" (1 x defective LV pin insulator), "P4" (1 x leaning POEL and 2 x low services linked to POELs) and "P3" (1 x missing bird cover, 2 x LV bushing cover defects, 1 x deteriorated LV fuse arm, 1 x loose kingbolt, 1 x polymeric insulator with bird damage).
- 11 HBRA items were recorded at sites previously inspected in early 2017. Priorities assigned were "Fault" (1 x broken spreader), "P3" (1 x missing bird cover), "P4" (1 x missing LV spreader, 1 x low service) and "P5" (3 x missing/defective bushing covers, 2 x polymeric HV insulators with bird damage, 1 x damaged HV insulator with a broken shed, 1 x loose LV shackle nut).

Jemena provided feedback on 27<sup>th</sup> October 2017 in relation to each of the items reported indicating they would record and rectify the defects reported as per their asset maintenance policies and procedures.

Excluding LBRA sites the audit observations did record defects at an isolated number of HBRA sites that may have been present during the previous inspection cycle and

didn't appear to have been recorded in the data provided. Specifically these items related to:

- 2 concrete poles sites missing bird covers from 5 shed dressing down insulators (A058262, A044570);
- 1 defective LV insulator detaching from pin – still supporting conductor which was previously recorded in 2013 but closed out. It is unclear whether the defect was previously rectified or the insulator has deteriorated further (A003769);
- 1 missing LV spreader – previously inspected in January 2017 (A142998); and
- 2 clamped grey twisted service – previously inspected in February 2015 (A021466) and January 2017 (A046809). It was noted that previous notifications for these items had been raised and closed out.

Other items of note recorded during the audit that have been referred to Jemena for follow-up clarification include:

- 3 defective crossarms requiring further assessment (2 x LV fuse crossarms, 1 x LV intermediate crossarm). It is expected Jemena will assess these items in line with its maintenance policies and determine whether further action is required.
- 20 sites with bushing covers missing or dislodged (2 x HV, 18 x LV). It is recommended that Jemena review this finding to determine whether these observations reflect general wear and tear, incorrect fitting / equipment or policy application. As an opportunity for improvement Jemena may consider reviewing its construction guideline (SP/4/2/39 B) to reflect that LV bushing covers are required on all live LV terminals (ref. AIM) as the current description references terminal links rather than the status of the bushing terminal.
- 8 sites were recorded with bird damage to HV polymeric insulator sheds. Whilst not uncommon it is expected Jemena will continue to monitor via its inspection processes to ensure damage is highlighted and items rectified prior to impacting the integrity of the insulators.
- 6 sites were recorded with low conductors (5 x service cables, 1 x LV). With the exception of one service (3.15m due to a leaning POEL) the four services were at heights > 4.8m and the LV cable was measured at 5.2m. It is expected Jemena will assess each site and assign appropriate actions.

In summary of the 55 HBRA observations recorded 32 would most likely be recorded as BFM items. Of these 32 items:

- 20 related to missing or misaligned bushing covers (allocated “P5” for assessment and action as required).
- 5 related to low services and 1 related to a low LV span. 1 low service (3.15m) is related to a POEL defect (allocated “P4” for assessment / action).
- 2 items relate to missing bird covers (5 shed insulators on concrete poles). These items have been assigned a “P3” priority based on previous notification examples within the data provided.
- 1 missing LV spreader (priority “P4”) and 1 x broken LV spreader (Fault).
- 1 x deteriorated LV crossarm assigned a “P5” for further assessment and 1 x deteriorated LV insulator was assigned a priority “P4” for assessment / action.

It is recommended that Jemena review each of these items and confirm details of assessment and any further corrective actions to ESV.

## 2.6 Active Asset Inspector Observations

The field auditor completed observations on two active asset inspectors as part of the recent field audit. The following asset inspectors were observed by the field auditor:


- [REDACTED]
- [REDACTED] (2 sites)

In the auditors opinion each of the asset inspectors observed was very knowledgeable about the requirements of the Asset Inspection role, demonstrated a good work ethic and took pride in the work that they did.

The auditor reported that the asset inspectors 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.

## 2.7 Asset Defects Recorded During ELC Audit

During the course of the Electric Line Clearance field assessment the auditor recorded one item which has been referred to Jemena for follow-up. The items related to an open wire LV POEL which didn’t have a spreader fitted. Refer photo’s below:

<p><b>Feeder:</b> COO-011 <b>LIS:</b> A038861 <b>Issue:</b> Service runs from A038861 – query if spreader required.</p> <p>Referred to Jemena 6<sup>th</sup> October 2017.</p>	
--	---

The item has been referred to Jemena to follow-up as per it’s POEL management procedures.

## 2.8 Summary Observations and Recommendations

The BFM audit conducted a visual, ground based assessment of 454 poles on the Jemena distribution network validating recorded data for 386 (85%) of the sample and recording observations or additional defects at 68 (15%) of sites visited.

There was evidence that indicated a high level of accuracy between the type and location of assets in the field and the database and electronic PDA information provided by Jemena. The field auditor recorded that the asset locations and details matched the assets visited for each of the sites with exception of three sites which had different LIS# recorded (poles changed).

75 observations or additional defects items recorded at 68 sites. In addition to the sites audited a POEL missing an LV spreader was recorded during the Electric Line Clearance audit and has been forwarded to Jemena for review and rectification as required. From this analysis a total of 55 items were assigned a priority code of “Fault” (2), “P3” (2), “P4” (12) and “P5” (39) consistent with Jemena’s AIM and previous examples of similar type defects. 48 items were HBRA and 7 LBRA.

Of the 48 HBRA items recorded 16 were considered to be minor or non-BFM related items. Of the remaining 32 items (29 sites) considered BFM items 20 related to items on poles due for inspection in early 2018, 5 were last inspected in 2016 and 7 were inspected in 2017.

11 Defects or observations recorded at 10 sites (2.2% of the sample) have been assigned priority codes between "Fault" and "P4". Of these items it is likely a number of items may have occurred or deteriorated post their previous inspection, including four relating to low conductors due for inspection in early 2018, one broken spreader, one deteriorated LV insulator and two low services (inspected early 2016 and early 2017). The remaining three items related to bird covers missing (x2) and an lv spreader missing.

The remaining 21 items (19 sites) have been assigned a code "P5" for further assessment. 16 items are due for reinspection in early 2018 and the remaining five items relate to missing or misaligned LV bushing covers.

Table 2.7 provides a summary overview of the post analysis statistics by feeder audited.

Sub	Poles Assessed	Audit Aligned with Database (100%) or Items Rectified	Additional Defects / Obs. - # Sites (BFM – Fault to P4)	Additional Defects / Obs. (BFM – Fault to P4)
COO	241	59	44 (6)	48 (7)
STO	80	71	5 (2)	5 (2)
WT	49	23	9	10
AW	84	96	10 (2)	12 (2)
Total	454	386	68 (10)	75 (11)

TABLE 2.7: SUMMARY OVERVIEW OF BFM AUDIT BY FEEDER

#### Physical state of the assets:

- In general the audit found that Jemena assets audited were in a serviceable condition reflective of the data provided at the time of audit. Two items were reported as faults (deteriorated NS service in LBRA and a broken spreader in HBRA) with the audit findings validating information for over 85% of assets visited (nearly 90% taking into account 20 items related to general observations or miscellaneous reportable items).
- The audit found in general that previously recorded BFM related defect items were reflective of the asset condition, accurately recorded and coded for action as required. This was crossed check onsite with electronic database information.
- A total of 55 additional defect items were recorded during the audit (assigned priority "Fault" to "P5". 34 of these items are due for inspection in early 2018.
- A number of defects recorded during the audit (16) have been allocated priority ratings for follow-up ("Fault" to "P4") and Jemena have indicated appropriate actions have been implemented to address these items. 11 of these items have been classified as BFM items.
- A further 21 items classified as BFM items were allocated a "P5" code (20 x bushing cover issues, 1 x deteriorated LV crossarm) for further assessment by Jemena to determine actions required.
- It is recommended Jemena review the additional 32 BFM items recorded to determine corrective actions required and advise ESV of actions undertaken.
- A number of non-BFM defect items recorded during the audit (23) have been allocated priority ratings for follow-up ("Fault" to "P5") and Jemena have indicated appropriate actions have been implemented to address these items. It is recommended Jemena provide details confirming corrective actions to ESV.
- It is recommended Jemena review the POEL line defect reported during the ELC audit and rectify as per their asset maintenance policies confirming details of corrective actions to ESV.

---

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

- The audit found in general that for BFM related maintenance items the systems and processes provide Jemena with a reliable knowledge of the state of their system.
- Site location, pole identification and inspection information was validated for 448 of the 454 sites audited. Two sites (LIS# 58295 and 54311) were missing LIS numbers and the LIS# for three sites didn't match the recorded LIS # (LIS # 35237, 35236, 25636). LIS# 77764 was missing its latest inspection tag.
- Defects recorded at four HBRA sites during the audit had previously closed out notifications against them (A046809, A003769, A021466, A003769). It is recommended Jemena follow up each of these items to determine the reasons the notifications were closed with the defect remaining and report findings to ESV.
- The audit observed 20 sites with bushing covers missing or dislodged (2 x HV, 18 x LV). It is recommended that Jemena consider reviewing this finding to determine whether these observations reflect general wear and tear, incorrect fitting / equipment or policy application. As an opportunity for improvement Jemena may consider reviewing its construction guideline (SP/4/2/39 B) to reflect that LV bushing covers are required on all live LV terminals as the current description references terminal links rather than the status of the bushing terminal.
- 8 sites were recorded with bird damage to HV polymeric insulator sheds. Whilst not uncommon it is expected Jemena will continue to monitor via its inspection processes to ensure damage is highlighted and items rectified prior to impacting the integrity of the insulators.

***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 found in general that maintenance items recorded within Jemena's

database aligned to current priority ratings and requirements. Defect items and rectification dates appeared to be being monitored and managed as per Jemena's BFMP and AIM.

- The audit found isolated instances of BFM (11) related maintenance items not previously recorded which were allocated a priority code between "Fault" and "P4". Of these items 6 related to conductor/ ground clearance, 2 related to LV spreaders, 2 to missing bird covers and 1 a defective LV insulator. Jemena have provided initial feedback indicating the items have been assessed and allocated appropriate actions as per their internal maintenance processes.
- 21 additional BFM related items have been allocated a "P5" code for further assessment by Jemena to determine actions required. 20 of these items relate to missing or dislodged bushing covers and one deteriorated LV crossarm was referred for assessment (noting the crossarm is due for inspection in early 2018).
- 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

# 3. Audit Report – Electric Line Clearance

## 3.1 Overview

As a requirement of the Electricity Safety (Electric Line Clearance) Regulations 2015 [Clause 9. Management Plans] Jemena submitted its “Vegetation Management Plan” to ESV for review in March 2017. At the date of the audit it was noted that the version of the plan referenced was dated 30<sup>th</sup> March 2017, Version 1.0 of document number JEN PL 0101.

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 the Jemena ELCMP as they relate to the specific requirements of the ELC audit scope.

## 3.2 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.

A summary of the span codes typically recorded during Jemena vegetation assessment activities is provided in Table 3.1 below.

Code	Description – Recorded on Monthly Report
PT1	Tree contacting line
PT30	Tree in clearance space
PT30M	Tree in clearance space above the line
PT365	Vegetation is outside the clearance space but is ‘highly likely’ to encroach upon it prior the end of the current assessment year.
PT720	Vegetation is outside the clearance space, and will not encroach upon it between a period commencing not less than 365 days up to a maximum of 720 days.
RE	Vegetation is outside the clearance space however there is some uncertainty whether or not it may encroach upon it prior to the next assessment cycle. Reassessment required.
CC	The predominant vegetation characteristics observed throughout the span have historically not required any action to maintain the clearance space.
PTM	The PTM code shall be assigned to indicate the following: Public Light not supplied by an overhead cable; An abandoned line; A POEL; or When there is a duplicate Tree Record.

**TABLE 3.1 – JEMENA VEGETATION ASSESSMENT SPAN CODE SUMMARY**

The desktop review did note the absence of code “PT180” from both the current EMCMP and BFMP however it still appears to be an active code used in the vegetation assessment database. It is recommended Jemena provide confirmation to ESV in relation to whether code “PT180” remains an active code for span assessment processes.

For the purposes of the field audit code “PT180” was considered an active code and assessment criteria per document “Vegetation and Easement Management Assessment Procedure (Jemena Distribution) – Document number: VEM 20-50” were utilised.



### 3.3 Training and Competency of Vegetation Assessors

Jemena's ELCMP (Section 9.3) describes the training and competency requirements for vegetation assessors as:

- UET20312 Certificate II in 'ESI - Powerline Vegetation Control'; and
- ETTDRVC24A 'Assess vegetation and recommend control measures in an ESI environment' for local fieldwork which is currently the national unit of competency recognised by the Victorian Electricity Supply Industry.

This is consistent with ESV requirements in relation to competencies required to actively assess trees within an ESI environment.

### 3.4 ELC Database Extract (Desktop Review)

ESV provided ERP with a sample of the Jemena ELC Database inclusive of information relating spans across 4 substations and records for 22,605 spans. ERP, in consultation with ESV, randomly selected 1,794 spans for field assessment which were located on both roadside easements and within private property. Table 3.2 below provides a summary of the sites selected for field assessment.

TABLE 3.2: JEMENA ELC AUDIT SAMPLE SUMMARY

MEC & Audit Reference:		Jemena (CM-7249)		
Audit Sample	Location	Substation	Spans in Sample	# Spans Audited
	Bulla / Greenvale	COO	1,258	242 (19%)
	Craigieburn	STO	203	90 (44%)
	Watsonia / Macleod	WT	194	67 (35%)
	Westmeadows	AW	139	134 (96%)
TOTAL			1,794	533 (30%)

In total the field audit reviewed a little over 2.3% of the total number of spans within the audit area. Table 3.3 below provides an overview of findings relating to the desktop review of the sample spans selected for audit from of Jemena's Vegetation Management database as provided by ESV.

TABLE 3.3: JEMENA VEGETATION MGMT DATABASE SAMPLE OVERVIEW

Desktop Audit Results – Audit Sample Profile	Total	%
HBRA spans within sample	1,600	89%
LBRA Spans within sample	194	11%
<b>Total spans within sample</b>	<b>1,794</b>	<b>100%</b>
HBRA spans allocated current database code	1,600	100%
LBRA spans allocated current database code	194	100%
<b>Total spans allocated a current database assessment code</b>	<b>1,794</b>	<b>100%</b>
HBRA spans within ELCMP inspection guidelines	1,600	100%
LBRA spans within ELCMP inspection guidelines	194	100%
<b>Total spans within ELCMP inspection guidelines</b>	<b>1,794</b>	<b>100%</b>

The data audited indicated that 100% of the HBRA spans contained within the sample had an inspection date recorded between April 2017 and August 2017. 100% of LBRA spans had a recorded last assessment date between August 2016 and November 2016 indicating spans may due for a annual assessment cycle. The desktop audit also noted that ORP (other responsible person) vegetation was noted against spans.

The desktop assessment observations indicate Jemena are managing vegetation assessment requirements as per the vegetation management cycles noted in Section 3.2 of this report.

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.

### 3.5 Overview of Field Audit and Spans Inspected

Field Audits commenced in Craigieburn on Monday 25<sup>th</sup> September 2017 and concluded in the Watsonia area on Wednesday 4<sup>th</sup> October 2017. A total of 5 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.

Table 3.4 provides a summary of the spans attended and inspected during the field audit phase. A total of 533 spans were attended as part of the field audit process representing 30% of the total spans selected for audit (2.3% of the total sample provided). Compliance and span coding data was captured for these spans.

**TABLE 3.4: JEMENA ELC FIELD AUDIT SUMMARY – SITES ATTENDED**

MEC & Audit Reference:		Jemena (CM-7249)		
Audit Dates		25/9/17 to 4/10/17		
Audit Sample	Date	Location	Sub	Audit Sample
	26/9 & 2/10	Bulla / Greenvale	COO	242
	25/9	Craigieburn	STO	90
	4/10	Watsonia / Macleod	WT	67
	3/10	Westmeadows	AW	134
	TOTAL			533

All spans attended in the field were located in HBRA (75 x HBRA Declared) with the exception of 67 spans in the Watsonia area which were zoned LBRA. The database sample clearly identified council declared zones for both HBRA and LBRA.

The field audit objective was to assess Jemena's 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 substation within the sample database.

The audit verified the accuracy of the site location details for each of the 533 sites attended.

#### (1) Latest recorded assessment code

The auditor undertook an assessment of the latest recorded assessment code and taking into account the time lapse, evidence of growth and cutting activities recorded an observation in relation to the latest recorded assessment code for the spans assessed.

It was the auditors opinion that the latest recorded assessment code for 450 (84%) was most likely accurate at the time of assessment. The auditor recorded, based on his observation, what he believed was the most likely span assessment code for the remaining 83 (16%) of spans at the time of assessment. Table 3.5 below provides a summary of these observations.

		Auditors Assessment					
		CC	P180	P30	P365	P720	Total
Latest Assessed Code	CC		1			4	5
	PT180			3		1	4
	PT365		4				4
	PT720	24	17		27		68
	RE				2		2
	Total	24	22	3	29	5	83

**TABLE 3.5: JEMENA ELC AUDIT FIELD AUDIT SUMMARY – ASSESSMENT CODE DIFFERENCE**

Acknowledging the above summary is a retrospective view comparing observations at different points in time and under different conditions the observations, in general, indicate assessment and data recording processes provide an effective data source for vegetation compliance requirements with few significant differences recorded.

Three non-compliant spans (1 x HBRA, 2 x LBRA Declared) contained in the above sample are discussed further in Section 3.6 of this report.

The database contained a number of records where the previous assessment date was either “PT180” or “PT360” that had a post cut date indicating that assessment procedures along with cyclic pruning programs are utilised to maintain minimum clearance spaces.

### **(2) Latest recorded cut code**

The data recorded and analysed as part of this element of the audit aimed to validate the recorded “Latest Cut Code” for the span referenced against the field auditor’s observation and current assessment of the span and associated assets in the field.

The field auditor’s assessment considered the latest recorded cut code and compared it to the current span code taking into account observed clearance distance, time lapsed since cutting occurred and regrowth within the audited span.

This assessment focussed on spans where there was a latest cut code date recorded within 2016 / 2017 or 123 (23%) spans of the sample assessed. The following analysis provides a summary of 29 spans with cut dates in 2016 or 2017 where there was a difference between the recorded cut code and the assessment of the field auditor.

- 2 LBRA (Declared) spans were assigned a “PT30” by the auditor indicating, based on his observation, that vegetation remained in the clearance space post their previous cutting cycle (1 x service, 1 x mains).
- 8 spans coded “720” post their previous cut cycle were assigned a code “PT180” by the auditor indicating vegetation may require attention sooner than previously anticipated. These spans were previously cut between 78 and 387 days ago with three LBRA (Declared) spans assigned a current “P30” code.
- 19 spans were assigned a code between “PT365” and “CC” (each coded “CC720” post cutting). These spans are expected to remain compliant until their next cyclic inspection or cutting is due.

It is difficult to make a definitive conclusion from the above findings given the variables involved and time lapse between cutting activity and audit. As a general observation ELC activities appear to be achieving and maintaining clearance compliance with the field auditors assigned code agreeing with the recorded cut code for over 76% of the records dating back to February 2016 and over 85% for trees cut in the three months prior to audit.

### **(3) Latest recorded span code**

This analysis compares the “Latest Code” (span code) within the Jemena database compared to the field auditors current assessment of the span.

The field auditors assessment of the current span code aligned with the recorded latest span code for 423 (79%) spans.

Of the 110 spans where the auditors span code assessment differed from the latest recorded span code the following summary is provided:

- 15 spans were assigned a code “P30” indicating vegetation was within the minimum clearance space. These spans are discussed further in Section 3.6 of this report.
- 26 spans were assigned a code “CC” (previously “720”) by the field auditor. A further 15 spans were coded “720” by the field auditor (10 x “180”, 1 x “365”, 4 x “CC”). It is expected these 41 spans would be monitored via cyclic inspection processes.
- One span with a recorded “NC” code (previously coded “180”) was assigned a “180” code by the field auditor and two spans coded “RE” were assigned a “365” code. It is expected these would be monitored by Jemena VMS processes to ensure they remain compliant.
- 21 span previously coded between “CC” and “720” were assigned a “P180” code by the field auditor. Previously recorded span dates for these spans ranged from 31 to 420 days ago which may reflect a combination of anticipated growth (spans due for assessment), growth at a greater rate than anticipated (recently code assigned spans) or differing assessment opinion. It is recommended Jemena review this data to determine whether further actions are required to ensure minimum clearance spaces are maintained.
- 30 spans currently coded “720” were assigned a code “365” by the field auditor. Span codes were recorded between 31 and 420 days prior to the audit. It is expected these spans will remain compliant during this inspection cycle.

Table 3.6 provides a numerical breakdown of the current span code differences recorded during the audit. Details of the spans referenced in this analysis are provided in Appendix 4.



TABLE 3.6: JEMENA ELC AUDIT FIELD AUDIT COMPARISON OF LATEST CODE INFORMATION

		Auditors Assessed Current Span Code					Total
		CC	P180	P30	P365	P720	
Recorded Current Span Code	C720	1	3	5	1		10
	CC		1			4	5
	NC		1				1
	PT180			1		10	11
	PT365		4			1	5
	PT720	25	13	9	29		76
	RE				2		2
	Total	26	22	15	32	15	110

In summary, the analysis indicated a reasonable level of alignment between the field auditors current span assessment and the latest code within the Jemena database (79%) with a 44 spans having a last recorded span date between 154 and 420 days prior to the audit which may account for some of the recorded differences (i.e. regrowth).

Taking into consideration the timing of the audit and the ongoing Jemena cyclic and pre-summer assessment program, variability of factors such as growth rates and challenges relating to making visual assessments of span clearances for “long spans” the analysis indicates, in general, that current assessment and span code recording reflects the status of the assets in the field.

### 3.6 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 focussed on Jemena responsible vegetation during the field audit noting that the span code information provided related to Jemena responsible vegetation. The audit did observe that both council and ORP (Other Responsible

Person) vegetation was noted within the database. The auditor did not record any instances of vegetation within declared areas (council responsibility) where he felt there was an immediate risk to Jemena assets.

The audit noted that LBRA Declared spans within the database were currently due for inspection.

The field auditor observed 15 spans as containing noncompliant vegetation which he assessed as Jemena’s responsibility. Table 3.7 provides a summary of the audit findings in relation to current span compliance for Jemena responsible vegetation.

TABLE 3.7: JEMENA ELC AUDIT FIELD AUDIT SPAN COMPLIANCE

Jemena Vegetation Inside Minimum Clearance Space			
Spans Audited	Audited		%
HBRA	391	1	0.3%
HBRA (Declared)	75	0	0%
LBRA	0	0	0%
LBRA (Declared)	67	14	21%
<b>Total</b>	<b>533</b>	<b>15</b>	<b>2.8%</b>

A summary of non-code compliant spans was forwarded to Jemena for comment on Friday 6<sup>th</sup> October 2017. At the time of writing the report Jemena had not responded.

The following table (Table 3.8) provides a summary of the observed non-code compliant spans. Photographs of the non-code compliant spans identified are attached in Appendix 4.

There was one HBRA tree observed with growth inside the minimum clearance space which was assessed in August as a “P180”. The auditor’s observation indicated the fast growing tree was now inside the minimum clearance space. It is expected given the previous coding and notes that Jemena will manage the tree as per it’s vegetation management processes.

TABLE 3.8: JEMENA ELC AUDIT FIELD AUDIT NON-CODE COMPLIANT SPANS

TREE ID	CAMM NO	FEEDER	FIRE ZONE	VOLTAGE	Field Audit Date	LATEST DATE	LATEST CODE	Auditors Assessed Span Code	DATABASE COMMENTS	Auditors Observations/ Comments
945977	A058289	AW 14	HBRA	HV	3/10/2017	24/08/2017	PT180	P30	*NOT declared*. Prune euc below. JEN ESM key required for gate beyond this point.	Fast growing EU
976524	A088073	NH-WT	LBRA Declared	66KV	4/10/2017	10/08/2016	PT720	P30	Crossover service to #18	Xmas bush LV
976517	A088068	NH-WT	LBRA Declared	66KV	4/10/2017	10/08/2016	PT720	P30		Photinia LV
976510	A088069	NH-WT	LBRA Declared	66KV	4/10/2017	10/08/2016	PT720	P30	(ORP vegetation outside #17)	Liquidamber
976525	A088072	NH-WT	LBRA Declared	66KV	4/10/2017	10/08/2016	PT720	P30	#1, (ORP vegetation outside #1)	Calistomon LV
976519	A124986	NH-WT	LBRA Declared	CS	4/10/2017	12/09/2016	C720	P30	Loi at #15 Chapman St, Palms in laneway on cs to Public Lightning.	Palms on neutral screen service
1043693	A103063	NH-WT	LBRA Declared	66KV	4/10/2017	10/08/2016	PT720	P30	#24.	Ash and elm inside clearance space
975607	A077752	WT 04	LBRA Declared	HV	4/10/2017	3/02/2017	C720	P30	JOB #1,LOI AT #17 Harborne st for vegetation in Frensham rd (ORP vegetation outside #31)	Acer in clearance space
975616	A078004	WT 04	LBRA Declared	HL	4/10/2017	3/02/2017	C720	P30	LOI AT #18 Harborne St for vegetation in Frensham Rd.	Leader in clearance space
976468	A088066	NH-WT	LBRA Declared	66KV	4/10/2017	12/09/2016	C720	P30	LOI at #10,(ORP vegetation outside #10)	Ash in clearance
976469	A088079	NH-WT	LBRA Declared	66KV	4/10/2017	10/08/2016	PT720	P30	(ORP vegetation outside #16 Moorwatha St)	Laganaria in clearance
976529	A088077	NH-WT	LBRA Declared	66KV	4/10/2017	10/08/2016	PT720	P30		Elm in clearance
976530	A088076	NH-WT	LBRA Declared	66KV	4/10/2017	12/09/2016	C720	P30	LOI at #28,(ORP vegetation outside #30 Moorwatha St)	Crepe Myron inside clearance LV
1043695	A098721	NH-WT	LBRA Declared	66KV	4/10/2017	10/08/2016	PT720	P30	span crosses Webster Cr. #36 clear TO SKY.	Inside clearance space
1079820	A077760	WT 04	LBRA Declared	HL	4/10/2017	27/10/2016	PT720	P30	Duel curcuit with WT 7 AUSNET FEEDER.	Ash inside clearance

The remaining 14 spans observed with vegetation within the minimum clearance space were in LBRA Declared areas. Each of these spans had a latest code of “720”. Each of these spans are due for annual assessment (previously assessed between 329 and 420 days ago).

The finding in relation to LBRA Declared spans may indicate growth rates greater than anticipated, miscoding of tree responsibility or differing opinions between the auditor and previous assessment.

It is recommended that Jemena review the span coding and tree responsibility assignment for the trees assigned a non-compliant code within the LBRA Declared area to determine whether further corrective actions are required.

A further 22 compliant spans were allocated “PT180” (15 x HBRA, 7 x LBRA Declared) code by the field auditor indicating vegetation was nearing the minimum clearance space. Four of these spans had a recorded code of “365”, one “NC” and 17 either “CC” or “720”.

It is recommended that Jemena review the audit finding for these spans to ensure the current span coding is accurate and vegetation is managed via it’s ELC processes to remain clear of the minimum clearance space.

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. This was particularly evident for HBRA. Instances of Jemena responsible vegetation within the LBRA Declared inside the minimum clearance space and recommendations have been made to review the span responsibility identification and coding for some spans.

It is expected that the non compliant spans identified during the recent audit will be managed per Jemena business as usual vegetation management processes.

### 3.7 Active Vegetation Assessor Observations

During the audit the following experienced vegetation assessment personal (Field Officers) were observed by the field auditor:

- Vilnis Salitis (Newport)
- Mick Stanke (Footscray)

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

The field auditor was also accompanied by Neil McIntosh (Field Officer, Select Solutions). The field auditor also made comment in relation to Neil’s knowledge, experience and high level of ownership for the ELC task.

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 Vegetation Assessor observations is attached in Appendix 6.

### 3.8 Non-vegetation defects identified

During the course of the field assessment the auditor identified 1 line item for follow-up by Jemena to determine if further action was required. The items has been discussed further in Section 2 of the report.

**Feeder:** COO-011 **LIS:** A038861  
**Issue:** Service runs from A038861 –  
query if spreader required.

Referred to Jemena 6<sup>th</sup> October  
2017.



### 3.9 Summary Observations and Recommendations

The Electric Line Clearance field audit assessed span clearances from vegetation at 533 sites across four substations. 466 spans were HBRA (75 HBRA Declared) and 67 spans were LBRA Declared.

The field auditor assigned, based on his observations at the time of the audit, a different current span code than currently recorded for a total of 110 spans.

- The field audit assigned a code to 15 spans indicating vegetation was inside the minimum clearance space. One HBRA span on COO (latest code “180” with fast growing tree noted) and 14 LBRA Declared spans on WT (currently due for assessment).
- A further 21 currently compliant spans were assigned a code “180” by the field auditor indicating vegetation may enter the clearance space earlier than previously anticipated. One span assigned a “180” code had a latest code of “NC” but was previously assessed as “180” indicating works were still required to be completed.
- 73 spans were recoded either “365”, “CC” or “720” by the field auditor indicating they would most likely remain compliant until their next annual pruning or assessment.

The auditors assigned code for the remaining 423 spans (79%) matched the currently recorded code within the Jemena database.

In relation to cutting activity the database indicated that 123 of the spans had a recorded cut date in 2016/17. There were 29 spans where the auditor’s assessment indicated a different cut code to that recorded in the database. As a general observation cutting activities appear to be achieving and maintaining clearance compliance with the field auditors assigned code agreeing with the recorded code for over 76% of the records dating back to February 2016 and over 85% for trees cut in the three months prior to audit.

Table 3.9 provides a summary overview of the audit findings.

The following section of the report provides a further summary of the audit findings,

observations and recommendations.

**TABLE 3.9: OVERVIEW OF JEMENA ELC FIELD AUDIT FINDINGS**

Sub	Spans Assessed	Location Information Correct	Spans - Non-Compliant Vegetation	Spans Code “180” Different to Latest Code	Spans – Audit Code Different to Latest Code
COO	242	242	0	7	43
STO	90	90	0	4	20
WT	67	67	14	7	24
AW	134	134	1	4	23
<b>Total</b>	<b>533</b>	<b>533</b>	<b>15</b>	<b>22</b>	<b>110</b>

#### *The accuracy of inspection data and work recommendations*

- Jemena’s database information was in general validated as accurate, easy to follow and contained information consistent with the requirements of Jemena’s ELCMP.
- It was the auditors opinion that the latest recorded assessment code for 450 (84%) was most likely accurate at the time of assessment. The auditor recorded, based on his observation, what he believed was the most likely span assessment code for the remaining 83 (16%) of spans at the time of assessment.
- There was evidence within the full dataset information provided, and the sample selected for audit, to indicate that assessment activity is a catalyst for cutting activity with a number of records previously assessed as either “P180” or “P30” having a completed compliant cut code assigned post their assessment date.
- Jemena review the audit observations for compliant spans assigned a different current span code by the auditor to determine whether any further action is required to ensure spans remain compliant and data accurately reflects span conditions (in particular 85 HBRA sites with a latest recorded date between May-August 2017).

---

***Vegetation clearance standards and compliance with the Code of Practice for electric line clearance***

- Information within Jemena's database indicates it was progressing with its annual and pre-summer assessment program. Annual assessments were yet to be completed on LBRA declared spans linked to Sub WT at the time the field audit was undertaken.
- 1 HBRA span (assessed 40 days prior to the audit) and 14 LBRA Declared spans were assigned a code indicating vegetation was within the minimum clearance space (2.8% of the sample). The audit noted that the spans within the LBRA Declared were yet to have annual inspections completed. It is expected Jemena will manage the spans identified with vegetation inside the minimum clearance space per its ELC management processes.
- It is recommended that Jemena review the audit finding in relation to LBRA Declared vegetation assigned "PT30" codes during the audit to confirm assessment activities are accurately identifying and coding Jemena responsible vegetation within declared areas requiring action to ensure vegetation remains clear..

***Vegetation management data reflects the status of field observations made at the time of the audit***

- The field audit verified the span identification information was accurate for all sites audited and each of the records provided contained previous inspection date, cutting information (where applicable) and span coding details.
- The field auditor did assign a different current span code to 110 spans based on his observations at the time of the audit. 44 spans had a latest recorded span code greater than 154 day prior to the audit which may account for some of the code differences. 66 spans had a latest recorded code within 78 days of the audit.
- Taking into consideration the timing of the audit and the ongoing Jemena annual assessment and cutting programs (noting Sub WT LBRA Declared annual assessments were not completed as yet), variability of factors such as growth rates and challenges relating to making visual assessments of span clearances for "long spans" the analysis indicates, in general, that current assessment and span

code recording reflects the status of the assets in the field.

- It is recommended that Jemena review the data for 22 (15 x HBRA, 7 x LBRA Declared) spans where the field auditor assigned a code "180" (currently coded "720 x 16, "365" x 4, "cc" x 1, "NC" x 1) to confirm the spans will remain compliant via its ELC management processes.
- The desktop review did note the absence of code "PT180" from both the current EMCMP and BFMP however is still appears to be an active code used in the vegetation assessment database. It is recommended Jemena provide confirmation to ESV in relation to whether code "PT180" remains an active code for span assessment processes.
- The audit recommends that Jemena continue to utilise and develop its ELC procedures to ensure annual inspection programs are completed efficiently and vegetation database management is maintained to a high level of currency and accuracy.

## 4. Acknowledgement

---

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

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

- [REDACTED] (for assisting with each day with the BFM field audits).
- [REDACTED] (for assisting with each day with the ELC field audits).
- [REDACTED] (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: Key Documents and References

Appendix 2: Audit Plans

Appendix 3: Jemena BFM Field Audit Database and Photo's

Appendix 4: Jemena Field Audit Database and Photo's

Appendix 5: Asset Inspector Checklist

Appendix 6: Vegetation Assessor Checklist

## Appendix 1: Key Documents and References

---

Document Title	Version	Date
Electricity Safety (Bushfire Mitigation) Regulations 2013	4	1 May 2016
Electricity Safety (Electric Line Clearance) Regulations 2015	1	28 June 2015
Jemena Bushfire Mitigation Plan – Electricity Distribution Network	1.0	30 June 2017
Jemena Asset Inspection Manual	3.0	29 June 2016
Jemena Electric Line Clearance Management Plan <i>[Not approved by ESV at time of audit]</i>	1.0	30 March 2017
Jemena Asset Management Database extract	-	30 August 2017 (from ESV)
Jemena Vegetation Management System Database extract	-	5 September 2017 (from ESV)



# Appendix 2: Audit Plans



## PROJECT AUDIT PLAN

ABN 28 089 981 215  
P O Box 132  
GOLDEN SQUARE 3555  
PHONE: (03) 5442 8900  
FAX: (03) 5443 3348  
Email: [admin@erppower.com](mailto:admin@erppower.com)

PROJECT: AUDIT PLAN – BUSHFIRE MITIGATION (ASSET CONDITION) AUDIT  
DATE: 22 August 2017

Item #	Description	Details														
1	Client Client Contact	Energy Safe Victoria [REDACTED]														
2	Auditee Auditee Contact	Jemena Electricity Networks TBC														
3	Auditor/s	[REDACTED] – ERP (Audit Lead) – 0438 018 338 [REDACTED] – ERP (Field Auditor) - 0420 721 970														
4	Audit Objective and Scope	Assess the level of conformance of Jemena Electricity Networks BFM field activities with the requirements of the Electricity Safety (Bushfire Mitigation) Regulations 2013.														
5	Audit Criteria	Electricity Safety (Bushfire Mitigation) Regulations 2013														
6	Timeframes	<table><tr><td>Review Audit Data</td><td>18 September 2017</td></tr><tr><td>Submit Audit Plan to ESV &amp; DB</td><td>28 August 2017</td></tr><tr><td>Confirm Audit Field Contact</td><td>18 September 2017</td></tr><tr><td>Commence Field Audit</td><td>25 September 2017</td></tr><tr><td>Complete Field Audit</td><td>4 October 2017</td></tr><tr><td>Interim Audit Results to ESV</td><td>11 October 2017</td></tr><tr><td>Interim Audit Results to DB</td><td>11 October 2017</td></tr></table>	Review Audit Data	18 September 2017	Submit Audit Plan to ESV & DB	28 August 2017	Confirm Audit Field Contact	18 September 2017	Commence Field Audit	25 September 2017	Complete Field Audit	4 October 2017	Interim Audit Results to ESV	11 October 2017	Interim Audit Results to DB	11 October 2017
Review Audit Data	18 September 2017															
Submit Audit Plan to ESV & DB	28 August 2017															
Confirm Audit Field Contact	18 September 2017															
Commence Field Audit	25 September 2017															
Complete Field Audit	4 October 2017															
Interim Audit Results to ESV	11 October 2017															
Interim Audit Results to DB	11 October 2017															
7	Summary of relevant documentation	Electricity Safety (Bushfire Mitigation) Regulations 2013. Asset Inspection Manuals and database extract for Jemena Electricity Networks.														
8	Methodology	<ul style="list-style-type: none"><li>• Desktop audit of Asset Inspection Manuals and database extract</li><li>• Discussions with Responsible Officer/s (as required)</li><li>• Field audits against database contents</li><li>• Field interview/ conversation with minimum 2 x field Inspector/ assessors</li><li>• Field observation of a 2 x field Inspector/ assessors</li></ul>														

Electrical Resource Providers Pty Ltd

YOUR POWERLINE DESIGN, CONSTRUCTION AND MAINTENANCE PROFESSIONALS



## PROJECT AUDIT PLAN

ABN 28 089 981 215  
P O Box 132  
GOLDEN SQUARE 3555  
PHONE: (03) 5442 8900  
FAX: (03) 5443 3348  
Email: [admin@erppower.com](mailto:admin@erppower.com)

PROJECT: AUDIT PLAN – ELECTRIC LINE CLEARANCE ASSESSMENT  
DATE: 22 August 2017

Item #	Description	Details														
1	Client Client Contact	Energy Safe Victoria [REDACTED]														
2	Auditee Auditee Contact	Jemena Electricity Networks TBC														
3	Auditor/s	[REDACTED] – ERP (Audit Lead) – 0438 018 338 [REDACTED] – ERP (Field Auditor) – 0407 689 150														
4	Audit Objective and Scope	Assess the level of conformance of Jemena Electricity Networks ELCMP field activities with the requirements of Electricity Safety (Electric Line Clearance) Regulations 2015.														
5	Audit Criteria	Electricity Safety (Electric Line Clearance) Regulations 2015														
6	Timeframes	<table><tr><td>Review Audit Data</td><td>18 September 2017</td></tr><tr><td>Submit Audit Plan to ESV &amp; DB</td><td>28 August 2017</td></tr><tr><td>Confirm Audit Field Contact</td><td>18 September 2017</td></tr><tr><td>Commence Field Audit</td><td>25 September 2017</td></tr><tr><td>Complete Field Audit</td><td>4 October 2017</td></tr><tr><td>Interim Audit Results to ESV</td><td>11 October 2017</td></tr><tr><td>Interim Audit Results to DB</td><td>11 October 2017</td></tr></table>	Review Audit Data	18 September 2017	Submit Audit Plan to ESV & DB	28 August 2017	Confirm Audit Field Contact	18 September 2017	Commence Field Audit	25 September 2017	Complete Field Audit	4 October 2017	Interim Audit Results to ESV	11 October 2017	Interim Audit Results to DB	11 October 2017
Review Audit Data	18 September 2017															
Submit Audit Plan to ESV & DB	28 August 2017															
Confirm Audit Field Contact	18 September 2017															
Commence Field Audit	25 September 2017															
Complete Field Audit	4 October 2017															
Interim Audit Results to ESV	11 October 2017															
Interim Audit Results to DB	11 October 2017															
7	Summary of relevant documentation	Electricity Safety (Electric Line Clearance) Regulations 2015. ELCMP and ELC Database extract for Jemena Electricity Networks.														
8	Methodology	<ul style="list-style-type: none"><li>• Desktop audit of ELCMP and Database</li><li>• Discussions with Responsible Officer/s (as required)</li><li>• Field audits against database contents</li><li>• Field interview/ conversation with minimum 2 x field Inspector/ assessors</li><li>• Field observation of a 2 x field Inspector/ assessors</li></ul>														

Electrical Resource Providers Pty Ltd

YOUR POWERLINE DESIGN, CONSTRUCTION AND MAINTENANCE PROFESSIONALS

## Appendix 3: Jemena BFM Field Audit Database and Photo's

---

See separate attachment.

## Appendix 4: Jemena ELC Field Audit Database and Photo's

---

See separate attachment.

10/12/2017

COMMERCIAL-IN-CONFIDENCE

36

10/12/2017

## 37