AusNet Transmission Group Pty Ltd

Transmission Revenue Review 2017-2022

Supporting RIN: RINs Schedule 1 - 7.12.a.AusNet Services (Transmission) - Vegetation Management Audit Reports

Submitted: 30 October 2015

Electricity Safety (Bushfire Mitigation) Regulations 2013 & Electricity Safety Act 1998

AUDIT No: CM-1536

Audit Report July 2015

AusNet Services (Transmission)

Report Details:

Network	AusNet Services (Transmission)
Audit No:	CM-1536
Regulation:	Electricity Safety (Bushfire Mitigation) Regulations 2013 Electricity Safety Act 1998
Audit Topics	Bushfire Mitigation
Audit Dates	5 March 2015 – Desktop review 11–12 March 2015 – Field Audit (Eildon-Mt. Beauty feeder line)
Audit Team Leader	Roland Tan, Lead Auditor
Audit Team Member	Ed Micallef, Senior Engineer, Safety Management Systems
Auditee Attendance	Desktop: HSEQ Systems Manager Bushfire Mitigation Manager Network Safety Manager Network Safety & Risk Manager Field: Crew Leader, Transmission Lines Vegetation & Easement Field Officer for audit area
Sites Visited	Mount Beauty – Eildon (MBTS-EPS) 220kV Line

Signatories

Title	Name	Signature	Date
Lead Auditor	Roland Tan	Roland Tan	28 May 2015
Manager, EIS Eastern Operations	B. Fox	Brett Fox	2 July 2015
Manager, Practice & Quality	Ian Burgwin	Ian Burgwin	2 July 2015

Summary

This is a report of the bushfire mitigation plan audit conducted at AusNet Services Transmission head office in Southbank and sampling (27) of the towers on its Mount Beauty - Eildon (*MBTS*-EPS) 220kV feeder line. The audit was limited in scope and provides a snap-shot of AusNet Services implementation of their bushfire mitigation plan, field activities and controls in meeting the legislative requirements.

The objective of the audit was to determine AusNet Services compliance with the Electricity Safety Act 1998, the Electricity Safety (Bushfire Mitigation) Regulations 2013, and approved bushfire mitigation plan. The audit occurred during the period 5–12 March 2015. A desktop review was conducted on the 5 March 2015 and was followed up with a field audit on the 11 and 12 March 2015.

Bushfire mitigation activities on the transmission network, as audited, were found generally to be effective and operating in accordance with the approved bushfire mitigation plan. However, there are some findings contained in this report to be addressed as soon as practicable.

One (1) NC, and two (2) ARAs were raised as a result of this audit; they are described in detail in section 2.6 of this report.

In summary the audit findings were:

Document & Record Control

ARA 1 – Document control did not demonstrate the consistent use of approved templates as non-approved Condition Assessment forms were utilised in the inspections of towers.

Operational Control

ARA 2 – Warning and directional signage were not maintained.

NC 1 – An AusNet Services employee accompanying the auditors climbed a tower without appropriate PPE.

The ESV auditors appreciate the assistance provided by AusNet Services in the planning, delivery and reporting of this audit.

Contents

1. Introduction

1.1 Purpose

The aim of the Energy Safe Victoria (ESV) 2014–15 bushfire mitigation audit on AusNet Services transmission network was to assess compliance with the *Electricity Safety Act 1998*, the *Electricity Safety (Bushfire Mitigation) Regulations 2013*, and approved bushfire mitigation plan. This provides a snap shot of the preparedness of the AusNet Services transmission network for the upcoming bushfire season.

1.2 Background

ESV is the independent technical regulator responsible for electricity, gas and pipeline safety in Victoria. ESV was created under the *Energy Safe Victoria Act 2005*, and has objectives, functions and responsibilities conferred on it under this Act and the *Electricity Safety Act 1998*, *Gas Safety Act 1997* and *Pipelines Act 2005 (the Acts)*. The role of ESV is broad and includes regulating the design, construction and maintenance of electricity, gas and pipeline networks across the State. ESV has a team of officers who audit electrical and gas safety in businesses across Victoria.

ESV is responsible for reviewing major electricity company (MEC) and specified operator performance in meeting the requirements of the *Electricity Safety (Bushfire Mitigation) Regulations 2013*. The audits ESV conducts against these regulations provides an insight into the performance in mitigating bushfire risk.

This audit is the second of two transmission audits for the 2014/15 period.

On 20–21 August 2014 ESV audited the 500 kV lines (HWTS–CBTS 4, HWTS–ROTS 3 and CBTS–ROTS 4 operated by AusNet Services.

1.3 Description of Network

The AusNet Services transmission network consists of 6,572km of powerlines and approximately 13,000 towers. Voltages include 500kV and 220kV AC from Victorian power station switchyards, and 330kV and 275kV AC interconnections with NSW and SA respectively. There is also 66kV AC sub-transmission interconnecting with the distribution network across Victoria.

1.4 Scope

This audit scope included a desktop review of the bushfire mitigation plan and related documentation to which is referenced at the head office (see Appendix B) with the following managers on the 5 March 2015:

- HSEQ Systems Manager
- Bushfire Mitigation Manager
- Network Safety Manager
- Network Safety & Risk Manager

Subsequently a field audit across the Eildon – Mt. Beauty 220kV feeder line was undertaken on the 11 – 12 March 2015 with two representatives of AusNet Services:

- Crew Leader, Transmission Lines
- Vegetation & Easement Field Officer responsible for the area

1.5 Audit Method

ESV's Lead Auditor (Roland Tan) and bushfire mitigation subject matter expert (Ed Micallef) conducted a desktop review at the head office of AusNet Services on 5 March 2015. Present were the four managers responsible implementing the bushfire mitigation plan.

ESV's Lead Auditor (Roland Tan) and bushfire mitigation subject matter expert (Ed Micallef), together with two representatives from AusNet Services, inspected the field assets on 11–12 March 2015. 27 towers were selected on the day of the audit to confirm:

- that the assets had been inspected and maintained (as per the asset inspection manual), and
- that the observations in the field matched AusNet Services' records.

AusNet Services submitted the names, phone numbers and email address for the appropriate people to contact to assist with the audit.

AusNet Services provided copies of appropriate records, documents and guidance. They also provided ready access to each audit site and a suitable meeting room for the audit team for the audit duration.

AusNet Services provided an appropriate vehicle for each site visit, including image stabilised binoculars to review the condition of assets.

1.6 Audit Grading

Audit findings were graded as follows:

Opportunity for Improvement (OFI): The audit found general compliance with the process or procedure that is in line with statutory and business requirements. However the audit identified an opportunity for the process or procedure to be improved.

Area Requiring Attention (ARA): The audit found evidence of non-compliance that appeared to be minor or a "one off" situation and did not appear to pose a safety risk or major deviation to the process or procedure, but required a formal review and a corrective action response.

Non-Conformance/ Non-Compliant (NC): The audit found evidence of non-compliance with the applicable process or procedure, and/or the process or procedure did not meet statutory or business requirements. A formal NC report is required to be separately documented and requires a formal review and a corrective action response from the auditee.

2. Results and Discussion

2.1 Referenced Documentation

The audit reviewed the documents detailed in appendix A.

2.2 Previous Audit Findings

The three ARAs resulting from the AusNet Services audit on the 20 and 21 August 2014 (HWTS – CBTS 4, ROTS 3 and ROTS 4 of the 500kV lines) were closed out by E. Micallef based on the responses made in the letter presented to ESV on the 5 November 2014 by AusNet Services Bushfire Mitigation Manager.

2.3 Audit Description

The audit plan for the field audit was emailed to AusNet Services HSEQ Management Representative on 2 March 2015 by E. Micallef of ESV; receipt was confirmed on 3 March 2015. Several documents relating to the field audit were provided, including the *condition assessment survey* during Jan-Feb 2014 by AusNet Services Bushfire Mitigation Manager.

The request to conduct a desktop review was conveyed and agreed with AusNet Services HSEQ Management Representative on 20 February 2015 by R. Tan of ESV; and confirmation was made to undertake the audit on the 5 March 2015. The audit agenda for the desktop review included:

- Bushfire mitigation plan organisational structure
- Responsibilities and authorities
- Bushfire mitigation policy and objectives
- Consultation and communication
- Awareness, competency and training
- Risk management
- Document and record control
- Operational control and monitoring
- Internal audits.

2.4 Desktop Review

A desktop review was held in AusNet Services head office on the 5 March 2015 covering the following elements (details are contained in appendix B):

- Responsibility & authority
- Policy & objectives
- Consultation and communication
- Awareness, competency and training
- Risk management
- Document and record control
- Operational control
- Monitoring & measurement
- Internal audits.
- Investigations, Corrective & Preventive Action

2.5 Field Audit

The field audit took place along the *MBTS-EPS 220kV Line* on 11–12 March 2015, auditing 27 towers located along the line as listed below.

Tower numbers audited: 1, 2, 11, 12, 13, 41, 42, 43, 85, 86, 126, 127, 128, 157, 158, 159, 197, 198, 199, 243, 244, 245, 277, 278, 279, 346 and 354.

As detailed in appendix C their condition and queries about their condition were conveyed to AusNet Services, and responses from AusNet Services received (italicised).

2.6 Audit Findings

No	BMP Clause requirements/as set along 220 kV feeder line	Finding	Compliance Grading
1	Document & Record Control	a) Non approved Condition Assessment forms were utilised in the inspections of tower nos. 55, 140, 218 and 310 contrary to r.7(n)(iv)	ARA 1
2	Operational Control	a) Warning signage was not being maintained at Tower 041 contrary to section 9.2 in LPP 09-01 issue 5 dated 1 Aug 2014 and drawings T14-173-33 rev D and T14-173-62 rev B.	ARA 2
		b) One under crossing sign at Tower 243 was in the wrong location and another was missing (AusNet Services span); wrongly located under crossing sign was not on dog leg contrary to T14/173/33 rev D and T14/173/62 rev B and r.7(n)(v) of the Electricity Safety (Bushfire Mitigation) Regulations 2013.	
		c) The AusNet Services representative who accompanied the ESV auditors climbed tower 279 without first being equipped with the appropriate safety equipment contrary to section 2.2 in LPP 14-07 issue 2 dated 21 Mar 11 Climbing and Working Aloft – contrary to r.7(n)(v) of the Electricity Safety (Bushfire Mitigation) Regulations 2013.	NC 1

3. Conclusion

The desktop assessment of the bushfire mitigation plan and subsequent field audit of the asset on the *MBTS-EPS 220kV feeder line* (Eildon – Mt. Beauty) suggests that the AusNet Services transmission network is generally compliant with its Bushfire Mitigation Plan. However, there was one (1) NC, and two (2) ARAs identified during the course of this audit for rectification and offer opportunities for further improvement.

4. Recommendations

The findings identified in this audit should be reviewed and remedial action implemented. The progress of these rectifications will be monitored by ESV to ensure their successful completion and effectiveness to minimise the potential of recurrences.

Appendix A

No.	*Criteria: Bushfire Mitigation*
1	**BFM Plan** BFM 10-02 Bushfire Mitigation Plan (Issue 17 dated 25/06/2014) Attachment 24 – BMP 10-02 Bushfire Mitigation Plan – Transmission
2	**Asset Inspection Documentation & Documents** • Asset Inspection procedures o 4111-1 Asset Inspection Manual (Issue 8 dated 12/12/2012) o Attachment 3 – LPP 09-06 Condition Assessment of Overhead Lines (Issue 1 dated 1/08/2014) o Attachment 4 – LPP 09-01 Patrolling of Overhead Lines (Issue 5 dated 1/08/2014) o MBTS-EPS Lines Jan-Feb 2014 o Attachment 1 - BFM 10-06 Vegetation Management Plan Transmission (Issue 23 dated 20/03 2014) o Attachment 2 – TI-435-20-31 o Attachment 11 - HSP 05-02 Treatment of European Wasp and Bee Nests o Attachment 8 - TI-435-20-33 o Attachment 9 - TI-435-20-62 o Attachment 12 – LPP 08-05 Damper Installation o Attachment 14 – LPP 14-07 Climbing and Working Aloft • A copy of asset related condition reports for the MBTS-EPS 220kV feeder line o Condition Assessment Survey Jan-Feb 14 o Attachment 5 – Condition Assessment Normal Inspection Audit HWTS-SMTS Tower 1 o Attachment 6 – Condition Assessment Normal Inspection Audit HWTS-SMTS Tower 3 o Attachment 7 – Condition Assessment Normal Inspection Audit HWTS-SMTS Tower 11 o Attachment 10 - Condition Assessment Normal Inspection Audit HWTS-SMTS Tower 43 o Attachment 13 - Condition Assessment Normal Inspection Audit HWTS-SMTS Tower 198 o Attachment 15 - Condition Assessment Normal Inspection Audit HWTS-SMTS Tower 344 o Attachment 16 - Condition Assessment Normal Inspection Audit HWTS-SMTS Tower 346 o Attachment 17 - Condition Assessment Normal Inspection Audit HWTS-SMTS Tower 346
3	**Supplementary Procedures & Documents** o QMS 20-04 Document and Data Control (Issue 9 dated 19/12/2014) o QMS 20-02 Records Management (Issue 3 dated 1/12/2006) o QMS 20-03 Records Retention Schedule (Issue 2 dated 15/07/2013) o QMS 21-21 Transmission Line Condition Assessment Audit (Issue 1 dated 11 /01/2013) o QMS 21-10 Audit (Issue 10 dated 12/08/2013) o HSEQ Management System Audit Plan 2014-17 (QMS 21-11-1) o Attachment 21 – 30-4006-04 Volume 2 Crisis and Emergency Management o NSMC Charter (V6 dated Jan 14) o Role Charter – Dave Harden CEOT Support Manager

- Role Charter – Karen Miller AE-Asset Manager Lines

4 Other

- Email/ Correspondence
  - Sample of rebranding changes of brochures (Email correspondence wrt Maintenance Checklist 17-24Feb15)
  - Attachment 18 – Maribyrnong Palms Plan
  - Attachment 19 – Maribyrnong Palms Letter
  - Attachment 20 – Edgars Creek Removals

- Meeting Minutes
  - Minutes of NSMC dated 20th June 2014
  - Minutes of NSMC (BMP) dated 20th June 2014
  - Transmission lines practices working group (LPWG) minutes on the 23rd Sep 14, Rowville

- Reports
  - Network Safety Report Jan 2015
  - Attachment 22 – Exercise Icarus Report Ver 1 Final
  - Attachment 23 – Powercor Services Training Matrix

Appendix B

Element	Regulation	Observation
Responsibility & Authority	R7(1) (b) Preparation of Plan (c) Carrying out plan (d) Emergency contact	Responsibilities for planning and implementing the BMP and emergency contact is identified in section 7 of BMP 10-01 (issue 20 dated 25 June 2014). *Service Delivery* and *Select Solutions* are the overseeing departments for AusNet Transmission's BMP; the former is responsible for line maintenance whereas the latter is responsible for vegetation clearance. Role charters (position descriptions) were available for CEOT Support Manager and Asset Engineering- Asset Manager lines.
Policy & Objectives	R7(e) BM policy	Bushfire mitigation policy is identified in section 3 (p.8)
	R7(o) Policy to assist fire control authorities in investigating fires near network	Key objectives are identified in section 2.2 in BMP (p.7) Section 3.2 of the BMP describes the assistance provided to fire control authorities in their investigation of fires near supply networks.
	R7(f) BM objectives R7(q) Description of measures to assess performance of MEC for BMP	Fire prevention and communication with stakeholders is mentioned in section 2.2 in p.7 and section 3.1 in p.8 where there is a requirement for "Consultation with municipalities, landowners, …" and "…raise awareness of all aspects of bushfire mitigation…". Public awareness documents are available in the company's website (under the heading 'Maintaining Private Lines' and "Maintenance – Easement Use')

		MEC BMP performance measures – monthly *Network Safety Report* January 2015 identify KPIs (Transmission BFM Index, Incidents – Line Drops, Explosive Failure, Transition Plans – 37-month HBRA plan); 19 incidences of overdue inspections (thermal) were identified in August and September and three more in October 2014.
Consultation & Communication	R7(g) Description, Map or Plan	Geographic area of responsibility identified in section 6, Fig 6-1 and Appendix 2.
	R7(p) Procedure for enhancing public awareness of: (i) public owners responsibilities for maintenance/ mitigation (ii) MEC inspection private electric lines Sect 113A(3) BMP available on AusNet's website and office	Section 14 Public awareness and Table 14-1 describes brochures for public information and campaigns to promote the mitigation of bushfire. Public awareness documents are available in the company's website (under the heading 'A Guide to Living with Transmission Line Easements' and 'Transmission – Easement Use'). One example of web document amendment prior to public dissemination was observed from the example of the email correspondence between the Corporate Relations Coordinator and the bushfire Mitigation Manager on the 17 and 24 February 2015 for the updated of the Maintenance Checklist on the website
Awareness, training & competency	R7(j) Approved ESV training course R7(k) Competencies of persons other than R7(j)	Section 10.2 in the BMP identifies only qualified transmission linesman, as listed in the *AusNet Services Training Register*, as being able to complete asset inspection work i.e. holding the qualification described in Appendix 3. Section 13.6 Training describes the training required of workers. Section 13.7 in the BMP identifies Inspector competency through sampling rate and assessment templates.
Risk management	R7(h) Preventative strategies/ programs	Preventative Strategies identified in section 8 of the BMP: General asset maintenance and replacement – referred to as *Asset Inspection Manual*, and *Targeted Asset Replacement* – currently pursuing the replacement of 220KV insulator strings. Risk model of BMP identified in Fig.8-1 Asset Management Strategy Transmission Lines. Asset Management Strategy Transmission Line Insulators AMS 10-75 issue 8 approved and dated 13 December 2012. Asset Management Strategy AMS 10-77 issue 1 approved and dated 18 January 2013. Most of the strategies were revised in 2013 and the latest in 2014 i.e. AMS 10-68 Secondary Systems on 16 October 2014.
Document & Record Control	R7(n)(iii) Procedure to identify	BMP was emailed to R. Tan on 20 Feb 2015 by AusNet Services HSEQ Systems Manager.

	deficiencies of BMP/ implementation	BMP Electricity Transmission Network (BFM 10-02 issue 17) approved and dated 25 June 2014.
	R(7)(n)(iv) Procedure to change BMP/ implementation to rectify deficiencies	Several documents were reviewed for their document control requirements: Network Safety Management Committee (NSMC) meeting minutes were approved on 20 June 2014. Document & Record Control procedure QMS 20-04 issue 9 was approved by AusNet Services HSEQ Systems Manager on 19 December 2014. *LPP 09-00 Patrols, Fires and Vegetation* with listing of subsidiary documents: 09-01 Routine patrolling of overhead lines rev 4 dated 1st December 2008, 09-03 Fires on Easements rev 3 dated 1 December 2008, 09-06 After Bushfire Policy. Section in the QMS 20-03 Record Retention Schedule identified that BFM audit records are maintained for seven years.
Operational Control	R7(h) Preventative strategies/ programs R7(l) Op & Maintenance Plans: i. Event of fire ii. During total fire ban day iii. During fire danger period	Section 8 describes the preventative strategies. The Asset Management Strategy, Transmission Lines (AMS 10-75) utilises two programs to mitigate bushfire risk: The first program comprise of cyclic asset inspection activities based on assessment criteria contained in the *Asset Inspection Manual*. The other program complements the general maintenance program and targets asset replacement - derived from the analysis of asset condition and performance monitoring. Currently this program is the replacement of 220kV insulator strings. Scheduled inspections are conducted with maintenance (if necessary) of assets (i.e. foundations, anti-climbing devices, line hardware, insulators and conductors & ground wire. Section 8.2.1 explains that separate vegetation inspections and maintenance are being scheduled. The frequency of both asset and vegetation inspections (and maintenance where necessary) is summarised in Table 9-1. Section 7.2. in the *January 2015 Network Safety Report* identifies that the 220kV insulator strings had been completed. Section 11.2 identifies restricted activities on Total Fire Ban (TFB) days e.g. EDPI permit ref FM/18/3060 on 6 October 2014 to 30 June 2015, CFA ref nos: HQ14/15 S40 032, HQ 14/15 S40 033 on 27 August 2014 for the period 1 September 2014 to 1 June 2015. Supported by email from the Bushfire Mitigation manager to AusNet Services regional area managers.
Monitoring & Measurement	R7(h) Preventative strategies/ programs	Section 8.2.1 explains that inspection scheduling completed via Maximo – facilitates maintenance and replacement activities and issuance of work orders (Section 10.1).
	R7(i) Inspection	Section 13.4 Inspection Effectiveness.

	Plan: HBRA=37mths; non HBRA = 61mths	Section 13.7.2 Monitoring explains that audit results identify deficiencies and trends.
	R7(n)(i) monitor implementation of BMP R7(n)(v) Procedure to monitor effectiveness of inspections	Inspections are conducted in two phases by two separate inspectors – as described in QMS 21-21 issue 1 approved and dated 11 January 2013. Appendix C Inspection Condition Assessment Sheet in LP 09-06.
Internal Audit	R7(n)(ii) Audit implementation of BMP R7(n)(vi) Procedure to audit effectiveness of inspections	Procedure and plan (i.e. 2014–2015) for planning, conducting and reporting on internal audits are available. Section 13.2 in the BMP describes the audit of the BMP. QMS 21-10 Audit issue 10 approved and dated 12 August 2013.
Investigations, Corrective & Preventive Action	R7(m) Investigations, analysis and methodology	As per Section 13.7.2 in the BMP, results of audits and NC are documented and managed via AusNet Services IMS (Issues management system) and implementation of actions is monitored via the *Network Safety Management Committee*. The *Action Register* identifies investigations initiated during the monthly NSMC meetings e.g. Morwell Terminal Station Incident on 23 May 2014, Crossarm Testing on 23 May 2014, etc. Section 4.5 in QMS 21-10 describes the *Corrective Action* procedure arising from audits and incidents; *Issues Management System (IMS) Register* is the record of all incidents (e.g. ref nos. 354930 initiated on 25 February 2015 still open and due on 30 September 2015). These incidents (those requiring immediate action for example ref. nos. 354784) are reviewed during the NSMC meetings (e.g. in January 2015). The monthly *HSEQ Scorecard* encompasses more than the electricity requirements and identifies the status of corrective actions (e.g. February 2015). In the email of 28 April 2015, AusNet Services HSEQ Systems Manager advised that from 1 April 2014–31 March 2015 there had been 15 corrective actions and seven improvement initiatives raised; all had been closed-out. There have been 172 *System Incident Reports* (SIRs) logged between 1 April 2014 and 30 March 2015; five remain open as at 31 March 2015. There have been 838 *Defective Apparatus Reports* (DARs) logged between 1 April 2014 and 30 March 2015; DARs are currently not being tracked as they are auto logged into Maximo (work management system) and managed as an operational activity. By 4 May 2015, Maximo will be migrated to SAP and it is expected that DAR will be differentiated from other work activities.

Appendix C

Tower 1
CCT1 has vibration dampers (VD) but CCT 2 did not have VD. Consistently throughout this audit one circuit on the tower had vibration dampers installed but not the other..
Can AusNet Services provide their methodology for installing vibration dampers on transmission lines? Can AusNet Services provide details of how and why one circuit on this line has vibration dampers and the other does not?

The CCT 2 was strung first (~1955) and not fitted with dampers. CCT 1 was strung later (~1960) and is mostly fitted with dampers. Retrofits have been on an ad-hoc basis as opportunities have arisen.

Dampers are generally fitted when other hardware requires replacement.

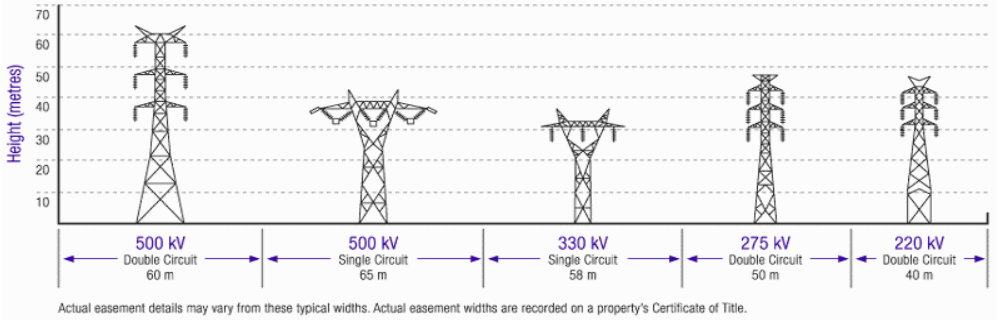
There have not been any vibration related conductor failures issues to warrant a specific retrofit program for the line.

There were blackberries growing under the tower. What is AusNet Services' policy regarding blackberries or other vegetation under their towers? Please provide details.

There is no formal procedure for managing grass or weeds (i.e. blackberries), they are treated as "vegetation"; species with a mature height no greater than 0.5m. If species do grow taller than 0.5m they will be actioned if they impede access to the tower for line works. Grass around the tower base is acceptable unless the Lines Group think it is unsafe. Generally grass is never an issue as we encourage some growth around the towers to stop erosion.

Vegetation near transmission line towers is managed in accordance with the BFM 10-06 Vegetation Management Plan (Transmission), [Attachment 01], section 4.2.9, which states:

"1. Vegetation near transmission line towers will be managed to provide clear areas for operation and work safety. Figure 4.2 shows the types of tower construction used by SP AusNet (Transmission).



2. Vegetation clearance distances around towers vary depending on voltage and tower construction type but may be limited to species with a mature height no greater than 0.5m. Vegetation clearance requirements around towers are set out in the Transmission Line Clearing Requirement Charts – 435 Series Drawings [Attachment 02].

3. Exceptions may occur in situations of low bushfire fire risk (LBRA) such as private backyards or parklands in urban areas, e.g. Metropolitan Melbourne. In these situations it could be expected that vegetation could be allowed to come within 5m horizontal distance from the tower steelwork at ground level. Other variations may be allowed depending on the risk assessed by the Vegetation Management Group."

Tower 2

Ok

Tower 11
Light rust. Please provide record for Tower 011.

The corrosion assessment is conducted in accordance with procedure [Attachment 04]. Table 1 of the procedure provides a priority rating where findings are matched against the table. The attached condition assessment [Attachment 07] dated 9/1/2014 identifies the level of corrosion as rating 2. This rating is graded as PT912 in table 1, of procedure LPP 09-01, meaning re-inspect in 3 years.

Tower 12
Ok

Tower 13
Ok

Tower 41
Missing signs from tower legs.

The tower will be re-inspected and signage will be installed in accordance with AusNet Services procedures [Attachment 08 and Attachment 09].

Tower 4
Ok

Tower 43
Brent brace. Please provide AusNet Services inspection record of this tower and standard for braces.

The tower brace assessments are conducted in accordance with procedure LPP 09-01 Patrolling of Overhead Lines [Attachment 04]. Table 1 of the procedure provides a priority rating where findings are matched against. Minor bends in braces are not recorded as a defect as they do not affect their function.

The attached condition assessment [Attachment 10] dated 9/1/2014 identifies the level of corrosion as rating 2. This rating is graded as PT912 in table 1, of procedure LPP 09-01, meaning re-inspect in 3 years.

Tower 85
Three wasp nests on tower. What are AusNet's policy/ procedures with regards to upkeep/ maintenance of towers?

AusNet Services procedure HSP 05-20 Treatment of European Wasp and Bee Nests [Attachment 11] outlines the methods for managing wasps and bees. The procedure defines wasp/bee behaviour, health risks and nest removal process if appropriate.

The nests have not been identified in the 2014 asset condition assessment. The nests will be evaluated and processed in accordance with the procedure.

Tower 86
OK

Tower 126
OK

Tower 127
CCT 1, One vibration damper on one side of tower and two on the other

CCT 2, One vibration damper on either side of tower.
Why the difference in the number of vibration dampers?

Damper quantity is related to span length so 2 dampers on span to T126 is normal. One damper may be a result of earlier ad-hoc installation, as per comment for T001. (Dampers see LPP 08-05 Damper Installation [Attachment 12].

Tower 128
CCT 1, No VD
CCT2, One VD on one side
Please explain rationale for this variation.

Damper quantity is related to span length, therefore 2 dampers on this span is appropriate. One damper may be a result of earlier ad-hoc installation, as per comment for T001. Dampers are installed in accordance with procedure LPP 08-05 Damper Installation [Attachment 12].
Also refer to commentary for Tower 1.

Tower 157
Ok

Tower 158
Ok

Tower 159
OK

Tower 197
Ok

Tower 198
Bent Brace E191

The tower brace assessments are conducted in accordance with procedure LPP 09-01 Patrolling of Overhead Lines [Attachment 04]. Table 1 of the procedure provides a priority rating where findings are matched against. Minor bends in braces are not recorded as a defect as they do not affect their function. The attached condition assessment [Attachment 13] dated 9/1/2014 does not identify any damage to the member. The tower will be re-inspected.

Tower 199
Ok

Tower 243
One under crossing sign in wrong location, should be on dog leg
Missing undercrossing sign for AusNet Services span.

The tower will be re-inspected and signage will be installed in accordance with AusNet Services procedures [Attachment 08 and Attachment 09].

Tower 244
Ok

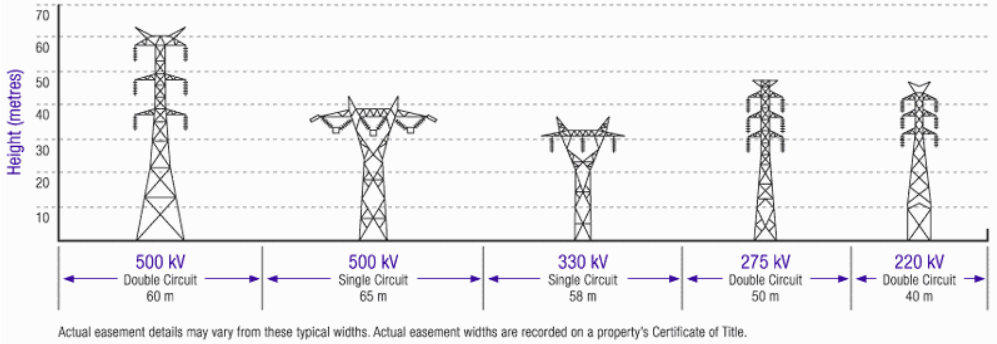
Tower 245
Ok

Tower 277
Long grass under tower.
What is AusNet's policy/ procedures with regards to upkeep/ maintenance of towers?

There is no formal procedure for managing grass or weeds, they are treated as "vegetation"; species with a mature height no greater than 0.5m. If species do grow taller than 0.5m they will be actioned if they impede access to the tower for line works.
Grass around the tower base is acceptable unless the Lines Group think it is unsafe. Generally grass is never an issue as we encourage some growth around the towers to stop erosion.

Vegetation near transmission line towers is managed in accordance with the BFM 10-06 Vegetation Management Plan (Transmission) [Attachment 01], section 4.2.9, which states:

"1. Vegetation near transmission line towers will be managed to provide clear areas for operation and work safety. Figure 4.2 shows the types of tower construction used by SP AusNet (Transmission).



2. Vegetation clearance distances around towers vary depending on voltage and tower construction type but may be limited to species with a mature height no greater than 0.5m. Vegetation clearance requirements around towers are set out in the Transmission Line Clearing Requirement Charts – 435 Series Drawings [Attachment 02].

3. Exceptions may occur in situations of low bushfire fire risk (LBRA) such as private backyards or parklands in urban areas, e.g. Metropolitan Melbourne. In these situations it could be expected that vegetation could be allowed to come within 5m horizontal distance from the tower steelwork at ground level. Other variations may be allowed depending on the risk assessed by the Vegetation Management Group."

Tower 278
Ok

Tower 279
Lock on anti-climb device was left unlocked. AusNet Services representative climbed tower and closed the lock. NOTE: When climbing the tower the AusNet Services representative did not use a harness.
Please provide a copy of AusNet Services' climbing procedure including where it is required to use a safety harness.

The matter of an AusNet Services representative climbing the tower without appropriate safety climbing equipment as defined in our procedure LPP 14-07 Climbing and Working Aloft [Attachment 14], which requires attached climbing when 1.8m or more above ground.
The AusNet Services representative advised that he did make comment to the ESV auditors that he did not have the safety equipment in his vehicle, but in the interest of public safety would proceed to close the lock. The employee has been cautioned and instructed that the appropriate course of action is to advice the CEOT who would in turn make local arrangements to deal with such issues.

Tower 354

Ok

Tower 346

This is the span across Eildon Weir. This is a special structure where there is a tower for each conductor.

a) Rusty bolts on both towers.

The corrosion assessment is conducted in accordance with procedure LPP 09-01 Patrolling of Overhead Lines [Attachment 04]. Table 1 of the procedure provides a priority rating where findings are matched against.

The attached condition assessment [Attachment 16 and 17] dated 9/1/2014 identifies the level of corrosion as rating 1 and 2. This rating is graded as PT912 in table 1, of procedure LPP 09-01, meaning re-inspect in 3 years.

b) Minimal threads (1 or 2) showing in the lower steel connections of the towers.

Please provide AusNet Services inspection report for this tower. What is AusNet's policy/ procedure with regards to the integrity of bolts?

The number of bolt threads is covered by procedure LPP 09-06 Condition Assessment of Overhead Lines [Attachment 03], Appendix B. The bolts may have between 1 to 3 threads showing which is deemed as normal and the accepted minimum is one thread in accordance with AS 1559 which allows for flush finish.

The condition assessment conducted [Attachment 16 and 17] on 24/1/2014 does not indicate any issues with bolt length.

Electricity Safety (Bushfire Mitigation and Electric Line Clearance) Regulations

AUDIT No: CM-1536

Electricity Safety (Bushfire Mitigation) Regulations 2013

Electricity Safety (Electric Line Clearance) Regulations 2010

AusNet Services (Transmission)

August 2014

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1.0	25/08/2014	First issue	E Micallef	N. Murray	M. Tshaikiwsky

Report Details:

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Audit Date	20 and 21 August 2014
Audit Team	Ed Micallef: ESV Senior Engineer Safety Management Systems
Sites Visited	HWTS – CBTS 4, 500kV line HWTS – ROTS 3, 500kV line CBTS – ROTS 4, 500kV line

Signatories

Title	Name	Signature	Date
Lead Auditor	Ed Micallef	*Ed Micallef*	25/08/2014
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Disclaimer: The information contained in this report is based on conditions observed and information provided during the audit process. Energy Safe Victoria does not guarantee compliance with all statutes or relevant recognised standards nor does Energy Safe Victoria guarantee that all risks and hazards have been identified within the areas and sites visited during the audit process.

This report is confidential and distribution is limited to Energy Safe Victoria and AusNet Services (Transmission).

1 Executive Summary

This report is based on the findings from the Electricity Safety Bushfire Mitigation and Electricity Safety Electric Line Clearance audits carried out by Energy Safe Victoria (ESV) on AusNet Services (Transmission) assets during the period 20 and 21 August 2014 and the desktop assessment carried out prior to the audit.

In the context of the scope, the audit found that the 500 kV lines, HWTS – CBTS 4, HWTS – ROTS 3 and CBTS – ROTS 4, operated by AusNet Services were well managed and that AusNet Services was well prepared for the 2014/2015 fire season.

AusNet Services has a detailed knowledge of their assets, their condition and the proximity of vegetation to their assets. The easement report provided by AusNet Services (Transmission) included detailed information on the condition of the lines.

The audit was completed in accordance with ESV document "Audit Plan SPA TRANS BFM 2014 to 2019 for SP Draft.docx" which was presented to AusNet Services prior to the audit.

A total of 56 transmission towers and lines were included in the audit, over three different 500 kV transmission lines.

A number of documents were supplied by AusNet Services, both before and during the audit. A list of these documents is attached to this report. These will be retained by ESV in a safe, secure manner to substantiate the audit findings. Additional information was provided by AusNet Services during this audit which is not necessarily reproduced nor captured by the documentation listed in this report. The audit made a number of observations and identified '0' Non-compliances (NC), '3' Areas Requiring Attention (ARA), and '0' Opportunities for Improvement (OFI). Of the 56 transmission towers audited, 2 received Opportunities for Improvement. No vegetation clearance issues were identified as part of this audit.

All NCs, ARAs and OFIs require a formal response by AusNet Services. A response to ESV on the proposed corrective action(s) is required within 60 days of this report. ESV will follow-up on the action(s) to ensure that corrective action is taken to improve the ESMS.

ESV was impressed with all of the AusNet Services personnel; they were well prepared for the audit, with appropriate records and a detailed knowledge of the assets.

A number of 'good practices' were identified during the audit including:

- twice yearly inspection of the transmission assets by local linesmen
- yearly inspection of the transmission easement by the vegetation management group
- a detailed easement report detailing current and past issues with a timeframe for resolution.

2 Introduction

This is part one of three separate transmission audits for the 2014/15 period.

2.1 Audit Method

A detailed audit scope, including a request for information, was prepared and sent to AusNet Services. AusNet Services provided the requested information and developed a timeframe for the audit.

ESV staff spent two days out in the field with AusNet Services personnel. The 500 kV transmission towers were audited in pairs:

- HWTS – CBTS 4 line and HWTS – ROTS 3 line
- CBTS – ROTS and HWTS – ROTS 3 line

The actual locations were decided on the day of the audit by ESV. In most cases, three sets of two towers were audited at each location.

2.2 Audit Grading

Outcomes of the audit were graded in the following way:

- **Compliant (C):** The audit found evidence of compliance with the applicable process or procedure and the process or procedure meets statutory and business requirements.
- **Opportunity for Improvement (OFI):** The audit found general compliance with processes or procedures and the processes or procedures meet the statutory and business requirements. However, an opportunity for the process and procedure to be improved was observed.
- **Area Requiring Attention (ARA):** The audit found evidence of non-compliance that appeared to be minor or a "once off" occurrence. The non-compliance did not appear to pose a safety risk or major deviation from the process or procedure.
- **Non-Compliant (NC):** The audit did not find any evidence of compliance with the applicable process or procedure and or, the process or procedure did not meet statutory and business requirements.

3 Audit Observations

No	HWTS - ROTS 3 500 kV line	Finding	Classification	Comment
1	Tower 48 Churchill National Park	Lock on anti-climb device was left unlocked (photo 116).	ARA	Lock was in place but not locked.
2	Tower 53 Churchill National Park	Large hole in concrete foundation of transmission tower leg (photo 127).	ARA	AusNet Services did not provide any information to state they were aware of the hole prior to the audit.
3	Tower 53	Bent transmission	ARA	An angle member at ground

	Churchill National Park	tower member at ground level (photo 128, 130)		level was found to have a “kink” in it. AusNet Services did not provide any information to state they were aware of the bent member.

The audit observations confirm that the transmission network is in good condition and that AusNet Services has good knowledge of the state of the network and the surrounding vegetation. Regular patrols of the system ensure that their knowledge is regularly updated.

In addition to the findings listed above a number of other observations were made:

- surface rust on several tower members and bolts (photo 67, 68)
- rust or pollution on many insulators (photo 72)
- corona discharge at many towers
- water around tower foundations (photo 77, 78)
- overall wet and muddy conditions (photo 92, 93)
- bird’s nests on many towers (photos 84, 85, 100)
- spacers with loose connections.

AusNet Services were aware of most of these observations that are not considered to require immediate attention but are an observation of the state of the transmission system.

4 Conclusion

The main objective of the audit was to assess the condition of the AusNet Services transmission network in preparation for the upcoming fire season. The audit of the HWTS – CBTS 4, HWTS – ROTS 3 and CBTS – ROTS 4, 500kV transmission lines confirmed that the network was in good condition and that AusNet Services was prepared for the upcoming fire season.

A total of 56 transmission towers were audited. Three Areas Requiring Attention were identified on two transmission towers and a formal response from AusNet Services is required for each ARA.

Since this was the first transmission audit for many years, AusNet Services had difficulty in readily providing some of the information requested by ESV.

AusNet Services’ line personnel were well prepared for the audit and able to make decisions as required. Resources were well organised and ESV thanks AusNet Services for making their four wheel drive vehicle and driver available for the duration of the audit.

5 Documents Tendered

Document Name

HWCBG Easement Report

HWCBE Easement Report

HWTS-ROTS Circuit Data Sheets - Detailed Route Plan.pdf

LPP 09-01 Inspection and Patrol of Transmission Lines.pdf

LPP 09-06 Condition Assessment of Overhead Lines.pdf

Network Safety Report - June14 Extract Trans Safety Prog.pdf

Route Plan CBTS-ROTS C1_156_3.pdf

Route Plan HWTS-CBTS C1_155_24.pdf

Route Plan HWTS-CBTS C1_155_35.pdf

Tx Tower Drawing with Monitoring Points.pdf

VEM 20-01 Hazardous Tree and 56M Assessment Procedure.pdf

VEM 20-02 Hazardous Tree and 56M Management Procedure.pdf