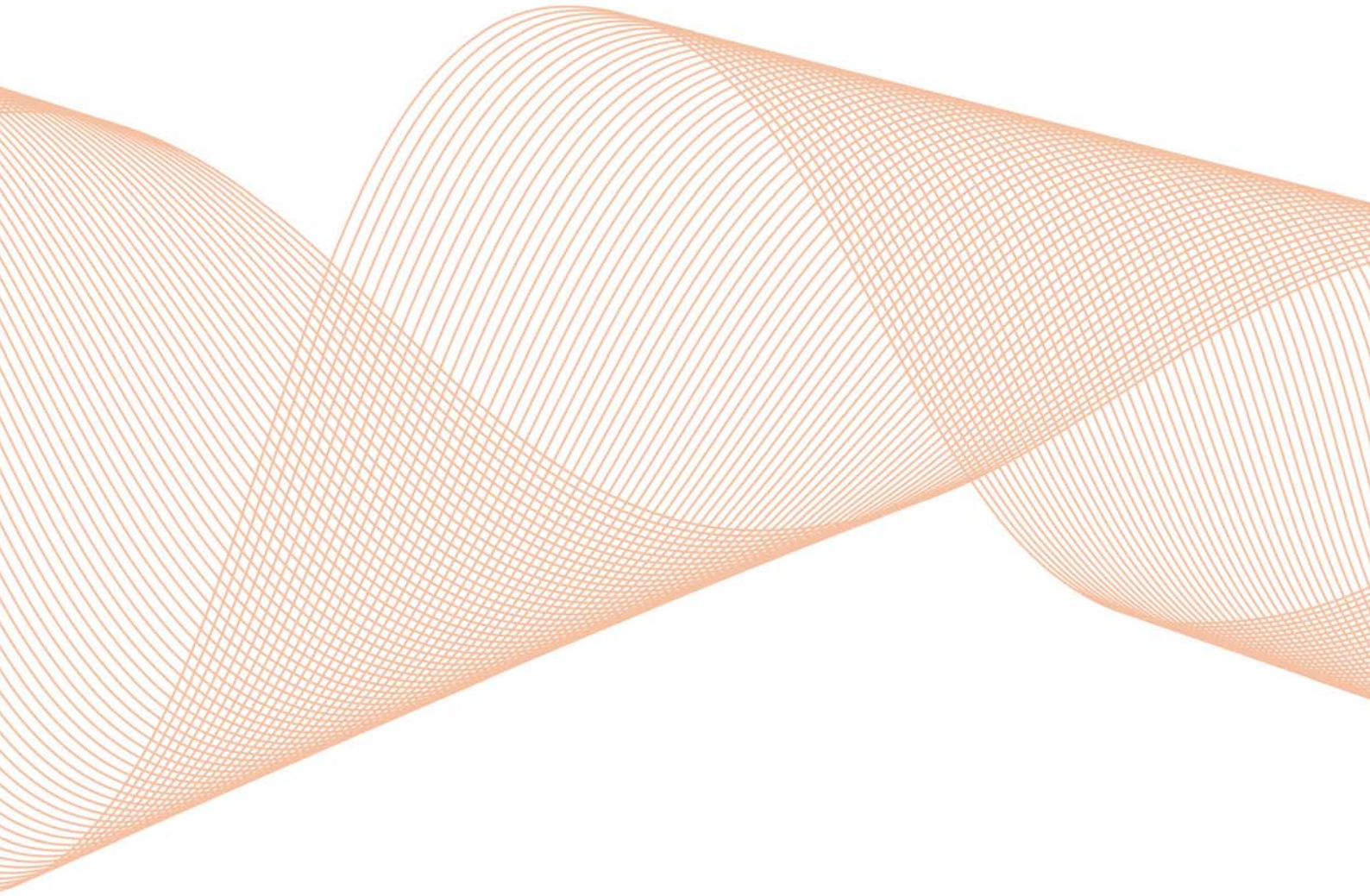
Appendix U.2 – Bushfire Management Implementation Plan

September 2011



TITLE:

Bushfire Management Implementation Plan 2011/2012

PREPARED BY:

Tony Baird (Senior Asset Strategy Analyst)

THIS REVISION:

V1 – August 2011

ORIGINAL ISSUE:	DATE FOR NEXT REVIEW:
August 2011	June 2012

Network Performance branch, Networks division

safe reliable efficient

Document Control

Endorsement Approvals

	Name	Title	Signature
Prepared by	Tony Baird	Senior Asset Strategy Analyst	
Endorsed by	Ankur Maheshwari	Branch Manager Network Performance	
Approved by	Mark de Laeter	General Manager Networks	

Record of Revisions

Revision number	Date	DM version	Revised by	Description
1	June 2011	1	Tony Baird	Original
2	June 2011	2	Derek Perkins	Editorial Corrections
3	July 2011	3	Derek Perkins	Delivery Volumes
3A	July 2011	3A	Rob Cross	Reformatted to comply with corporate template DM# 4050357
3B	July 2011	3B	Derek Perkins	DM error
4	August 2011	4	Tony Baird	Inclusion of comments from major stakeholders and editorial corrections

Documents Referenced In This Document

DM#	Title of Document
3009109	Bushfire Risk Assessment Methodology

Other Documents That Reference This Document

DM#	Title of Document
8293574	Bushfire Management Plan 2011 2012

Volumes and Budget Endorsement

Endorsed	Signature
Acting/Branch Manager Distribution Operational Asset Management	
Senior Asset Strategy Analyst Network Performance	

Stakeholders (people to be consulted when program of works is changed)

Position / Branch / Section
Principal Engineer – Strategic Asset Management
Distribution Group Manager
Transmission Group Manager
Branch Manager Distribution Operational Asset Management
Branch Manager Transmission Maintenance Delivery
Branch Manager Transmission Operational Asset Management
Transmission Line Services Manager
Branch Manager Program and Works Integration
Poles and Towers Asset Manager
Conductors Asset Manager
Plant Asset Manager

Notification List (people to be notified when document is updated)

Position / Branch / Section
Distribution Group Manager
Transmission Group Manager
Branch Manager Distribution Operational Asset Management
Branch Manager Transmission Maintenance Delivery
Branch Manager Transmission Operational Asset Management
Transmission Line Services Manager
Branch Manager Program and Works Integration
Branch Manager Network Planning and Development
Branch Manager Network Standards, Policy and Data Quality
Strategic Projects Manager AA3 Focus Group

Contents

1 Context

The objectives and strategies to be adopted by Western Power for the management of bushfire risk are identified in the Bushfire Management Plan[1] 2011/12. This plan details the implementation of the Bushfire Management Plan.

[1] DM# 8293574 Bushfire Management Plan 2011/2012

2 Objective

The objective of the Bushfire Management Implementation Plan 2011/12 is to translate the Bushfire Management Plan strategies into specific and measurable programs of work. Specifically this Plan:

- Reviews effectiveness of the work conducted under the 2010/11 Bushfire Management Implementation Plan;
- Outlines priority risk mitigation strategies to be implemented for Transmission and Distribution in the 2011/12 bushfire season;
- Outlines high level budgets to implement the Bushfire Management Plan;
- Outlines processes to monitor and review the implementation of the plan; and
- Defines responsibilities for implementation of the plan;

3 Achievements of 2010/11 Bushfire Management Implementation Plan

The 2010/11 Bushfire Management Implementation Plan has achieved many milestones to increase the safety of the general community, fire fighters and Western Power staff. Some of the milestones achieved in 2010/11 include:

- Met the performance target of 8, 000 LV Spreader installations in Moderate Fire Bushfire areas, which mitigates potential bushfires from clashing of LV conductors. This program continues in 2011/12. Installation of LV spreaders in Extreme and High Fire risk areas was completed in 2009/10;
- Met the performance target of of 10,000 silicone solutions to prevent Pole Top Fires in Extreme and High Bushfire zones; coastal and pollution areas. Siliconing is an annual program;
- Completion of the Spacer Cable Work Manual and training of internal crews to install the fire safe conductor for heavily treed areas in Extreme and High Bushfire Risk zones;
- Met performance target of vegetation cutting in Bushfire Risk areas by 15 November 2010;
- Implementation of a package of assistance to Volunteer Fire Brigades throughout the Western Power Network[2];
- Completion of a data and field validation exercise to enhance visibility and reduce risk of Priority conditions in all fire risk zones in the Western Power Network; and
- Establishment of Bushfire Implementation Planning Committee to ensure Bushfire Management Implementation Plan 2011/12 targets are internally communicated and agreed in terms of budget and deliverability. Membership of the Committee includes Operational Asset Management, Program and Works Integration and Network Performance.

[2] Western Power Network means the Distribution and Transmission Networks

4 Summary of Fire Events in 2010/11

4.1 Overview

A total of 79 network related fires[3] occurred in 2010/11. This number is lower than 2009/10 but higher than previous years. The reason for the number of fires in 2010/11 is due to environmental conditions, the asset condition, the high number of non asset related fires and changes to reporting. These are explained below.

4.1.1 Environmental Conditions

Perth and the South West Land Division (where the Western Power Network is located) recorded above average temperatures and had a number of windy days and storm events.

High wind days in late December 2010 and early February 2011 also caused a number of trees to fall over and wind borne debris to fly into power lines. Environmental conditions, especially higher temperatures and winds, increase the likelihood of fires.

4.1.2 The Asset Condition

36 fires were due to asset conditions. This equals the average annual number of asset related fires recorded since 2004/05. The number of asset failures causing fires fell dramatically in 2010/11 compared with 2009/10 (see Figure 1 on page 11).

4.1.3 High Number of Non Asset Related Fires

43 fires recorded in 2010/11 were due to factors other than asset conditions (see Figure 1 on page 10). This is substantially higher than previous years, where the average number of non asset initiated fires since 2004/05 is 17.5 per year.

The two major increases in non asset fires are trees falling onto assets and birds contacting assets. As stated earlier, high winds caused a number of trees to fall down, but it is unclear as to why so many bird related fires occurred compared to previous years. Western Power will continue to monitor in 2011/12.

4.1.4 Changes and Improvements in Reporting

Reporting has improved in recent years. Western Power has conducted reporting sessions with depot staff to improve reporting accuracy and timeliness.

Additionally, from 2009/10 onwards, Western Power changed its reporting of fires to include very minor fires in urban areas that in previous years were not reported. The combination of better reporting and inclusion of small urban fires has contributed to the increase in numbers of fires reported in the last two years.

[3] "Network Related Fires" includes Transmission and Distribution Asset Initiated Fires, Non-Asset Initiated Fires and Asset Initiated Bushfires. See section 4.2 for definitions of fire events.

4.2 Definitions of Fire Events

Western Power defines fire events[4] according to the root cause. Consequently, Western Power has two fire event classifications, they are;

1. Asset initiated fires – fires that are directly attributable to Western Power assets;
2. Non asset initiated fires – fires that are not attributable to Western Power assets, and are typically caused by environmental (wind, flora and fauna) and human causes (operational, vandalism and other third party causes).

4.3 2010/11 Asset and Non Asset Initiated Fire Events

Table 1: 2010/11 Asset and Non Asset Initiated Fire Events

Asset/ Non Asset	Cause	EFR	HFR	MFR	LFR	Total
Asset	Equipment Failure	3	4	3	4	**14**
Asset	Wires Down			4	5	**9**
Asset	Conductor Clashing			2	1	**3**
Asset	Pole Top Fire		1	2	1	**4**
Non Asset	Operational		1	1	2	**4**
Non Asset	Vandalism		2			**2**
Asset	Pole Down			2		**2**
Non Asset	Bird	2	1	4	5	**12**
Non Asset	Tree Down	3	4	4	2	**13**
Non Asset	Vegetation		1	1	2	**4**
Non Asset	Third Party		2			**2**
Non Asset	Wind Borne Debris				2	**2**
Non Asset	Animal	1		2	1	**4**
Non Asset	Under Investigation		3		1	**4**
Total		**9**	**19**	**25**	**26**	**79**

[4] Fire events are fires that reach the ground and ignite flammable material.

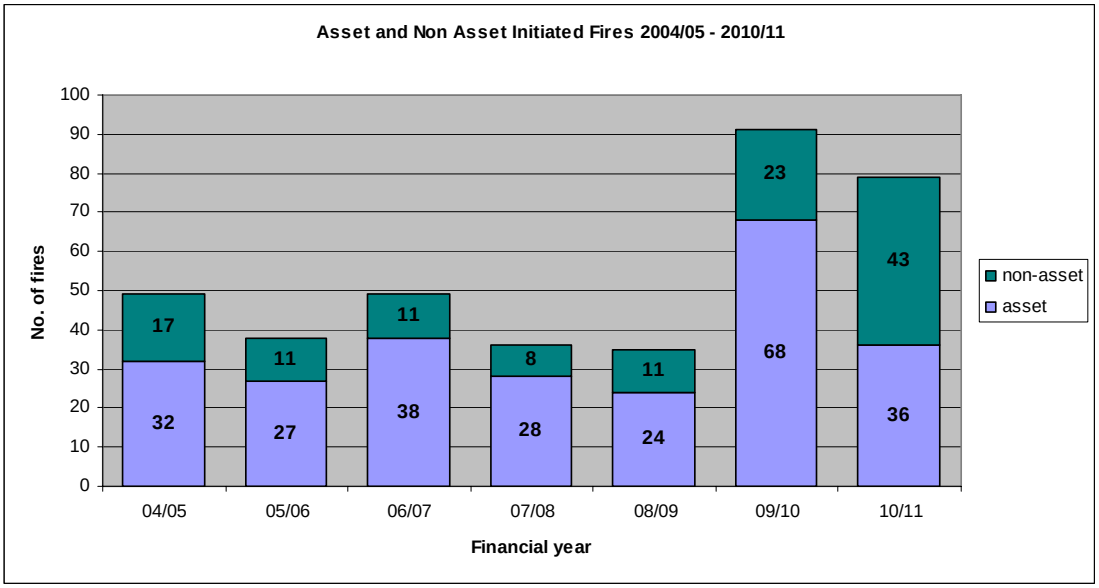
4.4 Asset and Non Asset Initiated Fires 2004/05 – 2010/11

Table 2: Asset and non-asset initiated fires 2004/05 – 2010/11

Asset/ Non asset	Root Cause	04/05	05/06	06/07	07/08	08/09	09/10	10/11	Total
Asset	Pole Top fire	19	9	10	8	5	18	4	73
Asset	Equipment Failure	11	10	12	7	2	14	14	70
Non Asset	Bird/Animal	5	5	4	3	6	10	16	49
Asset	Wires Down	1	2	8	6	5	15	9	46
Asset	Clashing Conductor	0	2	7	7	4	11	3	34
Non Asset	Tree Down	5	4	2	1	1	5	13	31
Non Asset	Vegetation Encroachment	0	1	2	3	4	7	4	21
Asset	Pole Down	1	1	1	0	6	3	2	14
Non Asset	Invalidated	3	1	1	1	0	0	8[5]	14
Non Asset	Wind/Lightning	4	0	2	0	0	1	2	9
Non Asset	Operational issue	0	0	0	0	2	3	4	9
Asset	Drop Out Fuse	0	3	0	0	0	4	0	7
	Total	49	38	49	36	35	91	79	377

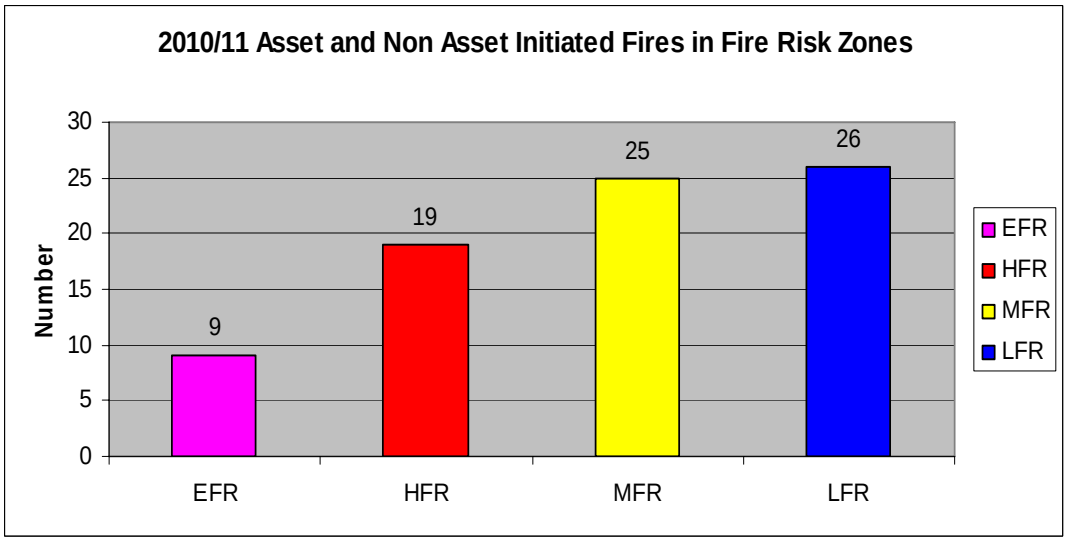
[5] Includes “Under Investigation”, “Vandalism” and “Third Party”

Figure 1: Graph of asset and non-asset initiated fires 2004/05 – 2010/11



4.5 2010/11 Asset and Non Asset Initiated Fires in Fire Risk Zones

Figure 2: 2010/11 Asset and Non Asset Initiated Fires in Fire Risk Zones



4.6 2010/11 Fire Events – Investigations

Western Power monitors incident data and statistics of fire events to determine trends and highlight network damage or faulty equipment in need of repair or replacement. Investigations are carried out into all fire events. These investigations act as an input to the development of Bushfire Management strategies to further mitigate sources of ignition. Investigations reports can be found at:

http://busbar/ourStructure/networks/spdg/safetyCompliance/Incident_Investigation_Reports.html

4.7 Transmission Fires

In 2010/11, three asset related transmission fires were recorded.

In previous years, transmission fires were averaging less then 1 per year, with most being vegetation related.

The 2010/11 Transmission fires were caused by a broken cross arm, insulator failure and insulator pin failure.

In 2011/12, the Bushfire Management Implementation Committee will monitor Transmission asset management issues and include Transmission representatives on Committee to facilitate mitigation strategies.

Appendix B details the causes of the fires and subsequent mitigation strategies.

5 Responsibilities for the Bushfire Management Implementation Plan

Table 3: Responsibilities

Person	Responsible For
General Manager Networks	Approving the annual Bushfire Management Implementation Plan.
Manager Network Performance	The annual production and sponsorship of the Bushfire Management and Implementation Plans.
Senior Asset Strategy Analyst	Reflecting the requirements of the Bushfire Plans in the management of Western Power assets; and Monitoring & review of the status of the Bushfire Management Implementation Plan including bushfire season preparedness.
Transmission and Distribution Group Managers	The delivery of the program of works contained within the Bushfire Management Implementation Plan.
Transmission and Distribution Operational Asset Management Branch Managers	Delivers the Bushfire Management Implementation Plan efficiently by converting asset management strategies into an annual production plan.

6 Bushfire Risk

6.1 Bushfire Risk

- Bushfire Risk Assessment Methodology [6] identifies areas of bushfire risk according to the Australian Standard Risk Assessment Methodology AS4360 and in consultation with the Fire and Emergency Services Authority (FESA) and the Department of Environment and Conservation (DEC); and
- Network mapping of assets with overlays of bushfire risk based on AS 4360 and Bushfire Threat Analysis (BTA) conducted by FESA and DEC. The BTA is partially funded by Western Power[7].

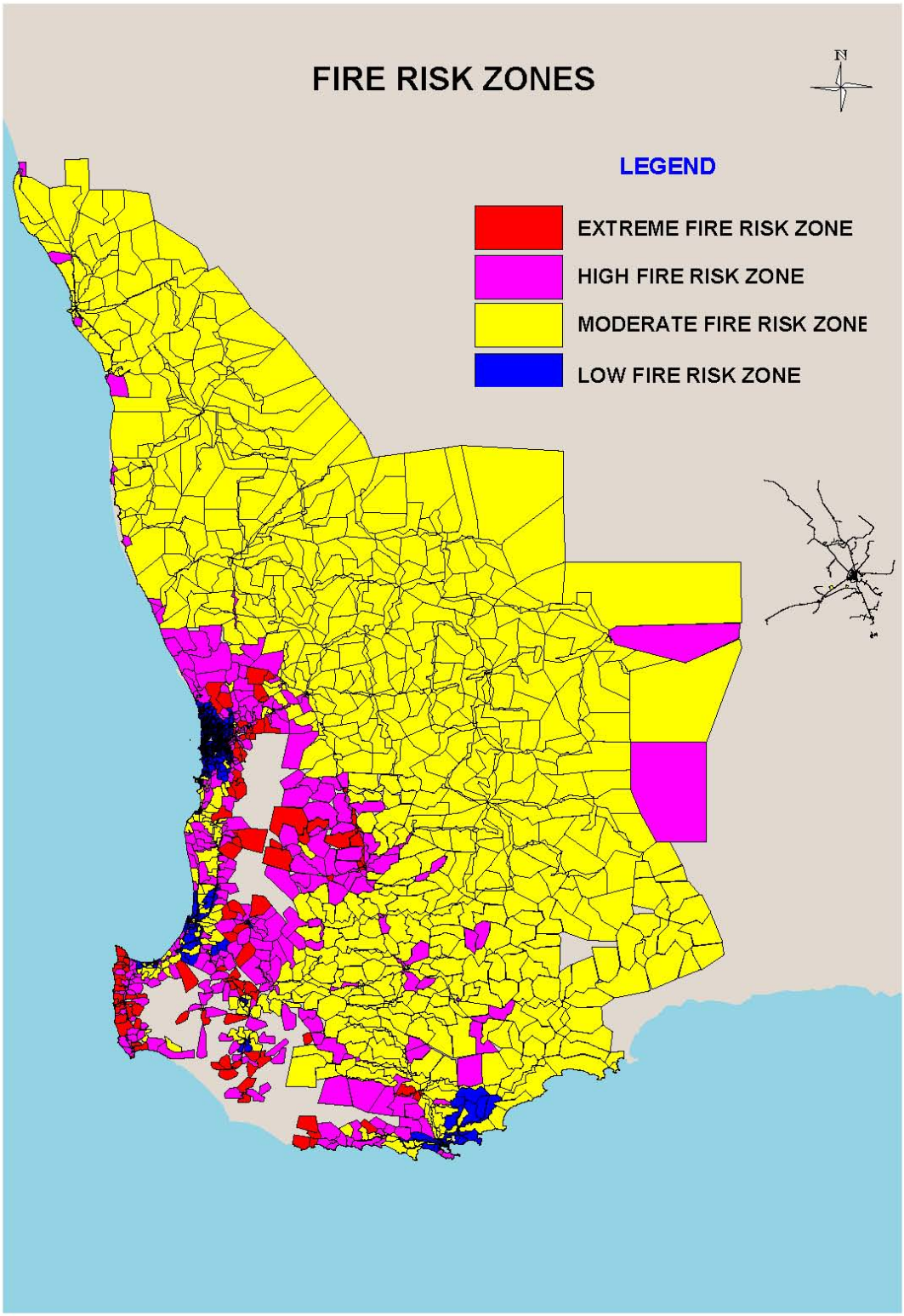
6.2 Bushfire Risk Map

Figure 4 (overleaf) shows Western Power's bushfire risk classification map.

[6] DM 3009109 Bushfire Risk Assessment Methodology

[7] The BTA is an ongoing mapping project conducted by FESA and DEC for the whole of Western Australia. The BTA maps fuel loads, potential fire behaviour, risk of ignition, suppression response and values at risk. Western Power jointly funded the BTA with FESA and DEC.

Figure 3: Fire Risk Zones across the Western Power Network



7 Bushfire Mitigation Strategies and Processes

By optimally mitigating sources of ignition from the networks, personnel, plant and equipment, the overall bushfire risk is reduced. Bushfire Mitigation Strategies and Processes are described below, with volumes listed in Section 10 and root cause mitigation provided in Appendix A.

Table 4: Bushfire Mitigation Strategies and Processes

Strategy	Implementation
LV and HV Distribution Conductor Clashing Mitigation Strategies	Installation of LV spreaders in accordance with application criteria in moderate fire risk areas; and Implement solutions for long bay HV distribution spans to prevent clashing in extreme and high bushfire risk areas. Solutions include installing intermediate poles or pole-top re-configuration.
Priority 1 and Priority 2 Strategy	Rectify all fire potential and public safety related Priority 1 and Priority 2 conditions within designated timeframes in Extreme and High Bushfire areas.[8]
Pole Top Replacement	Replace pole top hardware in Extreme and High Bushfire risk areas to mitigate against pole top fires and clashing of conductors.
Pole Down Mitigation Strategy	Unassisted pole failure is managed through the “End-to-end pole management” program. Although it is not discussed in detail in the Bushfire Management Plan, it does have a major impact on the bushfire management.
Wires Down Mitigation Strategy	Implement Wires Down Mitigation Projects in EFR and HFR areas. Solutions include reconductoring and replacement with Fire Safe Constructions. (ie;. ABC, Spacer Cable or Undergrounding)
Pole Top Fire Mitigation Strategy	Silicone insulators in EFR and HFR areas and coastal or polluted areas to mitigate potential pole top fires.
Vegetation Management	Complete vegetation management works in extreme and high bushfire risk areas before 30 November 2011; and Risk Assessment of overhanging trees in extreme and high bushfire risk areas.
Wildlife Proofing	Install bird diverters in areas of bird activity to mitigate against birds impacting on assets and potentially starting fires.
Standards	Formulating fire safe designs, including fire retardant paint on wooden poles, surge arrestors, Spacer Cable and fire safe fuses.
Damage Mitigation	Protection of Network Assets by Primary Response Group.
Public Awareness	Review fire awareness (vegetation) media campaigns to ensure optimal effectiveness.
Communication	Review and update the corporate fire communications protocol; and Promote Bushfire Mitigation initiatives and sponsorships.

[8] Western Power has categorised conditions into ‘Fire Potential’, ‘Public Safety’ and ‘Other’ to enable better targeting of high risk conditions. ‘Other’ refers to conditions that are not a fire hazard or public safety hazard and includes graffiti, labels and other defects.

Strategy	Implementation
Network Mapping	Review fire risk zones in 2011/12 to ensure they are current and applicable in terms of demographic and environmental conditions.
Reporting	Track and report all bushfires initiated by the network; and Report monthly priority project KPIs and PIs relevant to the Bushfire Management Plans.

8 Reporting

The Bushfire Management Implementation Plan requires monthly reporting on status and issues relating to Plan projects.

8.1 Bushfire Season Preparedness Index

The Bushfire Season Preparedness Index is the lead indicator that provides a pre-bushfire season risk indicator on the following areas:

- Vegetation in Extreme and High Bushfire Risk areas to be cut by November 30 of each year;
- Fuse pole clearing in Extreme and High Bushfire Risk areas completed by November 30 of each year; and
- Priority One and Two maintenance conditions in Extreme and High Bushfire Risk areas that are bushfire or public safety related are completed within nominated timeframes by November 30 of each year.

8.2 Monthly Reporting during Bushfire Season

During the Bushfire season the following priority programs are reported monthly, including;

- Long Bay program;
- LV Spreaders;
- Wires Down Mitigation;
- Vegetation Management;
- Priority 1 and Priority 2 Conditions; and
- Siliconing.

8.2.1 Asset and Non Asset Initiated Fires Register

The Asset Initiated Fires Register tracks and reports all Asset Initiated Fires. Relevant fields include:

- Date;
- Cause;
- Location (PICK ID);
- TCS Number;
- Root Cause;
- Fire Risk Zone
- Investigation Reports/Root Cause Analysis; and
- Claims.

9 Communications Strategy

The Bushfire Management Implementation Plan is undertaken on an annual basis and has well-established communication practices in place.

These involve management of:

- Communications between Network Performance and Operation Asset Management to ensure conversion of strategic asset management strategies into an annual production plan. Regular meetings are held between Network Performance, Operation Asset Management and Program and Work Integration to facilitate agreed targets and deadlines;
- Environmental issues;
- Stakeholder liaison including land access;
- Communication for network outages as required;
- Communication with Plant & Standards for design standards;
- Communication with Field Service Standards for work practice standards and procedures; and
- Communication addressing safety for all personnel involved in this Plan, including contractors.

10 Priority Bushfire Mitigation Projects Budgets and Targets for 2011/12

The priority bushfire mitigation projects in 2011/12 include projects that have been identified internally (Western Power) and externally (Energy Safety) as key projects for bushfire mitigation.

Table 5: Priority Action Items for 2010/11

Exp.Type	Priority Projects	11/12 $M	Target	Required by
CAPEX	HV Long Bay Clashing Conductors	**$12.385M**	3,962 solutions[9]	June 2012
CAPEX	Wires Down Mitigation Strategy – Conductor length [10] Note: Conductor length as confirmed by OAM – subject to field experience	**$19.238M**	Hendrix 142Km LVABC 4Km 3 Ph O/H 34Km 1 Ph O/H 24Km Serv Core 1Km	June 2012
CAPEX	Fire Safe Fuses	**$12.406M**	9,986	June 2012
CAPEX	Pole Top Replacement in Bushfire Risk areas	**$11.316M**	4,033 pole tops	June 2012
CAPEX	LV Spreaders	**$1.0M**	8,071 spreaders	June 2012
OPEX	Distribution and Transmission Vegetation Cutting and Inspection	**$36.827M**	531,196 bays inspected (find rate tracked separately) and 29,830 pole based clearing	30 November 2011 for EFR and HFR areas
OPEX	Pole Top Fire Mitigation -Siliconing	**$3.1M**	10,000 pole tops	31 Mar 2012 for EFR and HFR areas
OPEX/CAPEX	Priority One and Two Conditions that are directly bushfire and public safety related in EFR and HFR areas	**Dependent on find rate**	Rectify all fire and public safety related Priority 1 and 2 conditions within existing timeframes in EFR and HFR areas	30 November 2011 for fire and public safety related Priority 1 and Priority 2 conditions within existing timeframes in EFR and HFR areas
	TOTAL	**$96.272M**		

[9] Volumes will be dependent on resolution of three pole structures, in terms of unit rates and design. OAM and Network Performance will continue to work together to facilitate final volumes and costs.
[10] DM# 8348411 Agreement on Unit for Distribution Conductor

Appendix A: 2010/11 Distribution and Transmission Root Cause and Mitigation Relationship Summary

Table 6: 2010/11 Distribution and Transmission Root Cause and Mitigation Relationship Summary

Number of incidents in 2010/11	Fault Code	Root Causes	Key Risks	Strategies
9	Wires Down	Corrosion Joints Ties [11] Taps	Wires falling to the ground and causing bushfires	Conductor Asset Mission Four year maintenance inspection Wires Down Mitigation Strategy in EFR and HFR areas Conductor replacement Program in MFR and LFR areas Monitor Victorian Bushfires Royal Commission investigation into HV Tie failures
4	Pole Top Fire	Dust on insulators Moisture and dampness Loose hardware Age of insulator	Arcing causing wooden crossarms and pole top catching fire and falling to the ground igniting vegetation	Crossarms and Insulators Asset Mission Applying silicone to insulators to prevent the build up of dust and other pollutants Washing of insulators to prevent the build up of dust and other pollutants Converting overhead powerlines to underground powerlines Installing steel crossarms for high voltage All new constructions use polymeric insulators

[11] Better identification of faulty ties is currently being investigated as part of the Victorian Bushfires Royal Commission. WP is part of an extended Powerline Bushfire Safety Working Group that will be informed of developments.

Number of incidents in 2010/11	Fault Code	Root Causes	Key Risks	Strategies
3	Clashing Conductor	Long Bays Short crossarms Hot weather which creates differential sagging	Conductor clashing cause sparks and hot metal to fall to the ground igniting vegetation	Conductor Clashing Mitigation Strategy HV Long Bay project implementing solutions to HV bays exceeding criteria LV Spreader project installing spreaders that physically hold conductors apart
16	Bird/Animal	Birds and animals contacting hardware	Flashing over from asset Clashing conductor	Fauna Management Strategy Reactive proofing works Undergrounding Covered conductors
4	Vegetation	Vegetation encroaching into clearance zone and contacting conductors	Sparks and molten metal falling to the ground igniting vegetation	Vegetation Management Strategy 2010 – 2012 Extreme and High Fire Risk areas on a yearly cutting cycle Moderate Fire Risk areas on a 2 year cutting cycle Low Fire Risk areas on a three year cycle
13	Tree Down	Trees stressed or diseased	Trees falling on electrical assets and causing sparks or arcing that can ignite vegetation and cause fires	Vegetation Management Strategy 2010 – 2012 Inspections identify trees with very clear signs of disease or stress within management zone. Quantified Tree Risk Assessment for Overhangs and large trees

Number of incidents in 2010/11	Fault Code	Root Causes	Key Risks	Strategies
2	Pole Down	Fungal rot Insect infestation (termites) Material aging	Pole down causing sparks and arcing that can ignite vegetation and cause fires	Wood Pole Asset Management Plan Steel reinforcement of poles Four year maintenance inspection Pole replacement program
14	Equipment [12] Failure	Aging assets Weather	Assets arcing causing bushfires	P1P2 program Maintenance program
4	Operational	Switching/live work Operating machinery that can cause fires Changing fuses Driving error	Assets emitting sparks or arcing and causing fires Trucks or cars causing fires through hot exhausts Car vs pole	Work Practices 2.16 - Fire Precautions for Field Work is updated every year and reinforced through Depot communications Safe Driving Education

[12] Equipment Failure events include low conductors, Pole top Switches, HV Connections, PG Clamps, Insulator pins and broken cross-arms

Appendix B: Transmission Asset Initiated Fires

Number	Root Causes	Key Risks	Strategies
3	Broken Insulator Insulator mounting bolt Cross- arm snapped	Arcing causing wooden cross-arms and pole top catching fire and falling to the ground igniting vegetation	The cross-arm replacement program for 2011/12 will see the replacement of wooden cross-arms on 66KV transmission lines with new polymeric 132KV insulators. Western Power's aerial line inspection contractors have been instructed to focus on cross-arms and insulators.