

PROPERTY FIRE MANAGEMENT PLANNING KIT

*Balancing fire safety and land management with the
conservation of bushland plants and animals*

PART A | USER MANUAL



The Property Fire Management Planning Kit: Part A - User Manual is designed to accompany Part B – Workbook for use within a SEQ Fire and Biodiversity Consortium Fire Management Planning Workshop.

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PROPERTY FIRE MANAGEMENT PLANNING KIT VERSION 3 | LAST UPDATED FEBRUARY 2018 BY CRAIG WELDEN

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PART A | USER MANUAL

This Property Fire Management Planning Kit – Part A User Manual has been prepared for use by landholders and land managers in South East Queensland by the South East Queensland Fire and Biodiversity Consortium (SEQ Fire and Biodiversity Consortium). This User Manual forms one part of a suite of materials available online at www.fireandbiodiversity.org.au. It is strongly advised that the User Manual | Part A and Workbook | Part B are completed with reference to the Queensland Fire and Emergency Services (QFES) resources on property protection, currently known as *Prepare Act Survive*, and by attending a SEQ Fire and Biodiversity Consortium facilitated Property Fire Management Planning Workshop. To find out more about upcoming SEQ Fire and Biodiversity Consortium workshops in your area, visit the events page on the website: www.fireandbiodiversity.org.au, or contact your local government agency.

Background to the Property Fire Management Planning Kit

The initial concept for the Property Fire Management Planning Kit came from a document developed by the Shire of Yarra Ranges in Victoria, entitled "*Fuel Reduction Plan for Private Property*" (Hunt and Gooding, 1998). This document was first adapted for use in South East Queensland by Marc Gardner in June 2000 as part of the Lockyer Catchment Biodiversity Recovery Project. Dr Penny Watson, SEQ Fire and Biodiversity Consortium Project Coordinator (March 2000–August 2001), developed Version 1 of the SEQ Fire and Biodiversity Consortium Individual Property Fire Management Planning Kit. As with any land management planning tool, revisions are necessary to include new information, government enquiry findings and lessons learnt. Version 2 included further additions from Cuong Tran, SEQ Fire and Biodiversity Consortium Project Coordinator (2000–2002). This revised Version 3 Manual does not include some material from previous versions because of the readily accessible, and nationally consistent, *Prepare Act Survive* (PAS) materials available through each state emergency services provider for personal and property bushfire protection. The QFES has tailored PAS material to a Queensland context, all freely available online - refer to the Further Services section at the end of this Manual for more information.

The SEQ Fire and Biodiversity Consortium – Who we are

The SEQ Fire and Biodiversity Consortium is a network of land managers and stakeholders committed to improving fire and biodiversity management outcomes, supporting and disseminating fire ecology research, facilitating partnerships between key stakeholders and building the capacity of land managers and private land owners in South East Queensland.

The SEQ Fire and Biodiversity Consortium gratefully acknowledges the support from the following stakeholder organisations reflecting the broad support the organisation receives and demonstrating its active and dedicated membership: Brisbane City Council; City of Gold Coast; Department of Transport and Main Roads (Southern Downs Region); Gympie Regional Council; Healthy Land and Water; Ipswich City Council; Lockyer Valley Regional Council; Logan City Council; Moreton Bay Regional Council; Powerlink; Queensland Fire and Emergency Services; Queensland Parks and Wildlife Services; Redland City Council; Scenic Rim Regional Council; Seqwater; Somerset Regional Council; South Burnett Regional Council; Sunshine Coast Council and Toowoomba Regional Council.

The SEQ Fire and Biodiversity Consortium gratefully acknowledges the support of Healthy Land and Water. Healthy Land and Water is an independent, not-for-profit organisation working to improve the sustainable use of land and waterways in South East Queensland. This project is supported by Healthy Land and Water through funding from the Australian Government's National Landcare Program.



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Disclaimer: This document has been prepared in consultation with a wide range of stakeholders, including the QFES. It has been developed purely as an aid to property fire management planning and in no way acts as a guarantee for bushfire safety. The aim of Property Fire Management Planning Kit (Planning Kit) is to minimise risk and to improve biodiversity conservation efforts, however a degree of risk will always remain when homes and other assets are located close to vegetation. Thus, whilst every effort has been pursued to make the information within this Manual as accurate and factual as possible, those involved in compiling this document take no responsibility for any adverse outcomes, actions or losses resulting from its implementation. This publication does not purport to provide legal advice, and any recommendations herein do not necessarily represent current public policy. No person should act solely on the advice given here and should seek additional advice as required and assume responsibility for their actions.

Further services of the SEQ Fire and Biodiversity Consortium are provided at the end of this document.

Cover photo: Fire Management Planning Workshop at Maroochy Bushland Botanic Garden
exploring the use of prescribed fire. C. Welden.

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Gahnia spp. three weeks following fire at Coolum, Sunshine Coast. (C.Welden 2017)

1.0 LIST OF ACRONYMS

AFAC	Australasian Fire and Emergency Service Authorities Council	LIDAR	Light Detection and Ranging (remote sensing tool)
APZ	Asset Protection Zone	LMZ	Land Management Zone
CFMP	Coordinated Fire Management Plan	OHFG	Overall Fuel Hazard Assessment Guide
CZ	Conservation Zone	RE	Regional Ecosystem
EHP	Department of Environment Heritage and Protection	REDD	Regional Ecosystem Database Descriptions
EZ	(Fire) Exclusion Zone	RFSQ	Rural Fire Service Queensland
FL	Habitat Feature	RZ	Rehabilitation Zone
FMZ	Fire Management Zone	SCZ	Special Conservation Zone
FPAA	Fire Protection Association of Australia	SFAZ	Strategic Fire Advantage Zone
GIS	Geographic Information System	SPZ	Sustainable Production Zone
GPS	Geographical Positioning System	STAR	Smoke Taint Risk Calculator
HLW	Healthy Land & Water (SEQ based Organisation)	PAS	Prepare Act Survive
HS	Cultural/Historical Site	QFES	Queensland Fire and Emergency Services
IS	Indigenous Site	QPWS	Queensland Parks and Wildlife Service
		SEQ	South East Queensland



Heathland on the Sunshine Coast. (C. Welden.2016)

2.0 INTRODUCTION

2.1 Background to the Property Fire Management Planning Kit

2.1.1 Aims

The primary aim of the Property Fire Management Planning Kit (the Planning Kit) is to assist you as a landholder or land manager to reduce the threat of bushfires/wildfires to life and assets on your property, while also protecting and enhancing the diversity and abundance of native plants and animals on your property. The Planning Kit is intended for use at a SEQ Fire and Biodiversity Consortium facilitated Property Fire Management Planning Workshop. On completion of the workshop you will have developed a fire management map and action plan tailored to your property (regardless of size), priorities (such as primary production and or conservation), and individual circumstance.

2.1.2 Outcomes

During the SEQ Fire and Biodiversity Consortium workshop, you will use the Planning Kit to develop a:

1. Property Map (with transparency overlay),
2. Vegetation Map,
3. Contour Map and/or LIDAR map (where available),
4. Fire Management Recording Sheets to document objectives, actions and timings of fire management for each identified management area on the property (to help inform and direct property action plans), and
5. 12 months, 2-5 years and 5+ years Property Fire Management Action Plans.

Collectively these maps, recording sheets and action plans will form a Property Fire Management Plan that will assist you to balance fire safety, biodiversity conservation and, where applicable, sustainable primary production on your property.

LIDAR (Light Detection And Ranging): LIDAR is a remote sensing tool that is used to map features across the landscape and identify variation across terrain. LIDAR can assist in identifying suitable locations for fire lines and in the identification of old farm tracks.

2.1.3 Intended use of the Property Fire Management Planning Kit

The Planning Kit consists of Part A – User Manual and its accompanying Part B – Workbook. An overview of these documents and their intended use can be seen in Figure 1.

When used together at a workshop, these resources will help guide you through a step-by-step process to develop a Property Fire Management Plan. The process itself is based on the concept that the best way to balance safety and conservation is to manage different areas, or zones, on your property in different ways with respect to fire.

Within the Planning Kit's Part A - User Manual, you will work through Steps 1 to 6 to progressively build up the different layers of your property fire management planning maps giving you a comprehensive picture of the hazards on your property and the risks these pose to assets. Information surrounding each of these steps, including the science behind underlying principles, are outlined within this User Manual to better equip you to develop property maps and property fire management action plans (templates found in Part B – workbook) and gain a better working knowledge of the principles and practices behind property fire management planning.

The Part B – Workbook is intended to be used alongside the Part A – User Manual to help you document:

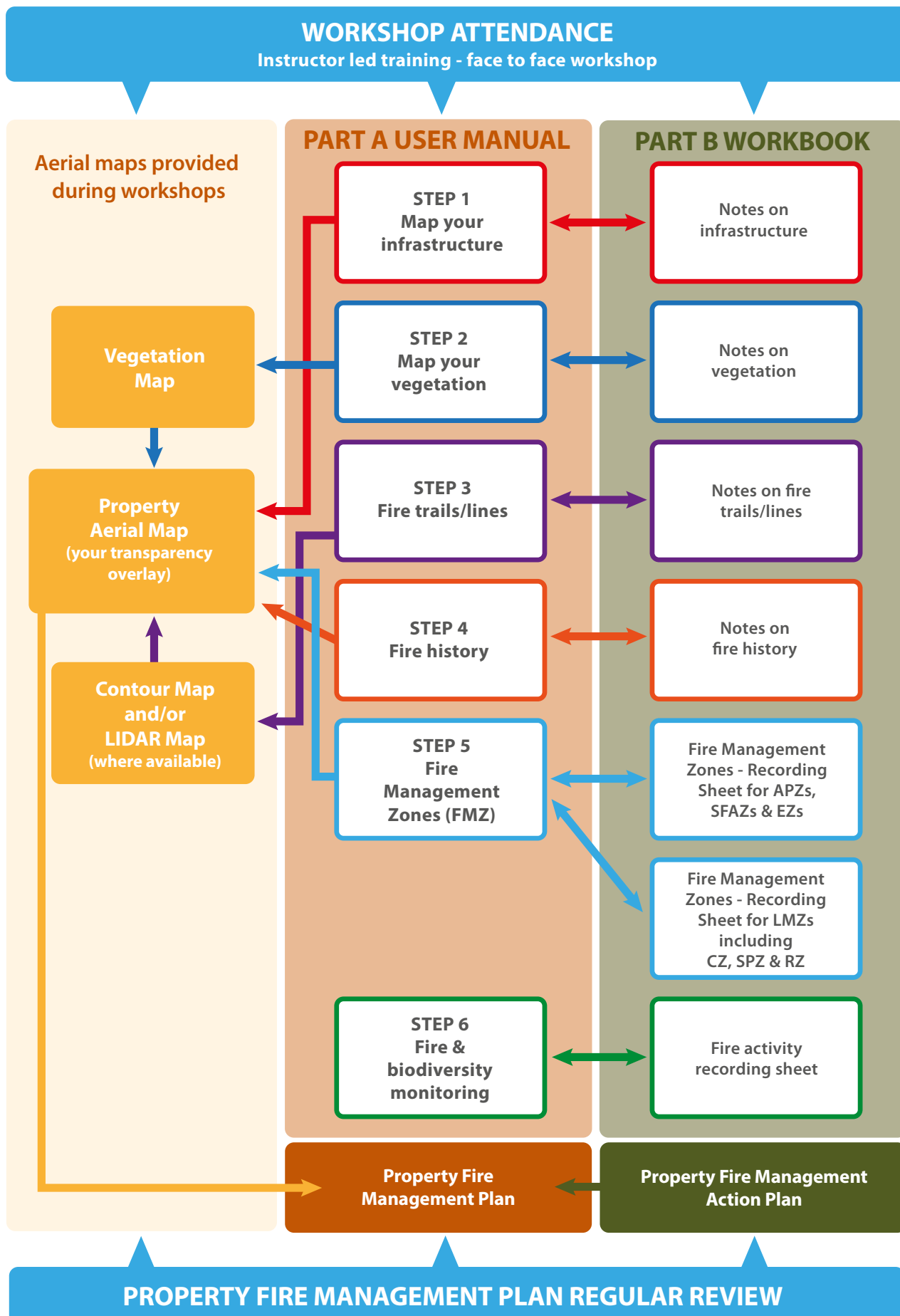
- i. General notes as well as information relevant to the development of property maps;
- ii. Planning notes for any different management areas identified on your property within the Fire Management Recording Sheets, located in Part B Workbook;
- iii. Property Fire Management Action Plans that can be used to implement priority tasks on your property after the workshop.

Note: These maps and plans are not static documents and will need regular revision to ensure currency of information over time.



Don't let this Planning Kit sit on the shelf once you have completed the workbook. Regular revision is required to track progress and the accuracy of time frames. We suggest that you review the plan within a year of inception.

Figure 1. Overview of how to use Part A and Part B of the Property Fire Management Planning Kit





Christmas Bells (Blandfordia grandiflora) are an example of a fire-adapted species. This individual is flowering after a fire at Beerwah on the Sunshine Coast. (D Metters)

Bushfires: Bushfire is a general term to describe a fire in vegetation (usually an out of control fire). We will use this term in this document as opposed to using the term “wildfire”. Definition taken directly from the Australasian Fire and Emergency Service Authorities Council - Bushfire Glossary (Rural and Land Management Group, 2010).

Wildfire: A wildfire is an unplanned vegetation fire, which includes grassland fires, forest fires, heath and scrub fires.

2.1.4 Fire in the Australian Landscape

Many Australian ecosystems, and the plants, animals, fungi and soils contained within them, have evolved with fire and are adapted to particular fire regimes (Bradstock, 2008, Bradstock *et al.*, 2012). Fire-adapted species may be damaged or killed by fire, but have a reproductive response (e.g. the opening of banksia woody seed capsules in response to the heat of a fire or the flowering of a grass tree).

Appropriate fire has a significant and positive role to play in maintaining the diversity of native plants, animals and fungi species in fire-adapted communities. Positive outcomes may include:

- opening up the foliage canopy, allowing sunlight to reach the ground and creating an ash bed rich in nutrients for germinating seeds and growing plants;
- creating hollows in trees and logs;
- triggering seed release, germination and flowering; and
- aiding in the control and eradication of weed species, pest insects and fungal diseases.

However, there are limits to the tolerance and ability of fire-adapted plants and animals to replenish after fire. Both too infrequent and too frequent fire can lead to species decline and even eventual local extinction. A fire regime refers to the general pattern in which fire naturally occurs in a particular ecosystem over an extended period of time. Fire regimes are classified by four key components: fire intensity, fire season, fire frequency (time between fires or number of fires in a given time frame) and fire extent (patchiness or the amount of area burnt). Read more about fire regimes in the SEQ Fire and Biodiversity Consortium Living with Fire Series-Fact Sheet 3: Recommended fire regimes (Section 6.5).

Prescribed burning is a tool that you can use as a land manager or landowner to achieve various objectives for fire safety, biodiversity conservation, and primary production purposes. This Manual does not provide advice on the operational matters concerning the carrying out of a prescribed burn, rather, it can give some guidance on the use of fire using appropriate fire regimes for varying ecosystems.

2.1.5 The science behind prescribed burning

Prescribed burning is a tool that you can use as a land manager or landowner to achieve various objectives for fire safety, biodiversity conservation and primary production purposes. This Planning Kit does not provide advice on the operational matters concerning the carrying out of a prescribed burn, rather, it provides guidance on the use of appropriate fire in different vegetation types (e.g. grassland and forest) and ecosystems. Prescribed fire, or planned burning has a number of key objectives, including reducing the fire hazard (i.e. the fuel) and thereby aiding in the reduction of the risk to people and property and aiding in providing necessary fire for ecosystems. Both too frequent and too infrequent fire can cause problems in fire-adapted ecosystems. If fire is excluded for too long, short lived species may become locally extinct. A plant species that only regenerates after fire may not survive if adults have died and its viable seed is no longer available (e.g. Christmas Bells *Blandfordia grandiflora*). Some birds have been found to move out of areas that have not burnt for a long time as the plants that they feed on are either shaded out or become old and die (Reside *et al.*, 2011).

It is common for some vegetation types to be replaced by another vegetation type, or even become locally extinct, as a result of the length of time since fire. An example of this is seen in Eucalypt forests with a grassy understory, where a shrubby understory can develop over time where there is infrequent fire, to the exclusion of a previously dominant grassy understory species. Periodic fire is needed to allow for the persistence of the native grassy understory (Baker and Catterall, 2015).

Fire may affect animal populations through direct or indirect effects. Typically, the direct effects are acute and occur during, or soon after a fire, and are generally influenced by the intensity, season (i.e. is the animal breeding) and extent of the fire. Indirect effects are generally related to the vegetation changes post fire in terms of the availability of refuges/homes and food.

Fire risk is influenced by nearby bushfire hazards. The rate at which fuel burns, and the intensity, is determined by several factors including the type of vegetation (i.e. grassy woodland versus heath or open forest), the arrangement of the vegetation (i.e. is it tightly compacted together or does it provide a vegetation “ladder” for the fire to climb), vegetation size, vegetation and soil moisture levels, the surrounding slope, and the aspect. Fine fuels can substantially influence bushfire behaviour. Fine fuels are those fuels that are less than 6mm in diameter if dead, and less than 3mm if alive (Hines *et al.*, 2010). The other major element is the weather (Cheney and Sullivan, 2008), but as we are not able to influence this factor it is not discussed at length here except for determining prevailing winds.

1.1.6 Assistance for prescribed burns on your property

The practical application of fire in the landscape is a skilled and knowledgeable art. If you are considering a prescribed burn for your property we encourage you get your neighbours together and seek assistance from Rural Fire Service Queensland (RFSQ). RFSQ can provide good local knowledge and a range of skills that would be advantageous to safely carrying out a prescribed burn. In Queensland it is illegal to light a fire without a “Permit to Light Fire” issued by a Fire Warden. See more information on the RFSQ website www.ruralfire.qld.gov.au. There are also a number of private fire services operating in South East Queensland who can carry out a prescribed burn on your property and assist in creating a prescribed burn plan.

Hazard and Risk

The difference between hazard and Risk is: “Hazard - is a source of potential harm or a situation with a potential to cause loss; whereas Risk is the chance of something happening that will have an impact on objectives (AS/NZS ISO 31000:2009). It is measured in terms of consequences and likelihood.”

(Queensland Government, 2016)



Fine fuels shown in this image are those that burn in the continuously flaming zone at the fires edge. (C Welden 2016)

2.2 Why do I need a Fire Management Plan for my property?

Many people choose to live in areas close to remnant or regrowth vegetation in South East Queensland. Due to the increased risk of bushfires in these areas, land owners need to make themselves aware of, and take steps to minimise, the risks to life and property. In preparing a Property Fire Management Plan that addresses the needs of different vegetation types on your property, you are also supporting the conservation of native vegetation and animals and potentially enhancing biodiversity.

2.2.1 What is my Property Fire Management Plan linked to?

Whilst your Property Fire Management Plan is primarily looking at the individual property scale, you will be encouraged throughout this document to consider looking beyond your own boundary, at the landscape level (i.e. talk to your neighbours). Fire is commonly referred to as being “tenure blind” and with most private properties in South East Queensland being relatively small in area, most bushfires will easily travel across property boundaries, particularly in difficult terrain, and throughout more remote locations.

Your completed individual Property Fire Management Plan can be linked with and used by:

- A landscape fire management plan (see Section 2.3 below).
- Fire Emergency Personnel in a bushfire: Please contact your local rural fire brigade for more information.
- Rural Property Fire Management Guide: The RFSQ can provide a form where you can record your property for self-assessment purposes. This guide can be downloaded from https://ruralfire.qld.gov.au/Bushfire_Planning/Documents/Rural_Property_Fire_Management_Guide_Editable.pdf. Refer to Section 6 (Further Services).
- The strategic aims of Healthy Land and Water: If you wish to explore more ways to look after your property and manage it productively, please contact Healthy Land and Water by visiting their website www.hlw.org.au, or by calling the office on +61 7 3177 9100, or contact the SEQ Fire and Biodiversity Consortium.

2.2.2 Taking your Property Fire Management Fire Plan map further

Depending on the complexity and extent of your property and available resources, it may be possible to digitise your map, so it may be viewed and edited either as a KML file in Goggle Pro/Earth, or as a PDF; you can contact the Healthy Land and Water GIS Team by visiting www.hlw.org.au/services/gis-mapping, www.lfwseq.org.au/maps, or contact the SEQ Fire and Biodiversity Consortium for more information.

Your role in Rural Fire Service Queensland

RFSQ is always seeking active volunteers for local Rural Fire Brigades. There are many roles that you can perform from firefighting, community education, fundraising and administration.

2.3 Why make a plan?

2.3.1 Capture and share your local knowledge

Even if you, or your family, have been on your property for generations and have used fire as a management tool, your knowledge of local fire history, such as the frequency of burns in different management zones and the impact on vegetation and wildlife, may be lost if you do not capture it. This information is valuable for neighbours and future generations, to help improve the usefulness of fire regimes and fire management planning in your local area. This information will also help in understanding the relationship between weather patterns and fire.

2.3.2 Landscape perspective

It is important that through the process of making your Property Fire Management Plan, you consider all actions taken and planned, and include what your neighbours may, or may not, be considering. Fire is “tenure blind” and may not stop immediately at fire lines, fire tracks, fence lines or property boundaries. It is therefore important to consider where your fire lines may be constructed and what hazards are on your property that may pose a risk to neighbouring assets. This will most often mean talking to your neighbours and working together to create a landscape fire management plan.

3.0 BEFORE THE WORKSHOP

3.1 Pre-workshop: property familiarisation

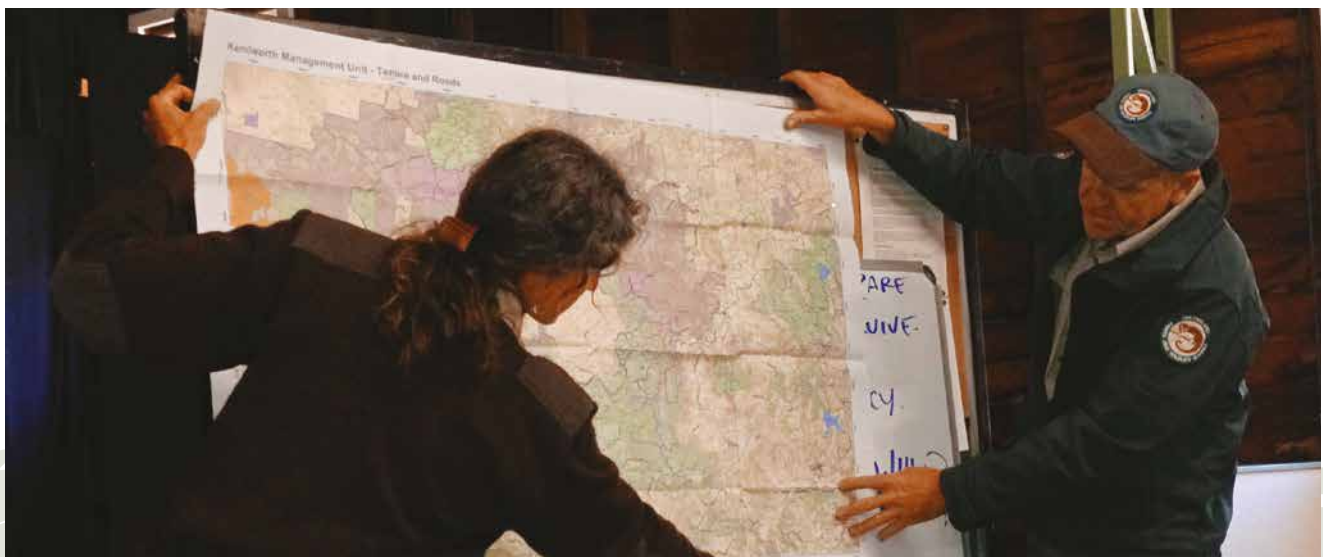
Each workshop is one day in duration, and covers a lot of content to help guide you, (the landholder or land manager), through a comprehensive Fire Management Plan for your property. Therefore we ask that before you attend, you familiarise yourself with the key features and infrastructure located on your property. That is, you may want to walk/drive/ride around your property and look for the features outlined in the Steps 1-6 in this User Manual. You will also be required to map your neighbour's property assets (tenure blind approach). If you wish, you can map some of the features using a GPS or use a mobile application that can download maps and record activity and save this information as a pdf for reference during the workshop. As your plan will affect everyone who lives on your property, consider including the whole family in the planning process.

Bring any maps or plans you already have relevant to your property to the workshop (i.e. property management plans, vegetation maps, aerial photos).

3.2 What you will be provided with to develop your Property Fire Management Plan

All participants will be supplied with the following at the workshop:

1. Property Fire Management Planning Kit: Part A – User Manual (this booklet) and Part B – Workbook;
2. Maps that show the following features of your property (printed to an A3 size to match the transparency overlay):
 - a. Aerial photo - (this will become your base map);
 - b. Topography - contour lines;
 - c. Regional Ecosystems (Description of Regional Ecosystems is found on page 17); and
 - d. LIDAR (if available).
3. Clear A3 transparency (overlay);
4. Mapping accessories:
 - a. Set of 8 fine point coloured permanent marking pens;
 - b. Ruler;
 - c. Eraser;
 - d. Methylated spirits and a cloth or a white board marker (to fix mistakes on transparency);
 - e. four small, fold back clips.



Many agencies (such as Queensland Parks and Wildlife Service staff pictured) contribute in the lead up to, on the day and post workshop helping communities become bushfire resilient. (C.Welden 2017)

4.0 AT THE WORKSHOP - LET'S GET STARTED

You will be provided with an aerial map of your property detailing contours and features of your property. At the workshop you will work on additional worksheets and maps and progressively build up the layers giving you a comprehensive picture of the hazards on your property and the risks these pose to assets.

To assist you in recording information during the workshop more easily, the Property Fire Management Planning Kit: Part B - Workbook, is a separate booklet. The Workbook is also available to be downloaded in an editable format by visiting www.fireandbiodiversity.org.au. If you have used up all the space on your worksheets you can also print off extra copies from the website. Please open your Part B – Workbook to the Fire Management Recording Sheets.



TIP: Within your Workbook, we have included sections on infrastructure, vegetation, fire trails and fire history. You may find that you need to write down some notes during the workshop that you can refer to later. Remember, that long past the workshop, notes may assist you in reviewing and implementing your Property Fire Management Plan.

Remember, as we have already discussed, recording information about planned burns or bushfires is useful for future planning needs. An example of this can be an understanding of fuel behaviour in a certain vegetation type, or plant responses due to intensity. Some examples are provided below the maps in each of the mapping steps.

It is recommended that if you plan to sell your property that you pass on this Property Fire Management Plan to the new owners.

4.1 Symbols used in the Property Management Planning Kit

The standard symbols (also known as elements) used within this User Manual are consistent with those used in both QFES operations mapping and the HLW property planning process.

4.1.1 Part A – User Manual symbols

You will notice that we have provided symbols beside each action to help make the mapping process easier, as follows:



Action – this hoe/rake symbol will prompt you to add information in the action sheets in the Workbook. The symbol is a rake hoe, also known as a McLeod tool (available at most hardware stores). Rake hoes are useful for creating temporary small fire lines for a prescribed burn.



Mapping – when you see this symbol you will be required to map the features that are mentioned within the workshop on the transparency that is provided.



Tip – handy hints for completing your tasks.

4.1.2 Mapping symbols

You will find the Property Infrastructure Symbolology on the back page of this User Manual Section 8. Remove this page to make it easier to use as a reference for your mapping.



Unburnt areas, as shown in this image, provide important refuges for animals during fire and a base from which they can recolonise following fire (SEQFBC 2014 Recommended Fire Regimes). (C. Welden 2017)

4.2 Steps in making your Property Fire Management Plan

✓ Step 1 – Map your infrastructure

To produce a fire management map for your property, first you need to have a clear picture of what the current built assets are on your property (refer to Section 8: Property Infrastructure Symbology), where they are located, and their proximity to hazards.

1. Place your transparency over your map.
2. Mark in the corners of the map with a cross, as seen in Figure 2 below, so this can be used as a reference point.



TIP: Use the four small fold back clips at each edge of the map to secure the transparency in place.



Figure 2. Mark the corners of your map with a cross on the transparency so that you can refer to this spot each time you change maps.

To make referencing easier, use the following eight colours for drawing the various elements of your map: **Black, green, yellow, brown, purple, blue, red and orange.**

Don't worry if you use a different colour scheme to that recommended throughout the User Manual, but keep yours consistent throughout the labelling process, and draw a key to reference the colours accordingly.



Basic Information required (Black):

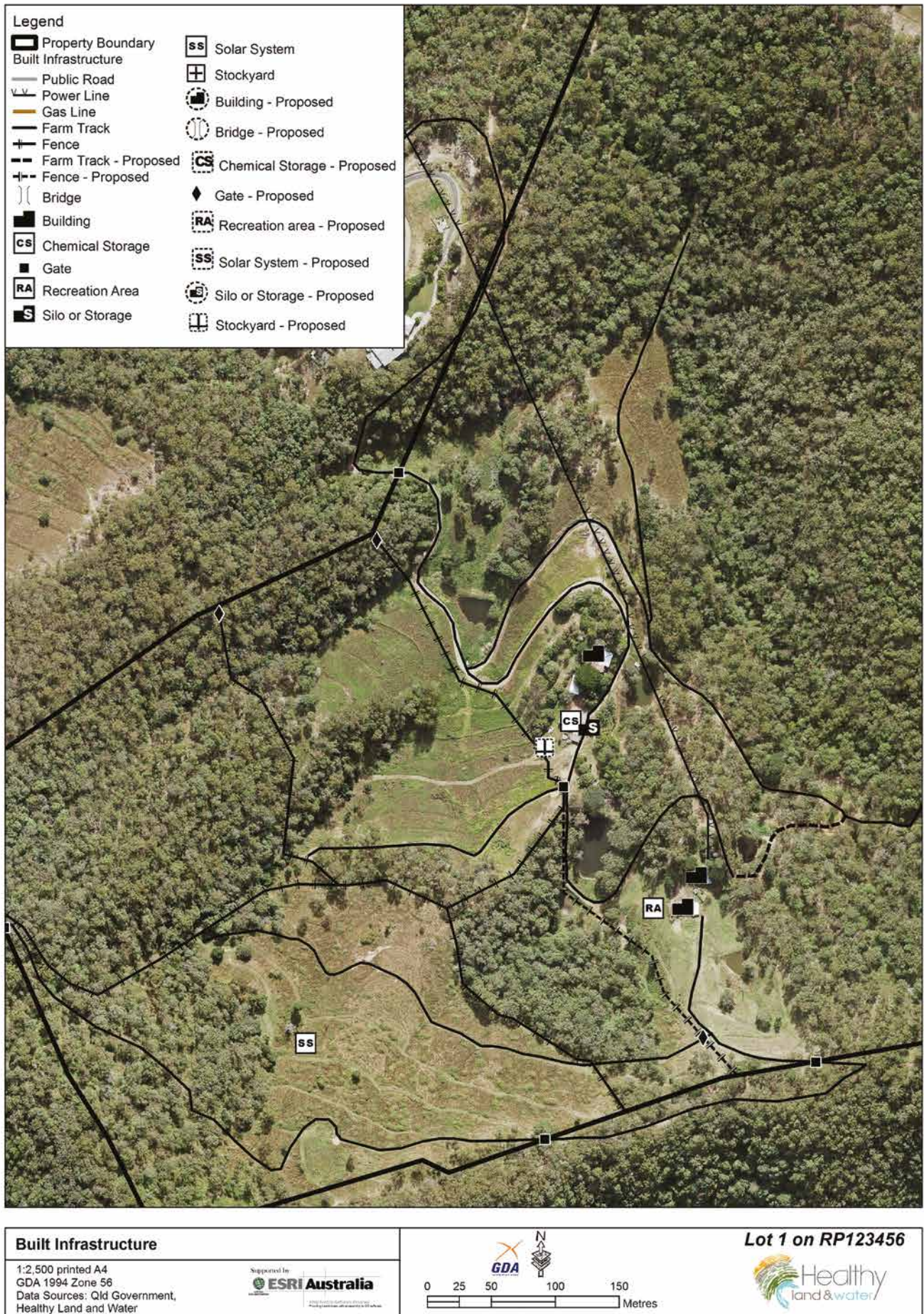
- Property name (if applicable)/address/lot on plan;
- Scale;
- Property boundary;
- Direction of prevailing winds;
- North arrow;
- Date of drawing; and
- Proposed revision date (suggest 1 to 2 years).



Built Infrastructure (existing) (Black):

- Houses, outbuildings, sheds and other buildings;
- Roads and internal property tracks, noting how accessible they are to vehicles;
- Fences (both proposed and existing) and gates;
- Power lines – those going to your house and large utility lines. If it is a large utility line, this area will be zoned differently. More details to assist you are supplied in Step 5 - Fire Management Zones;
- Gas pipelines;
- Hazardous chemicals and/or substances (include old stock dip sites here too);
- Recreational structures (e.g. tennis court);
- Fire tracks/lines; and
- Include proposed infrastructure such as buildings, fire trails, fences roads etc. Use a dotted line and mark *proposed*; and

Remember to map your neighbour's property assets (tenure blind approach).



Map 1. Worked example of adding the built infrastructure to your map.



Water infrastructure (Blue)

- Permanent rivers/creeks/streams;
- Intermittent (temporary) rivers/creeks/streams;
- Constructed waterways/pipelines;
- Water tanks;
- Dams, weirs and bores (please show overflow for the dams – i.e. boggy patches where a fire vehicle could get stuck);
- Stock watering points (off stream troughs);
- Windmills;
- Pumps and associated sheds/covers; and
- Swimming pools.

Use a dotted line to indicate proposed water infrastructure, and mark “proposed”.

In your Fire Management recording sheets (see Page 5 Part B - workbook), please record detailed information on the above water infrastructure, such as the capacity of water tanks and if pumps are electric or internal combustion.



Culturally significant sites (Purple)

- Mark on your transparency scar or carved trees, rock shelters that may house Traditional Owner artwork, or early European infrastructure. Mark with purple circles and mark HS and/or IS (abbreviation of Historical and Indigenous Site).
- If your map is to be shared, be aware that some sites may be culturally sensitive and therefore it may be necessary to exclude them from your maps.
- Also consider marking any culturally significant sites on your property with a permanent in-ground marker (such as a star picket) to avoid it being damaged during reactive firefighting operations (State of Victoria, 2015).

Remember, if you identify what appears to be a culturally significant site, immediately stop doing anything that may harm or interfere with the artefact or site and contact the Department of Aboriginal and Torres Strait Islander Partnerships. Preservation of our cultural heritage is important to preserve for future generations, plays an important part of indigenous culture today and has scientific and aesthetic values.

For further advice and information surrounding culturally significant sites, please refer to 5.4 Cultural Heritage within the Resources Section and 6.4 of the Further Resources Section located at the end of this User Manual.

Refer to Map 3 for a worked example of a map identifying and highlighting culturally significant sites.



Important habitat features (Purple)

This might include old trees with hollows, logs and rocks used by animals for shelter or nests, or the location of rare or threatened species. Mark with purple circles and mark FL (e.g. ignificant flora or habitat features).

Refer to Map 3 for a worked example of a map identifying and highlighting important habitat features.

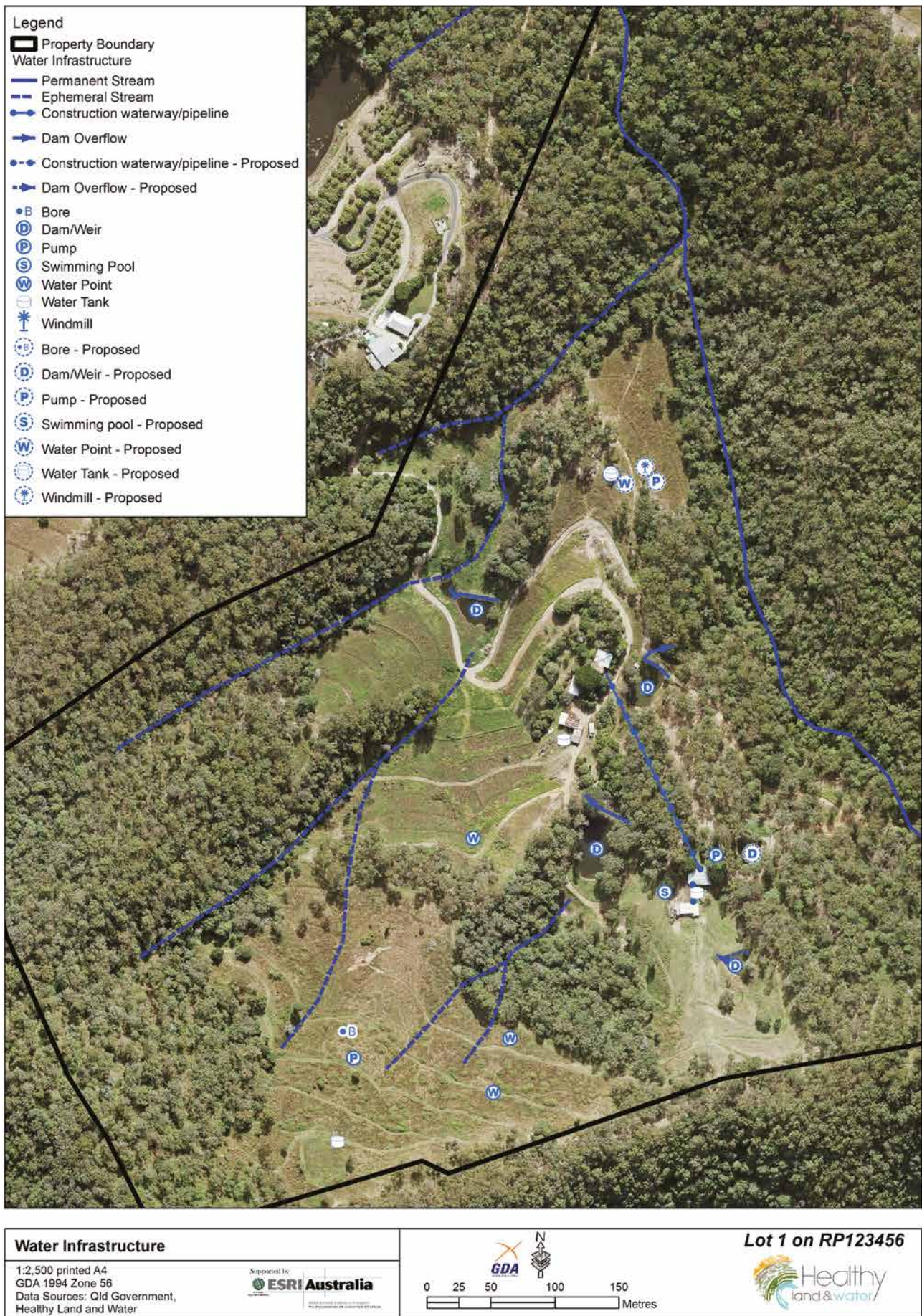


Neighbouring property bushland and assets

Label, identify and map nearby bushland and assets on neighbouring properties. Use the colours and symbols as above.

The RFSQ displays recent fire danger ratings for regions across Queensland sourced from advice from the Bureau of Meteorology. To understand how the fire danger ratings are determined visit: <http://www.bom.gov.au/weather-services/bushfire/index.shtml> (C. Welden, 2016)





Map 2. Worked example of adding water infrastructure and waterways to your map.

Sample notes – please add notes in your Workbook (Part B).

Example – Fire Management Recording Sheets - Notes on Infrastructure
Basic infrastructure, water, built environment, culturally significant sites, or important habitat features.
<i>Dam has overflow and is wet for most of the year - larger vehicles will get bogged.</i>
<i>Scar tree on western side near dam. Need to mark this down in the actions to ensure it is kept free of leaves at its base so it doesn't burn down.</i>
<i>Consider a cultural heritage plan.</i>
<i>Fuel load is too high near pump shed - need to include in actions to reduce fuel load around the pump.</i>

✓ Step 2 – Map your vegetation

How to map your vegetation



During the workshop, you will be given a copy of the regional ecosystem (RE) mapping for your property. Use this map as a guide to map your REs. In many cases the mapping may not be accurate, at the smaller scale we are looking at, therefore you will need to check on your aerial map that the RE boundary is accurate.



For land managers and landowners who have more than one RE on their property, please mark on the map the RE number (i.e. 12:3:5) so that you can refer to it in the Fire Management Zone steps.

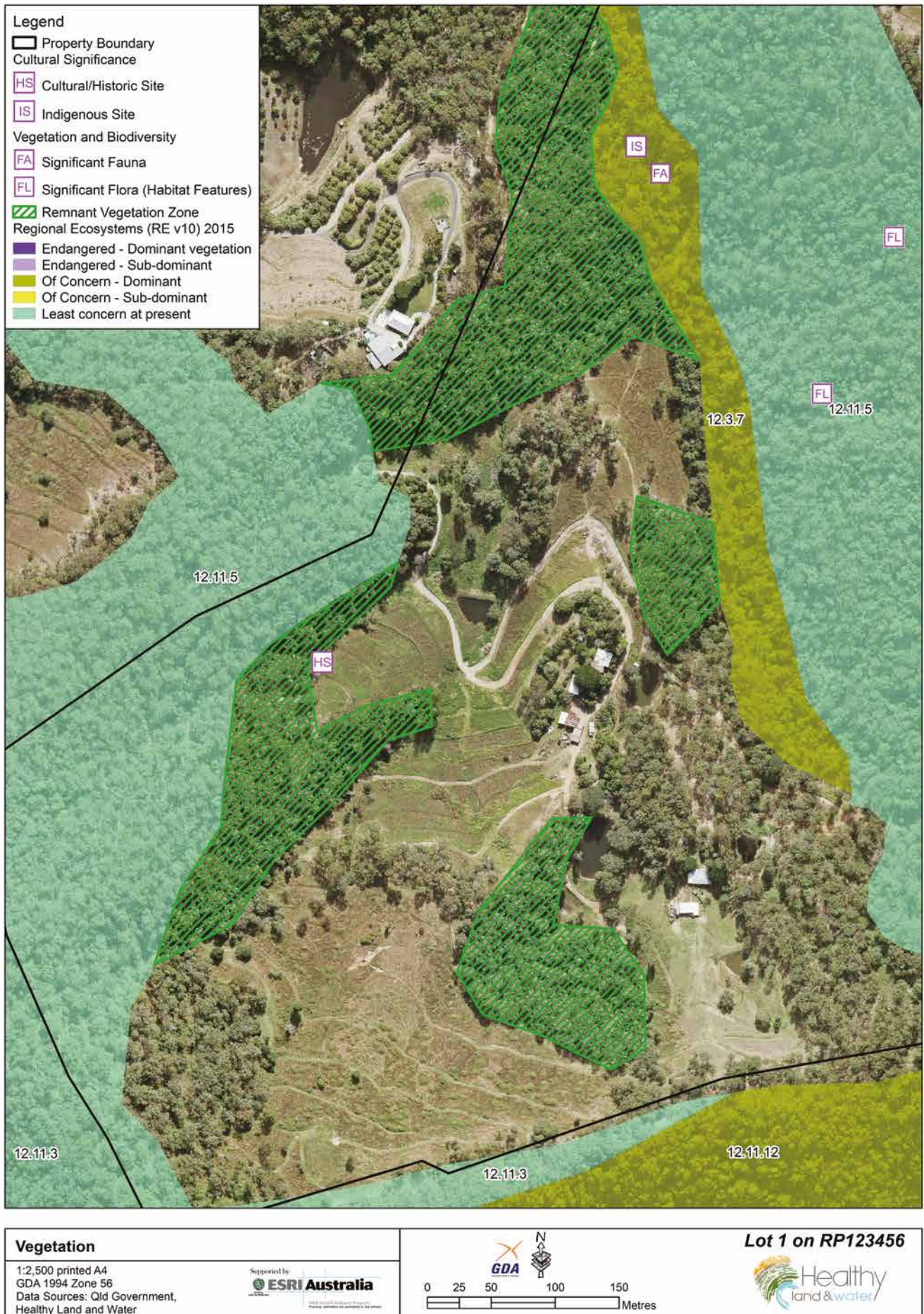


Within each of the RE's there may be other types of vegetation that are not covered by the RE mapping, such as riparian/creek line vegetation. Be aware that for some vegetation types, fire should be excluded due to that vegetation type being sensitive to fire. Examples include riparian areas (vegetation around creeks and rivers) and dry vine scrub. Keep a record of this in your Workbook: Fire Management Recording Sheets – Notes on vegetation. You will make changes to your vegetation map to reflect this in Step 5.3 Land Management Zones (LMZ) and Step 5.4 Fire Exclusion Zones (EZ).

Regional Ecosystem (RE): A regional ecosystem (RE) is a vegetation community classification system used within Queensland, developed by the Queensland Herbarium. Vegetation communities are associated with a combination of bioregion geology, landform and soil. Please refer to the Regional Ecosystem's Database Descriptions for the RE that is within each conservation zone. <https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download>. For more information on REs, refer to the following Land For Wildlife Regional Ecosystems fact sheet - www.lfwseq.org.au/wp-content/uploads/2016/11/LFW-Note-2016_V1.pdf

Sample notes – please add notes in your Workbook (Part B).

Example – Fire Management Recording Sheets - Notes on Vegetation
<i>The boundaries for most of the RE's in the mapping provided in the workshop appear to be correct. Need to double check the accuracy of the creek line (riparian) vegetation</i>
<i>Need to look at exclusion of fire on this riparian vegetation and start some weed management of the non-native grasses that are growing under the riparian vegetation</i>



Map 3. Worked example of adding culturally significant sites, vegetation community types and habitat features to your map.

✓ Step 3 – Map your fire trails/lines (Orange)

The purpose of fire trails are for providing access for firefighters to respond quickly to a bushfire. Therefore fire trails are very useful across the landscape provided they are maintained well and accessible for fire fighting vehicles.

Map current fire trails in **orange** and any proposed trails with a dotted line in **orange**.

Investigate if there are any old trails on your property that can be repaired and used again.



Tip: Before you plan to carry out any clearing of native vegetation be sure to check local, state and federal legislation. To find out more please visit: <https://www.qld.gov.au/environment/land/vegetation/clearing> (accessed online 24 July 2017)



Tip: Remote mapping, using LIDAR, can assist in determining old trails that you may not be aware of.



Tip: If you are considering construction of permanent fire trails, you will need to think carefully about drainage. Construction of fire trails is all about **drainage, drainage, drainage**. If the track is not properly constructed, erosion is likely to occur that can very quickly make your track impassable and will be a waste of time, money, as well as potentially erosion into local creeks and tributaries (Queensland Murray Darling Committee, 2012). Take care when constructing trails on soils that are highly erodible, such as in metamorphic hills. Keep in mind that any drainage channels require some fall in order for them to be self-cleaning (D. Kington, QPWS, *pers. comm* 2017). To learn more about soils and their erodibility, you can seek information from your local HLW Area Manager or the website.



*Example of a permanent fire trail.
Notice the side drain on the left that is taking water from the whoo boy. (C. Welden, 2010)*

Fireline: A fireline is a natural non flammable area, providing a containment edge for fire suppression for prescribed burning. This may include rainforest, mangrove, creeks, water-bodies, rock (P, Leeson, QPWS, *pers.comm.*, 2017).

Permanent versus temporary fire trails

You need to determine whether you require a permanent fire trail, or if a temporary track is sufficient. The construction of a permanent fire trail usually requires disruption of the soil profile and the vegetation community that may introduce weed species and can lead to soil erosion if not properly constructed. Additionally, a permanent fire trail can be used as a carriage way for pest animals and also facilitates the fragmentation of vegetation communities, and if they are too wide, can disrupt fauna movements.

Temporary fire trails can be used when carrying out a prescribed burn, and these trails can be slashed and/ or brush-cut. The general rule of thumb for the width of a fire trail for prescribed burns is twice the expected flame height, and for bushfires this increases to five times the expected flame height (Marsden-Smedley and Sherriff, 2013).

For slashed trails, the soil and associated slashed vegetation must be sufficiently moist if using the trail for prescribed burn purposes, otherwise the trail must be patrolled on a regular basis during the prescribed burn period.

Natural barriers that can be used for prescribed burns include creeks, dams, rainforest patches and gullies as they generally negate the need for a permanent fire trail (McGuffog, T, undated). Care must be taken however, to avoid fires burning into these fire sensitive communities by ensuring there is sufficient soil moisture and that burning occurs from the edge outwards from these areas.



Tip: Remember that topography may dictate that a fire line may be best placed on, or through, your neighbour's property.



Tip: If vehicles cannot pass easily on the sides of the trail (due to slope and or dense vegetation) it is recommended that you include passing bays. Many government construction guidelines recommend passing bays at 200 metre intervals. To allow for most long fire fighting vehicles they should be a minimum of 20 metres long and 6 metres wide (Leask, J. and Smith, 2011). Maintain minimum vegetation clearance height of 4 metres. This includes the track/road into your property.

Key points:

- a. Limit the number of fire trails to the number you can maintain, as every track increases bushland fragmentation, promotes opportunities for weeds and feral animals, adds to property maintenance costs and increases the potential for erosion;
- b. Use established tracks on your property as much as possible;
- c. Consider tracks on, or through, your neighbour's property;
- d. When constructing a trail, the main consideration is drainage, therefore avoid steep gradients. Use construction methods that slow and remove surface water so that erosion does not occur;
- e. Consider slashed fire lines when carrying out a prescribed burn;
- f. Allow space for a fire vehicle to turn around (including a farm ute with fire trailer) and clear vegetation to a height of 4 metres;
- g. Any gates should be a minimum of 3.6 metres wide;
- h. Avoid no through roads. If no alternative is available, they must be well sign posted at the start of the track to indicate that there is no through access. At the end of the road there must be area for a fire vehicle to turn around.



Tip: It is a good idea to inform your local Rural Fire Brigade (RFB) of any new fire infrastructure such as fire trails that you have added to your property. Taking your local RFB on a familiarity tour of any new trails will assist them in the event of a bushfire.

For further information on the construction of fire trails including drainage, turn around zones, passing bays for fire trucks etc., please refer to Section 5.7 Resources at the back of this User Manual.

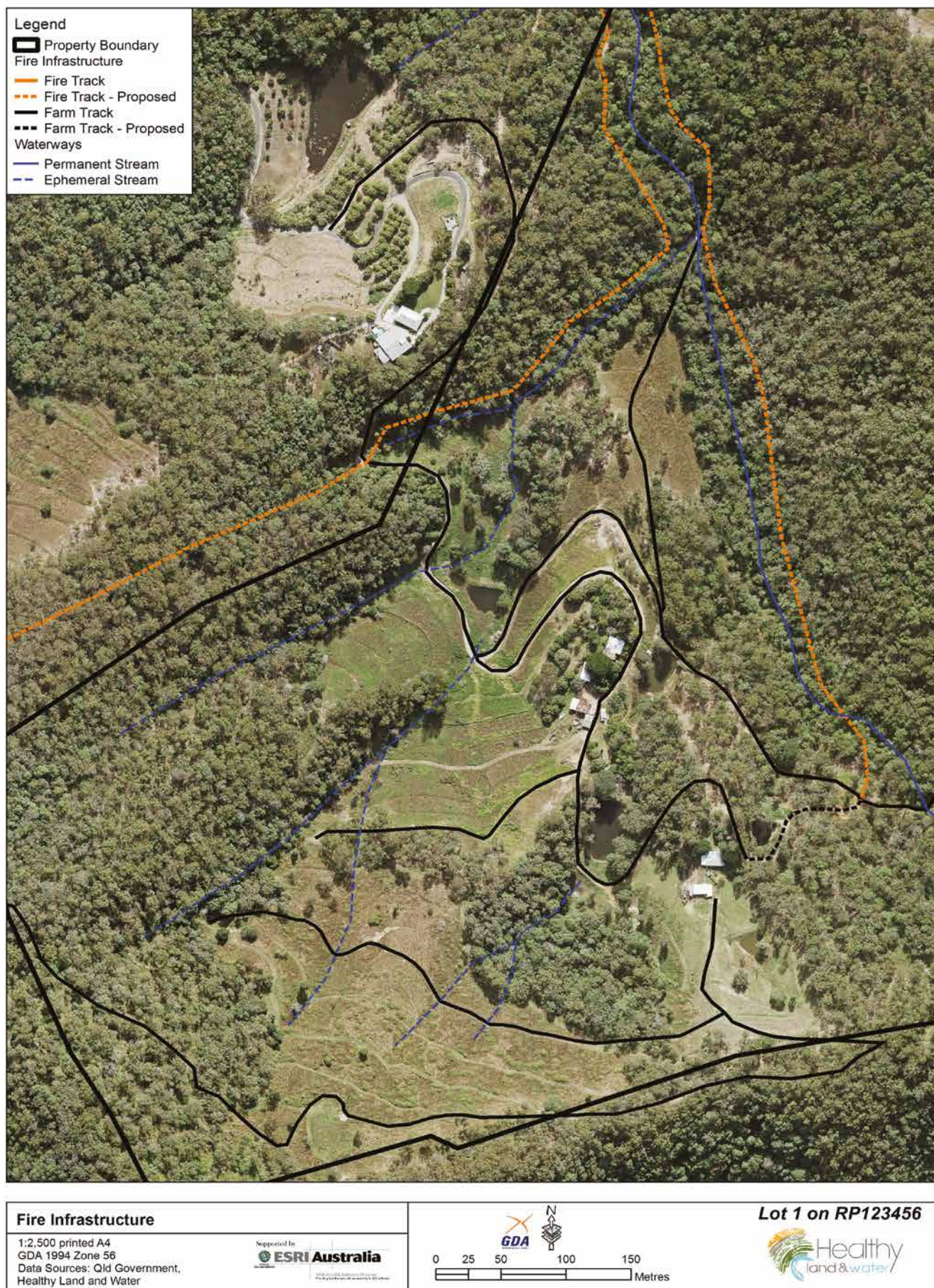


Action: List any actions in the 12 months, 2-4 years and 5+ years tables in your Workbook (Part B) on pages 19-22.

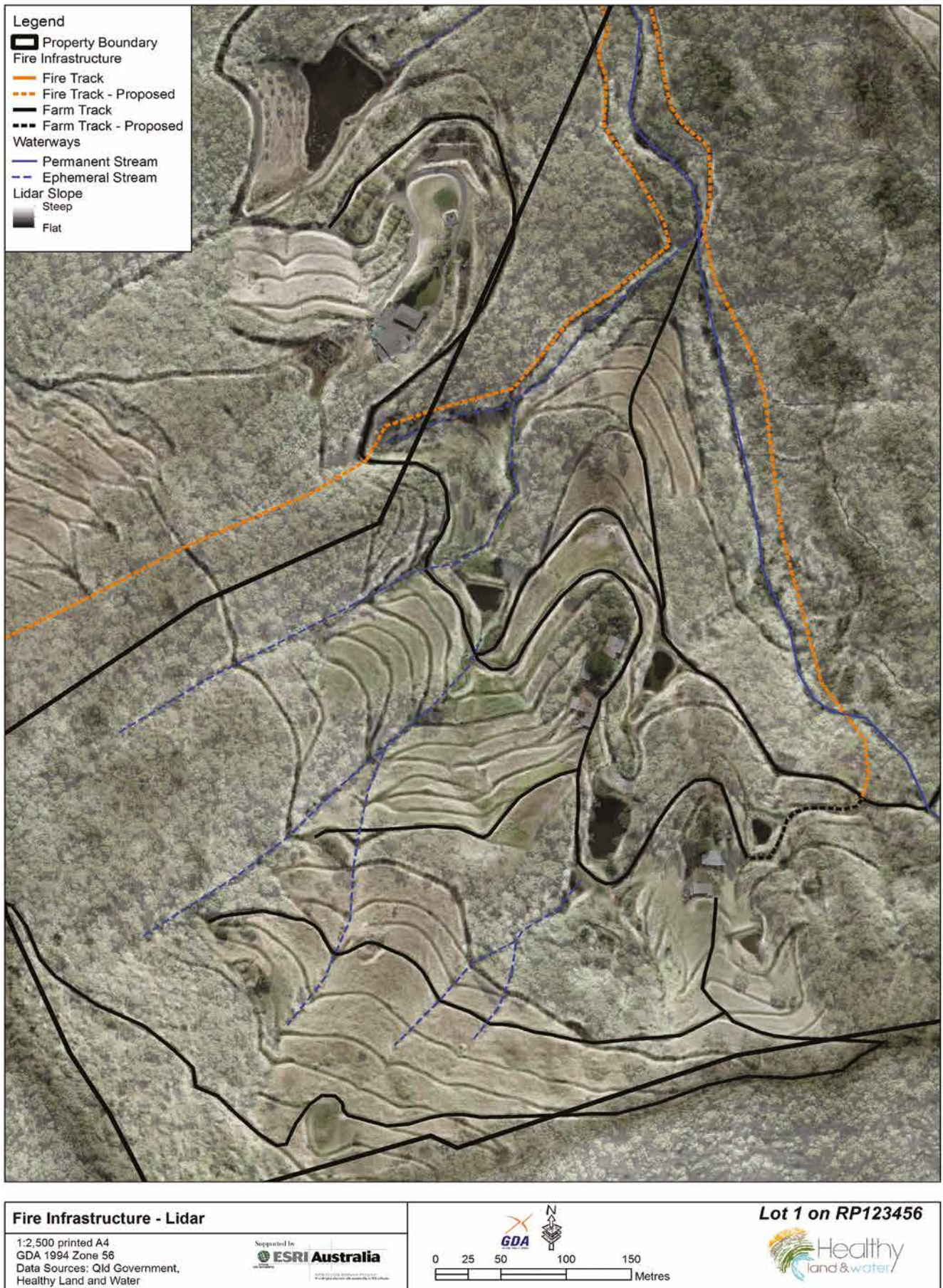
Worked example for Part B – Workbook: Fire Management Recording Sheets - Notes on Fire Trails
<i>Need to chat to Fred (neighbour) about placing fire trail on our boundary - future fire trail.</i>
<i>Need to budget for a fire trail on the western side near Mary and George's (neighbour) boundary.</i>
<i>Speak to the Rural Fire Brigade about passing on GPS maps of our current fire trails.</i>
<i>Need to be careful with fire trails on the highly erodible sites - where the soils are overlying weathering rock.</i>



Course aggregate like that shown in this image will assist in a boggy/wet situation. This trail allowed fire fighters to control the 2017 Caloundra Wildfire. (C. Welden. 2017)



Map 4. Worked example of adding fire trails and waterways to your map.



Map 5. Worked example of the use of LIDAR mapping. Note the old tracks and streams that are now visible with the use of LIDAR technology, that are not visible in the aerial maps within this User Manual

✓ Step 4 – Map your fire history (Red)

Recording the fire history of your property is an important step in determining future fire regimes and protecting your property assets. The direction, intensity and type of fire are all important factors to consider when recording your fire history, or when asking someone about the fire history of your property.

You can use remote mapping tools such as the Queensland Government's fire scar mapping that has been mapped from 1986 to present. It is worth remembering that these are only tools, and there are some limitations to their use. To access these fire scar maps please go to: www.qld.gov.au/environment/land/vegetation/mapping/firescar.

If you don't know the fire history of your property, or you are having trouble recalling this information, you may want to speak to people that have been in the area for a long time, your local RFSQ volunteers, or if you live within a peri urban area, speak to your local urban fire fighters.

Tip: There are some observable clues to look for on your property that can help to determine fire history, including:



- grass-tree skirts where grass trees are present. See for examples Figures 4 and 5 below;
- the age classes of the vegetation. The QPWS publication, "*Planned Burn Guidelines*" provides a pictorial guide and indicators to look for within vegetation groups, where fire has been excluded for some time. (Refer to: www.nprsr.qld.gov.au/managing/planned-burn-guidelines.html);
- checking to see if the fire history mapping, or what you have learnt from oral history, is the same as the observations you have made;
- presence and age of charred bark on rough barked trees such as bloodwood (P. Leeson , QPWS *pers.comm.* 2017).



Long unburnt (20 years plus) "skirt" on a grass tree.
(P. Leeson. QPWS year unknown)



Grass Tree with the skirt having one year's growth following the Stradbroke Island Bushfire of 2013. (Watson. 2014)



Action: List in your Workbook: Fire Management Recording Sheets – Notes on fire history some of the following key points, for your own future reference.

- Direction of fire and boundary of fire.
- Year, and if possible, the exact date of the fire (e.g. could be used for exact weather referencing).
- The intensity of the fire. The Queensland Government's "Planned Burn Guidelines - How to assess if your burn is ready to go" can be used to assess fire severity post fire. Tables are provided for differing vegetation types. Refer to: <https://www.npsr.qld.gov.au/managing/pdf/pbg-assess-a5.pdf>

Worked Example of Part B – Workbook: Fire Management Recording Sheets - Notes on fire history			
Date of Fire	Map coordinates of ignition	Bushfire or planned burn?	Fire intensity? See QPWS planned burn manual for guidance for fire intensity
20 May 2002	27°46870 LAT 153°02515 Long	Planned burn	It was a low intensity fire. Got a bit hot in some molasses grass.
Feb 2008	Same as above	Bushfire	Came across from the west from Nel and Fred's place. Was pulled up at Browns Roads.

✓ Step 5 – Map your Fire Management Zones (FMZ) (Yellow)

Now that you know a little more about the vegetation and assets on your property, we would like you to break up the property into Fire Management Zones (FMZ) according to land use and associated risk.

We have used the following FMZ's. These are consistent with most government land management agencies across South East Queensland, and as suggested by the Council of Australian Governments (COAG), cited in the report for the National Burning Project March 2015 (AFAC, 2015):

1. Asset Protection Zones (APZ)
2. Strategic Fire Advantage Zones (SFAZ)
3. Land Management Zones (LMZ)
4. Fire Exclusion Zones (EZ)

This Fire Management Plan focuses on land management and exclusion zones. For building protection measures, please refer to the "Prepare Act Survive" material prepared by the Queensland Fire and Emergency Services as outlined in Section 6: Further Services.

1. Asset Protection Zones (APZ)

An Asset Protection Zone (APZ) is an area surrounding a dwelling/structure that can be defended from bushfire. There are also recommendations from State Planning Policy and local government local laws that need to be considered, particularly when you are planning a new dwelling or making changes to your existing dwelling. Additionally, you need to consider laws when removing vegetation.

An effective way to minimise bushfire risk is to think carefully about how you design your house and other assets, and where you place them. Ridge top sites and steep slopes, particularly west-facing slopes, are best avoided. The best designs are simple ones that minimise corners where burning embers could get trapped. Spaces under the house and eaves where embers may get in should be bricked up or screened.

Asset Protection Zones (APZ) are intended to be safe zones for firefighters and home owners (home owners that are prepared and capable) to use to defend a property during a bushfire event. Recent research suggests reducing any vegetation in the APZ from 90% to 5% will significantly reduce potential house loss (Gibbons *et al.*, 2012).



Tip: The Victorian Government's "*Guide to retrofit your home for better protection from a bushfire*" is a great start to consider changes to better protect your assets: http://www.cfa.vic.gov.au/fm_files/attachments/plan_and_prepare/bushfire_home_retrofit.pdf.

You may also want to consider contacting a bushfire planning and design consultant, who are registered as meeting specific accreditation and competency requirements. See Section 6.3: Fire Protection Association Australia at the back of this User Manual to find a provider.

Recognise that different vegetation types (under the same conditions) burn differently, with differing intensity and ember potential. You can manipulate the hazard, and thereby reduce the risk, by burning or mechanical treatment (i.e. slashing/mowing).



Mark these areas on your map as APZ 1, APZ 2 and so on.



Action: You will need to identify within your Asset Protection Zones (APZ) your actions, objectives and the timing of when you are planning to carry out your actions and record this within your Workbook: Fire Management Recording Sheet – Asset Protection Zones.



While the most common mechanism for house loss is from ember attack, this house is at risk of direct flame contact. Also note the lineal fuel connectivity allowing a fire to easily travel from the surface ground fuels to mid fuels. (C. Welden, 2002)

2. Strategic Fire Advantage Zones (SFAZs)

A Strategic Fire Advantage Zone (SFAZ) is usually situated between the hazard and the APZ and is an area intended to reduce the bushfire hazard, slow a fire down and reduce its intensity. These are areas where prescribed burning is the most effective risk reduction management tool. Your SFAZ may have natural barriers, such as creek lines that may assist in slowing the fire.



Mark these areas on your map as SFAZ 1, SFAZ 2 and so on.



Action: You will need to identify within your Strategic Fire Advantage Zones (SFAZs) your actions, objectives and when you are planning to carry out your actions and record this within your Part B: Workbook - Fire Management Recording Sheet: Strategic Fire Advantage Zones.

3. Land Management Zone (LMZ)

Land Management Zones (LMZ) are areas that are managed for conservation, production, and cultural purposes.

We can break these up into further sub-zones (each is explained more fully below):

- a. Conservation Zone (CZ)
- b. Special Conservation Zone (SCZ)
- c. Rehabilitation Zone (RZ)
- d. Sustainable Production Zone (SPZ)

a) Conservation Zone (CZ)

These are areas that you have set aside for the protection and conservation of vegetation types and associated fauna communities.

You will have already mapped your Regional Ecosystems (RE) on your property. If you have more than one RE, it is important to map it differently from others as they will most likely have different fire regime characteristics.



Mark these as CZ 1, CZ 2 and so on.



Action: You will need to outline within your Conservation Zone (CZ) your actions, objectives and the timing of your actions and record this within your Workbook: Fire Management Recording Sheet – Land Management Zones (a worked example is provided below). Please refer to the Regional Ecosystem's Database Descriptions (REDD) for the RE that is within each conservation zone. For more information please refer description of REs under Step 2 of this manual. <https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download>.



Tip: Look at the fire history of the area to determine if the recommended fire regime is consistent with the past/current fire regime. If not, you will need to determine when and how you can make those changes to improve the health of your bushland. We strongly recommend you read an explanation of fire regimes as outlined in the SEQ Fire and Biodiversity Consortium “*Living with Fire series – Fact Sheet 3: Recommended fire regimes* (2014)” as referenced in section 6.5 at the back of this User Manual.



Tip: The presence of any threatened species (both plants and animals) will require further investigation. We recommend you consult with your Local Government Environment Officers and Land for Wildlife Officers or the Department of Environment and Science. If threatened species are present or likely to be present map these areas as a Special Conservation Zone as outlined in Section b) below..



Tip: Consider your objectives. What is the ‘health’ of your bushland? Some pictorial guidance on the health of your patch of bushland can be found in the QPWS publication “*Planned Burn Guidelines*” for each vegetation community.



The exclusion of fire has allowed the she-oaks to dominate in the picture on the left. You may consider introducing fire into this patch to promote a greater diversity of plants. The photo on the right was taken nearby where a fire was introduced four years prior. Fire introduced into this area reduced the density of she-oaks and promoted a greater diversity of plants. Mosaic burning allowed for the persistence of some she oaks (*Allocasuarina littoralis*). Most she oak species are feed trees for the vulnerable Glossy Black Cockatoos (Glossy Black Conservancy 2010). (C. Welden, 2013)



Tip: If the area is unhealthy and you are rehabilitating it please map it under c) Rehabilitation Zone (RZ).

b) Special Conservation Zone (SCZ)

A Special Conservation Zone will have species of significance that are classified as Vulnerable and Rare under the *Nature Conservation Act 1992* and the *National Environmental Protection and Biodiversity Conservation Act 1999*. These species have the potential to be used as indicator species in monitoring programs.



Tip: The Department of Environment and Science maintain a database of threatened species across South East Queensland that can be viewed on the EHP website: www.ehp.qld.gov.au/wildlife/threatened-species/



Tip: Refer to the SEQ Fire and Biodiversity Consortium’s “*Living with Fire series - Fact Sheet 3 - Recommended fire regimes*” (2014), for more information on fire as a key threatening process.

A **threatened species** is as species declining in numbers due to a threatening process or processes. Inappropriate fire is one such threatening process to biodiversity conservation, and both too frequent and too infrequent fire is a known key threatening process.



Tip: You can search for species on your property by using the Queensland Government's *"Spot our Species"* website (www.environment.ehp.qld.gov.au/spot-our-species/) to find location relevant information on threatened species, habitats, recovery actions and local community groups involved in species preservation. An additional function is the ability to submit your own wildlife sightings and keep a record of what you have spotted. The *Spot our Species* website connects with the Atlas of Living Australia. Refer to Section 5.1: Resources for more information.



Mark these areas on your map as SCZ 1, SCZ 2 and so on.



Action: You will need to outline within your Special Conservation Zone (SCZ) your actions, objectives and the timing of your actions and record this within your Workbook: Fire Management Recording Sheet – Land Management Zones (LMZ). Please refer to the REDD for the RE that is within each Land Management Zone (LMZ). Refer to Step 2 (page 17) for information regarding REs and the REDD.

c) Rehabilitation Zone (RZ)

For the purposes of this User Manual, we will use the term "rehabilitation" that covers both restoration and rehabilitation, as this is the term that is commonly used within South East Queensland by government land management agencies. We will use The Society for Ecological Restoration International (SERI) definition of ecological restoration as cited in Chenoweth and Bushland Restoration Services, (2012):

"...the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed."

The SEQ Ecological Restoration Framework Manual (refer to Section 5.1) goes on to define four common restoration approaches that include natural regeneration, assisted natural regeneration, reconstruction and fabrication.

Mosaic Burning: When carrying out a prescribed burn, allow some areas not to burn so that you get a "patchwork" effect. Mosaics or patchworks can be applied across your property and the landscape to allow for different stages of growth post-fire that may reduce the speed and intensity of a wildfire, support areas of recruitment, and provide refuges for native animals. Remember that mosaics will increase the chance fauna will survive a prescribed burn particularly within gullies or creek lines as observed by Garvey *et.al* (2010).

Fire can be used as a management tool to control, or reduce, the density of many woody weed species. While prescribed fire is generally known as a cheap method of control, the use of fire alone is unlikely to result in immediate control and in most cases preparation and follow up is required to ensure the control, and/or eradication, of weed species.

Timing is critical for weed control. Using fire at a time when weed seed is about to is due to germinate can help prevent the release of more seeds. Using fire to control weeds in their early establishment is easier than when they get to a later stage of growth. For woody weed control, such as lantana, you may need an understory of grasses to ensure fire penetration into a mature woody lantana population. If you have livestock, you may consider destocking an area for a period of time to allow for this thickening of understory grasses. Sometimes however, establishing a grassy understory may not be achievable as a result of competition from the woody weeds suppressing growth. However caution must be taken so as to not increase the fire risk to unsafe levels. It is therefore best to aim to build up a grassy understory in smaller patches.

Fire may provide an opportunity for native plant seeds to germinate and seedlings to flourish by:

- reducing or removing insects that would otherwise feed on the seedlings;
- improving soil conditions and allowing light to penetrate to the ground surface creating an improved environment for seed germination.

All of these factors provide a greater opportunity for weed invasion. It is therefore critical to ensure that resources and time be made available to control any weeds that appear following a fire. For specific weed control please consult with your local council's weed officer and land for wildlife officer, a Queensland Government Biosecurity Officer, or view the online resources provided by the Department of Agriculture and Fisheries (for more information please refer to Section 5.13: Weed Management).

It is important to recognise that woody weeds provide habitat and food for some native animals. Lantana, for example, provides cover and habitat for many small bird species. To conserve biodiversity values it is recommended that you adopt a planned staged removal of weed species and allow for the replacement/recruitment of native species that provide the similar structure and/or food source for native fauna.



Mark these areas on your map as RZ 1, RZ 2 and so on.



Action: You will need to outline within your Rehabilitation Zone (RZ) your actions, objectives and the timing of your actions and record this within your Workbook: Fire Management Recording Sheet – Land Management Zones (LMZ). Please refer to the REDD for the RE that is within each land management zone. <https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download>.

d) Sustainable Production Sub-zone (SPZ) (e.g. grazing, timber and vineyards)

When creating Asset Protection Zones (APZ) around production areas such as grazing, orchards, crops, vineyards, nurseries and timber plantations (to name but a few), you may need to consider factors including direct flame contact, radiant heat, ember attack and smoke effects. For some industries, such as nurseries, minimising the impact of a bushfire is similar to those measures taken for house protection.

Not all industries are represented here. It is recommended that you contact your industry association and the Department of Agriculture and Fisheries for more information on how fire may affect your specific industry (refer to Section 5: Resources).

Grazing

(Excerpt taken from Lloyd and Lord, 2013. Fire And Grazing In: Page and Walker, (Eds.) Living In Somerset - Property Management Handbook. 1St Ed. Esk: Somerset Regional Council).

This section specifically deals with how fire management can be best applied for positive grazing and environmental outcomes. Well planned and managed prescribed fires can have a positive effect on grazing production. Whilst some objectives may differ to that of fire management planning solely for biodiversity, both approaches have overlapping positive outcomes and it is possible to implement fire regimes that encourage both production and biodiversity values.

Potential advantages of an appropriate fire regime for grazing properties include:

- Improved vigour and quality of pasture by removing rank growth and encouraging new growth;
- Improved pasture composition by promoting desirable '3P' pasture species (e.g. speargrass, kangaroo grass and forest bluegrass), and reducing undesirable species (e.g. Wiregrasses);
- Encouraging grazing pressure to be spread over larger areas and minimise patch grazing;
- Reducing woody weed cover - particularly if used as part of a coordinated weed program;
- Helping to maintain a grassy understorey by controlling regrowth;
- Reducing the risk of bushfire that may damage/destroy valuable infrastructure (e.g. fences and yards), cause land degradation, create feed shortages and in extreme cases kill/maim livestock;
- Encouraging the establishment of tree species (where needed for shade, shelter etc.), and
- Improving overall land, soil and forest condition and biodiversity values.

Potential disadvantages of poorly managed fire regimes for grazing properties include:

- Short-term losses in production income as a result of lost grazing areas/pasture;
- Losses of ground cover and an increased risk of erosion and reduction in water infiltration;
- Soil fertility and pasture condition that may be reduced with very frequent burning or extremely hot fires;



Appropriate fire regimes can be used for grazing for improved vigour and quality of pasture and can have many other benefit for grazing production.
(B Lord 2017)

- Some invasive species and undesirable pasture species becoming more prolific as they may be more tolerant of frequent burns or very hot fires;
- Damage to timber resources and property infrastructure such as fences, yards, buildings;
- Reduction in biodiversity values or land condition, and
- Potential litigation for impacts of unmanaged fires on neighbouring properties.

The SEQ Fire and Biodiversity Consortium acknowledges the research undertaken by Tom Lewis and Valerie Debus, with respect to the above section, referring extensively to the guidelines *"Using fire in spotted gum – ironbark forests for production and biodiversity outcomes. Guidelines for Landholders"* (2007) which was published by the former Department of Primary Industries and Fisheries (Debus and Lewis, 2007) (now the Department of Agriculture, Fisheries and Forestry). The SEQ Fire and Biodiversity Consortium would also like to acknowledge the contribution of Bruce Lord from HLW and Andrew Houley, (RFSQ).



Tip: For more information on livestock and bushfires please see the list of resources and publication listed in the Section 5.8: Land management and Section 5.12: Livestock, pets, horses and fire.

Timber

Unplanned or high intensity fires can have an adverse impact on the cambium layers within commercial timber, that may result in a loss in saleable timber. Applying appropriate fire regimes across the landscape (similar to grazing) can complement biodiversity outcomes as well as timber production outcomes. Conversely, a lack of fire may change the forest structure and in time the invasion of fire sensitive plants and or shrubby understory can restrict eucalypt trees regenerating.

Most private native forests are managed for both grazing and timber production, with grazing being the primary income for landholders (Ryan, 2007).

Fire is used as a management tool for production timber and is usually undertaken during winter months for the following purposes:

- Reduction of shrubby regrowth;
- Encouragement of eucalypt regeneration;
- Control of woody weeds;
- Reduction of fuel loads (thereby minimising the adverse effects of wildfires on timber trees), and
- Maintaining a grassy understory that is suitable for grazing.

Fire should be applied to a landscape with considerations for an appropriate fire regime. Points to consider include:

- Varying the frequency of burns across your property and the landscape. Application of fire should be varied according to rainfall and grazing intensity;
- Applying mosaics (patchworks) across your property and the landscape. When carrying out a prescribed burn, allow some areas not to burn so that you get a "patchwork" effect. These areas allow for different stages of growth post-fire and may reduce the speed and intensity of a wildfire, areas of recruitment, and refuges for native animals, and
- Don't burn areas of sensitive vegetation such as rainforest, creek-line vegetation, or dry vine forests. Be sure to map sensitive vegetation and mark it as an Exclusion Zone (EZ) .



Native Forestry, Gympie messmate (*Eucalyptus cloeziana*) at Nanango. (P Daly 2013)

- Use lower intensity fires for timber production. High Intensity fires are more likely to:
 - Kill young trees;
 - Scorch tree crowns and reduce diameter growth;
 - Damage stems and cause wood defect;
 - Remove protective bark;
 - Allow entry of damaging insects and fungi, and
 - Deplete soil nutrient reserves, reduce plant cover and increase erosion and water infiltration (Debus and Lewis, 2017).



It is recommended that you refer to the publication *“Using Fire in Spotted gum/Ironbark Forests and Woodlands for production and biodiversity outcomes”*, (Debus and Lewis, 2017). For more information on the specifics of the application of fire for timber production as well as wine and grape production and grain silos, refer to Sections 5.9, 5.10 and 5.11.



Mark these areas on your map as SPZ 1, SPZ 2 and so on.



Action: You will need to outline within your Sustainable Production Zone (SPZ) your actions, objectives and the timing of your actions and record this within your Workbook: Fire Management Recording Sheet – Land Management Zones (LMZ). Please refer to the REDD for the RE that is within each Land Management Zone (LMZ). <https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download>.

4. Fire Exclusion Zones (EZ)

Fire Exclusion Zones (EZ) are areas where you want to limit fire to the boundaries of this area, and not have fire within the area. These areas can include vegetation communities that are sensitive to fire (such as dry vine thickets and rainforest) and will likely be killed if burnt and exposed to radiant heat. Fire Exclusion Zones (EZ) can also include utilities such as powerlines, water infrastructure, mobile phone towers, or culturally significant sites and assets that may be damaged or destroyed if fire is introduced.



Map this area as EZ 1, EZ 2 and so on.



Action: You will need to outline within your Fire Exclusion Zones (EZ) your actions, objectives and the timing of your actions and record this within your Workbook: Fire Management Recording Sheet – Land Management Zones.

Questions to consider:

a) How are you going to protect these areas?

You may need to think about the creation of a fire trail around these areas. For rainforest, the rainforest itself can provide a natural buffer (exceptions may occur in prolonged drought conditions, i.e. low soil moisture levels).

b) Does my property contain public utilities?

You may consider the use of mechanical control to manage the hazard. Care must be taken when using fire near powerlines. Fire can physically damage electrical infrastructure, which can disrupt electricity supply and/or create electrical hazards. Heat and smoke may cause an arc from one wire to another or to the ground, creating a safety hazard for people nearby and potentially disrupting electricity supply.



Tip: If using fire near powerlines please consult the relevant electricity utility. An information guide has been produced by Powerlink Queensland based on national guidelines for emergency personal. To read more, refer to Section 5.5: Fire safety and management – including home protection and construction.



Tip: If using fire near culturally significant sites please seek guidance. For more information refer to Section 6.4: Further Services.

Step 6 – Fire and biodiversity monitoring

The gathering of information on how your landscape has responded to fire will assist in reviewing and developing future Fire Management Plans.

1. Assessing your landscape's response to fire

You can spend as little, or as much, time in monitoring how your property has responded to the use of fire. A simple and time effective monitoring technique is the use of photo monitoring for the observation of plant community changes over time. For fauna, motion cameras can be used to detect absence and presence of fauna.

a) Vegetation surveys

To establish a photo monitoring site, simply place a star picket in the location that you will be taking a picture from and place a yellow safety cap on the top of the star picket (to keep it safe and so that you can identify the location of the star picket again). Take pictures from this site in the same direction every time and observe the vegetation changes over time. Pick sites that are not in the vegetation transition zones, for example, a transition zone between Regional Ecosystems (REs).

Take a look at and record what burned and what didn't burn following a fire. Why may this have happened?

b) Fauna surveys

The Queensland Government has an excellent resource, the *Fauna Survey Guidelines* (see link below), that helps to explain the use of different methods of fauna surveying. The use of a static fauna camera is becoming increasingly popular with private landholders to capture the presence of fauna (including pest species). Recognition of scats (animal poo) and traces of animals is also very useful. There are a great many resources to assist with identifying scats and traces. It pays to always be observant every time you traverse your property and take notes.

Fauna Survey Guidelines: www.qld.gov.au/environment/assets/documents/plants-animals/biodiversity/fauna-survey-guidelines.pdf



Action: Set up a file to keep the information you collect on the flora and fauna on and around your property. It will be helpful for future reference when assessing the potential impact of fire on the biodiversity of your area.

2. Fuel Hazard Monitoring

When assessing fuel hazard, one of the quickest and easiest methods is to use the *Overall Fuel Hazard Assessment Guide* (OHFG) (Hines *et al.*, 2010) that assesses the fine fuels and how they are arranged vertically and horizontally.

What are fine fuels?

"Fine Fuels are the fuels that burn in the continuously flaming zone at the fire's edge. They contribute the most to the fire's rate of spread and flame height. Typically, they are dead plant material, such as leaves, grass, bark and twigs thinner than 6mm thick, and live plant material thinner than 3mm thick. Once ignited, these fine fuels generally burn out within two minutes." (Hines *et al.*, 2010)

For ease of monitoring, use the same sites you have set up for vegetation surveys for the assessment of fuels. These sites should be within the differing management zones (for example within the Asset Protection Zone, or Land Management Zone).

The OHFG assigns various layers to the vegetation that include:

1. Canopy;
2. Bark fuel;
3. Elevated fuel; and
4. Near surface fuel and surface litter.

Please refer to page 7 of Hines *et al.*, 2010 for descriptions for each of these layers. This is a subjective assessment and there is ambiguity. We suggest you ask an experienced person to assess this with you.



Tip: Remember to provide a description of why you chose a particular rating so that there can be some understanding when looking at the assessment retrospectively.



Action: Use the Fire Activity Recording Sheet in Workbook B to monitor the impact of fire on your property.



4.3 Completing your Property Fire Management Action Plan

Congratulations on completing Steps 1 to 6 of the User Manual. During this process you have built up layer by layer a comprehensive picture of the hazards on your property and the risks these pose to your assets. You are now ready to complete your Property Fire Management Action Plan at the back of Workbook B.

It is important to rake around fallen logs, habitat trees and trees with scars at the base.
(C. Welden. 2017 Mount Coot-tha)

5.0 RESOURCES

This section outlines further resources to assist in the development of a Fire Management Plan. This section is divided into the following topics:

- 5.1 Biodiversity conservation
- 5.2 Relevant acts/regulations/standards
- 5.3 Garden design
- 5.4 Cultural heritage
- 5.5 Fire safety and management - including home protection and construction and fire and powerlines
- 5.6 Bushfire insurance
- 5.7 Fire trails
- 5.8 Land management
- 5.9 Wine – fire and smoke taint
- 5.10 Timber production
- 5.11 Grain silos
- 5.12 Livestock, pets, horses and fire
- 5.13 Weed management

5.1 Biodiversity Conservation

BRADSTOCK, R. A., GILL, A. M. & WILLIAMS, R. (EDS.) 2012. *Flammable Australia: Fire regimes, biodiversity and ecosystems in a changing world*. Melbourne: CSIRO publishing.

This book covers a great many topics relating to the use of fire in the landscape and its associated effects. Chapters include: fire regimes and the evolution of Australian biota, Fire regimes and soil based ecological processes and much more. The first edition from 2002 is also a great resource.

Chenoweth EPLA & Bushland Restoration Services 2012. *South East Queensland Ecological Restoration Framework: Manual*. Prepared on behalf of Healthy Land and Water and South East Queensland local government Brisbane.

This manual is a comprehensive document that details “how to” restore a bushland area. The information contained within is provided by local government and HLW staff who have extensive experience in the on-ground application of restoration techniques across South East Queensland.

Atlas of Living Australia

The Atlas of Living Australia provides many resources including list of species recorded within 1,5,10 km of a location that you nominate. You can explore information on each species and biodiversity data. www.ala.org.au.

Spot our Species

Do you want to know what species are known to be threatened within your “patch”? Use the Queensland Governments “Spot our Species” website to find location-relevant information on threatened species, habitats, recovery actions and local community groups involved in species preservation. An additional function is the ability to submit your own wildlife sightings and keep a record of what you have spotted. The Spot our Species connects with the above Atlas of Living Australia. www.qld.gov.au/environment/plants-animals/conservation/spot-our-species.

Species Profile and Threats

The Australian Government maintains a national *Species Profile and Threats* database designed to provide information about species and ecological communities listed under the *EPBC Act* (1999). It provides information on what the species looks like, habitat, movements, feeding, reproduction and taxonomic comments. The database can be viewed on the Department of Environment and Energy's website at www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

5.2 Relevant Acts/regulations/standards

- *Australian Standard for the Construction of Buildings in Bushfire-prone Areas AS3959 (2009) (most commonly used in fire management).*
- *Vegetation Management Act 1999 (VMA Act).*
- *Fire and Emergency Services Act 1990.*
- *Nature Conservation Act 1992.*
- *Environmental Protection Act 1994.*
- *Aboriginal Cultural Heritage Act 2003.*
- *Coastal Protection and Management Act 1995.*
- *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).*
- National guidelines on electrical safety for emergency service personnel, ENA Doc 008-2006 (SAI GLOBAL).
- *Planning Act 2016.*
- Local Government local laws. Contact your local council for more information.

To find the latest versions of the Acts listed above visit the Queensland Government website www.legislation.qld.gov.au/OQPChome or the Australasian Legal Information Institute: www.austlii.edu.au/.

5.3 Garden Design

Country Fire Authority Victoria, 2011. *Landscaping for Bushfire - Garden design and plant selection*. Melbourne: Country Fire Authority Victoria. - <http://www.cfa.vic.gov.au/plan-prepare/landscaping-for-bushfire/>

5.4 Cultural Heritage

Scar trees

Some useful resources available that may help to identify scar trees on your property and their management. LONG, A. 2005. *Aboriginal scarred trees in New South Wales - a field manual*. Department of Environment and Conservation (NSW) [online] accessed 12/01/17. www.environment.nsw.gov.au/resources/cultureheritage/ScarredTreeManual.pdf

5.5 Fire safety and management - including home protection and construction and fire and powerlines

(see Further Services section below)

Rural Fire Service Queensland - Building in bushfire prone areas: www.ruralfire.qld.gov.au/Bushfire_Planning/

Queensland Government State Planning Policy Interactive Mapping System

This online interactive mapping tool can be opened by most basic operating systems. You can view your individual property hazard rating. This tool is aimed at Local Governments and development applicants in providing an understanding of hazards that apply to individual sites. There are other features that are available other than hazards including matters that are of state and or national interest, such as under the EPBC (1994)]

Queensland Government – Building in a Bushfire Prone area

- The following is an older document (use with caution as it was published in 2000), but does contain some good

information on simple building design. www.hpw.qld.gov.au/SiteCollectionDocuments/protecting-home-against-bushfires.pdf

- The Queensland Government in 2009 adopted the Australian Standard for the Construction of Buildings in Bushfire-prone Areas AS3959 (2009). www.qld.gov.au/emergency/safety/building-fire-prone.html [Accessed 1 June 2017, updated 1 March, 2017]
- Victorian Building Authority and Country Fire Authority (CFA) - *A guide to retrofit your home for better protection from a bushfire – Building and renovation ideas to better prepare your home in a bushfire situation*.
- www.buildingcommission.com.au/consumers/pages/retrofitting
- www.buildingcommission.com.au/data/assets/pdf_file/0020/7391/Bushfire_Retrofit_Web.pdf

Consider these building ideas as part of your overall bushfire survival plan. Jointly written by the Victorian Building Authority and the CFA (Victoria) to provide practical advice to those who want to retrofit their premises to better protect them in the event of a bushfire. The guide is split into two parts: 1. Retrofit for generic ember protection and 2. Retrofit for various Bushfire Attack Levels (BAL). The BAL is based on the Australian Standard 3959 Building in a bushfire prone area.

Fire and powerlines

Powerlink Queensland have produced a useful and informative fact sheet for landholders on safety of fires near Powerlines.

Excerpt from *Fire and high voltage transmission line safety*, Powerlink Queensland Information Sheet, 6 November 2015: www.fireandbiodiversity.org.au/literature_191013/Powerlink_Queensland_Fire_Safety_information

"To ensure the safety of people and the transmission network, Powerlink restricts certain activities on its easements. For a comprehensive guide to activities that are permitted, conditional or prohibited on our easements in non-fire situations, please refer to our Easement Co-use Request Guidelines, available by calling Powerlink on Freecall 1800 635 369 or on our website www.powerlink.com.au"

5.6 Bushfire insurance

Insurance Council of Australia (ICA)

ICA provides advice on what can you do to protect your home and contents in the event of bushfire. How do you know if your assets are covered for bushfire damage? Find out the steps that you can take now to help future claims you may make. Ensure that your house/assets are up to date with adequate and relevant insurance relating to bushfires.

- www.insurancecouncil.com.au/for-consumers/consumer-tips/bushfire-preparation, and
- www.understandinsurance.com.au/types-of-disasters/bushfires

Another site to refer to, but is NSW based is the Insurance Law Service - www.insurancelaw.org.au/fact-sheets/bushfire-insurance-guide/

5.7 Fire trails

- *Whoa-boys: protecting your farm roads and reducing runoff into our streams*, Queensland Murray- Darling Committee and Powerlink Queensland, 2012 (Queensland Murray Darling Committee, 2012). (Available online). www.qmdc.org.au/module/documents/download/1300. Last accessed 20/05/2017.
- LEASK J & SMITH R 2011. *Guidelines for Plantation Fire Protection*. In: FIRE AND EMERGENCY SERVICES AUTHORITY OF WESTERN AUSTRALIA (ed.). Perth FESA. (Available online). Last

accessed 20/05/17. [www.dfes.wa.gov.au/safetyinformation/fire/bushfire/BushfireProtectionPlanningPublications/Guidelines for Plantation Fire Protection 2011 final.pdf](http://www.dfes.wa.gov.au/safetyinformation/fire/bushfire/BushfireProtectionPlanningPublications/Guidelines%20for%20Plantation%20Fire%20Protection%202011%20final.pdf)

- MCGUFFOG, T. undated. *The "how to" of fire breaks and aerial burns. Practical advice from the Bushfires Council, NT.* Darwin: Bushfires Council Northern Territory. (Available online.) Last accessed 20/05/17. www.savanna.cdu.edu.au/downloads/clasfire.pdf
- BUSHFIRE COORDINATING COMMITTEE NSW 2015. Fire Trails Policy No. 2/2007. In: COMMITTEE, B. C. (Ed.). Sydney. www.rfs.nsw.gov.au/_data/assets/pdf_file/0011/9596/BFCC-Policy-2-2007-Fire-Trails-amended.pdf. (Accessed online 20/05/17).
- HEALTHY LAND AND WATER, (undated), *Roads and Tracks, Erosion solutions for the Lockyer Valley. Version 3* Ed. Brisbane: SEQ Catchments, (available online).
- SMITH, R. unknown date. *Firebreak Location, Construction and Maintenance Guidelines.* Perth., Fire and Emergency Services Authority of Western Australia. (online) last accessed 20/05/17 www.dfes.wa.gov.au/safetyinformation/fire/bushfire/BushfireProtectionPlanningPublications/FESA%20Firebreak%20Guidelines_std.pdf

5.8 Land management

- Land Management online: This online tool has been developed for Queensland's Nature Refuge landholders by Agforce Queensland and the Queensland Government Department of Environment and Science. There is a great "links" page. www.landmanagementonline.org.au/useful-links/
- Northern Land Manager – Territory Natural Resource Management and Charles Darwin University.

Provides a great online search facility to view many land management topics that do not only relate to Northern Australia but have relevance here in South East Queensland [online] accessed 12/01/17 www.landmanager.org.au/#sort=sort_title%20asc&nid=568714

5.9 Wine and grape production – fire and smoke taint

Hazards of fire: Smoke is known to adversely affect the taste of wine and table grapes when it has settled over a vineyard for a length of time. The timing of when smoke affects the grapes varies, but it is said to affect grapes from when they are the size of a pea (The Australian Wine Research Institute, 2013).

Australian research has found that there are options for wine producers to lessen the negative effects of grapes being tainted by the smoke settling over a vineyard for an extended period. An online calculator, The Smoke Taint Risk Calculator (STAR), has been developed for grape producers and land managers in Western Australia. STAR is designed to reduce the risk of smoke taint in grapes and can be accessed here: <https://www.agric.wa.gov.au/fire/wine-grape-smoke-effect-reduction-smoke-taint-risk-calculator-star>

- THE AUSTRALIAN WINE RESEARCH INSTITUTE. 2013. *Fires and smoke taint* (Available online). www.awri.com.au/information-services/ebulletin/2013/11/15/smoke-taint-and-frost/. Last accessed 20/05/2017.
- WARD, G., BRODISON, K., AIREY, M., DIGGLE, A., SAAMRENTON, M., TAYLOR, A., FISHER, D., HASWELL, D. & GILLARD, J. 2012. *Development of smoke taint risk management tools for vignerons and land managers.* Perth: Department of Agriculture and Food, WA. - www.awri.com.au/wp-content/uploads/smoke_gward.pdf. (Last accessed 20/05/2017.)

5.10 Timber production

- RYAN, S. 2007. Fire Management Guide for Timber Production - Eucalypt and Cypress Pine Forests- Gympie Private Forestry Southern Queensland.

- DEBUSE, V. J. & LEWIS, T. 2007. *Using fire in spotted gum - iron bark forests for production and biodiversity outcomes.* Brisbane: The Department of Primary Industries and Fisheries Queensland
- Private Forestry Service Queensland – <http://pfsq.net/>.

5.11 Grain silos

Apart from the dangers associated with storing grain such as dust and phosphine gas, care must be taken when handling grain that has been exposed to high radiant heat following a bushfire. When grain is subject to radiant heat and is then exposed to oxygen, self-combustion may occur. Consider the site location of grain silos and ensure that there is adequate separation of fuels to minimise the exposure of the silo to radiant heat from a bushfire.

Contact your State Industry Body (AgForce Queensland) for more information about moving grain following a fire.

- www.storedgrain.com.au/stay-safe-around-grain-storage/
- www.agforceqld.org.au/

5.12 Livestock, pets, horses and fire

- BOWLER, J. 2007. *Risk management for stock owners in times of fire and flood.* In: DEPARTMENT OF PRIMARY INDUSTRIES (ed.) Primefact 380 ed. Sydney.: NSW Government. Online:
- www.dpi.nsw.gov.au/_data/assets/pdf_file/0004/104278/risk-management-for-stock-owners-in-times-of-fire-and-flood.pdf
- State Government advice relating to relating to livestock horses and pets:
 - <http://www.dpi.nsw.gov.au/agriculture/emergency/bushfire>
 - <http://www.cfa.vic.gov.au/plan-prepare/livestock/>
 - <http://www.dpi.nsw.gov.au/content/agriculture/emergency/bushfire/animals/assess-bushfire-burns-livestock>
 - <http://dpi.wa.gov.au/biosecurity/animal-biosecurity/animal-welfare/animals-and-bushfire/animals-and-bushfire-planning>
 - http://www.pir.sa.gov.au/emergency_management/bushfires/livestock_safety_during_bushfires

Horses

Following are some great resources that are available from DPI Victoria, CFA Victoria, FESA WA, and the Australian Horse Industry Council.

- **Horses and Bushfires** - DPI Victoria
- DEPARTMENT OF ENVIRONMENT AND PRIMARY INDUSTRIES. 2013. *Horses and Bushfires* [Online]. Melbourne: State Government of Victoria. Available:
 - <http://agriculture.vic.gov.au/agriculture/livestock/horses/emergencies/horses-affected-by-bushfires>
 - <http://www.dpi.vic.gov.au/agriculture/animals-and-livestock/horses/emergencies/horses-and-bushfires>. (Accessed 20/05/2017).
- Horse safety Australia. (unknown year). *Horses and Bushfires: prepare = act - survive.* Geelong: The Australian Horse Industry Council
 - www.horsesafetysaustralia.com.au/documents/news/bushfire%20advice%202%20pages%20fin.pdf. (Last accessed 20/05/2017)
- Country Fire Authority Victoria. (2012). *Horses and bushfires* (Available online). Melbourne: Country Fire Authority Victoria.

Available:

www.cfa.vic.gov.au/plan-prepare/horses-and-bushfires/#sthash.iNDm0xft.dpuf
Last accessed 20/05/2017).

5.13 Weed Management

- The Queensland Department of Agriculture and Fisheries has a great range of very informative fact sheets on how to manage weeds on your property. For more information go to: www.daf.qld.gov.au/plants/weeds-pest-animals-ants/weeds/a-z-listing-of-weeds.
- Weeds of Australia Identification online tool.** A quick and easy online tool to help you identify those pesky weeds on your property.
<https://www.business.qld.gov.au/industry/agriculture/land-management/health-pests-weeds-diseases/weeds-and-diseases/weed-identification-tool>

- Brisbane City Council online weed identification tool**
<http://weeds.brisbane.qld.gov.au/>
- Nature Conservation Council of NSW and the NSW Rural Fire Service, 2017 *The interaction between fire and weeds: A booklet for NSW landholders*. Sydney

Save our Waterways Now

Save our Waterways Now (SOWN) also have very comprehensive descriptions and methods of control of common weeds found in riparian areas. http://www.saveourwaterwaysnow.com.au/01_cms/details.asp?ID=51

6.0 FURTHER SERVICES

6.1 Queensland Fire and Emergency Services

The Queensland Fire and Emergency Services (QFES) provide an all hazards approach to natural disasters, including bushfire response and mitigation. QFES has some excellent resources available on their web page on how to best protect your home and family from bushfires and fire tips for children and seniors.

For personalised home safety advice you can book a Safe Home Visit from QFES Officers by going to: www.qfes.qld.gov.au/communitysafety/freeprograms/safehome.asp

Rural Fire Service Queensland (RFSQ) operates within QFES. RFSQ has over 36,000 volunteers across the state with over 1500 brigades and 2400 fire wardens. They not only fight fires but are also involved in bushfire mitigation, community education, permitting of fires, and deployments during all disasters.

Even if you live in a city near bushland, bushfire is a threat to you, your family and your property. Do you know your risk? Will you stay or leave early? RFSQ provides an online Bushfire Survival Plan that is also free to download.

Prepare Act Survive (PAS): *Prepare Act Survive* is targeted information provided by the QFES and RFSQ for communities living in bushfire risk areas. There are a number of publications that the QFES have produced that are freely available to download on the RFSQ webpage www.ruralfire.qld.gov.au

Remember! Planning to make a plan IS NOT A PLAN. See contacts in Property Fire Management Plan - Part B for your local RFSQ Office.

6.2 Local Government and SEQ Land For Wildlife Program

Local Government – **Bushfire Officers**. Some of the larger local governments employ Bushfire Officers that can provide further advice on bushfire hazards in your local area.

Most Local Governments provide private property conservation schemes including the **Land for Wildlife** program and Conservation Agreements, and also run Bushcare programs. Valuable skills can be gained by joining a local **Bushcare** program, which most of

the larger councils run. Most of the smaller councils support on-ground conservation groups such as local **Landcare** or **Catchment management groups**.

The South East Queensland Land for Wildlife program has a number of fantastic technical notes all available free online (www.lfwseq.org.au/) including four fact sheets on fire in the landscape that cover the following topics: **Fire in the Australian Landscape**, **Fire, Flora and Fungi**, **Fire and Fauna**, and **Fire and Your Property**. Why not join the Land for Wildlife program? Contact your local council for more information.

6.3 Fire Protection Association Australia (FPAA)

The FPAA is the national peak industry body for Bushfire Planning and Design Consultants who are registered as meeting specific accreditation and competency requirements. All FPAA Corporate members must hold a minimum public liability and product liability and follow codes of practice appropriate to bushfire advice for those wanting to undertake development on land subject to bushfire impact.

To find a provider within Queensland go to: www.fpaa.com.au/providers.aspx.

6.4 Aboriginal and Torres Strait Islander Cultural Heritage

The Queensland Government's Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP) provide advice on compliance and enforcement of the *Aboriginal Cultural Heritage Act 2003*, cultural heritage management plans (CHMP), cultural heritage data base and register and handling of human remains*.

Any land user can voluntarily develop and seek approval for a CHMP. A plan will describe how land use activities (including the use of fire and associated fire infrastructure) can be managed so as to avoid disturbance of culturally significant sites.

For further information on how to create a CHMP contact the Cultural Heritage Unit on telephone 1300 378 401 or email [cultural.heritage@atsip.qld.gov.au](mailto:heritage@atsip.qld.gov.au).

For more information about cultural heritage sites please visit the DATSIP website. www.datsip.qld.gov.au/resources/datsima/people-communities/cultural-heritage/chmp-guidelines.pdf (Last accessed 20/05/2017).

**The discovery of any human remains should always be reported to Queensland Police.*

6.5 SEQ Fire and Biodiversity Consortium Publications

The SEQ Fire and Biodiversity Consortium Consortium has produced a suite of materials to support land managers and those who work with them. To view these materials, please go to the Publications and Resources section on the SEQ Fire and Biodiversity Consortium website: www.fireandbiodiversity.org.au/publications. Materials completed, or nearing completion as of November 2017 include:

- **“Living with Fire” Series:**
 - Fact Sheet 1 – Fire ecology (in draft)
 - Fact Sheet 3 – Recommended fire regimes (2014)
- A comprehensive literature review - Tran, C. and C. Wild. 2000. **A review of current knowledge and literature to assist in determining ecologically sustainable fire regimes for the South East Queensland region.** 106pp.

- Ecological guidelines, for professionals who want a moderately in-depth summary of the management implications of the fire ecology literature - Watson, P. 2001. **The Role and Use of Fire for Biodiversity Conservation in South-east Queensland: Fire Management Guidelines Derived from Ecological Research.** 49pp.
- Operational Manual - Tran, C. 2002. **Best Practice Fire Management Manual – Operational Level: Guidelines and Procedures.** 100 pp.
- **Fire Monitoring Manual: Methods and Decision Matrices.** 2002.

Publications that SEQ Fire and Biodiversity Consortium has contributed to:

- LLOYD, S. & LORD, B., . 2013. Fire and Grazing In: PAGE, T. & WALKER, J. (eds.) **Living in Somerset - Property Management Handbook.** Esk: Somerset Regional Council.
- **Land for Wildlife Notes, Fire series** (2017) 1, 2, 3, 4.

7.0 REFERENCES

- AFAC 2015. *Risk Management and Review Framework for Prescribed Burning Risks Associated With Fuel Hazards.* Report for National Burning Project - Subproject 3 Australasian Fire and Emergency Service Authorities Council Limited.
- BAKER, A. G. & CATTERALL, C. 2015. Where has all the fire gone? Quantifying the spatial and temporal extent of fire exclusion in Byron Shire, Australia. *Ecological Management & Restoration*, 16, 106-113.
- BOWLER, J. 2007. Risk management for stock owners in times of fire and flood. In: Department of Primary Industries (ed.) *Primefact* 380 ed. Sydney: NSW Government.
- BRADSTOCK, R. A. 2008. Effects of large fires on biodiversity in south-eastern Australia: disaster or template for diversity? *International Journal of Wildland Fire*, 17, 809-822.
- BRADSTOCK, R. A., GILL, A. M. & WILLIAMS, R. (eds.) 2012. *Flammable Australia: fire regimes, biodiversity and ecosystems in a changing world.* Melbourne: CSIRO Publishing.
- CHENEY, N. P. & SULLIVAN, A. L. 2008. *Grassfires - Fuel, weather and fire behaviour* 2nd Ed., Melbourne, CSIRO Publishing.
- CHENOWETH EPLA & BUSHLAND RESTORATION SERVICES 2012. *South East Queensland Ecological Restoration Framework: Code of Practice.* Prepared on behalf of SEQ Catchments and South East Queensland Local Governments. Brisbane.
- DEBUSE, V. J. & LEWIS, T. 2007. Using fire in spotted gum - iron bark forests for production and biodiversity outcomes. Brisbane: The Department of Primary Industries and Fisheries Queensland
- GARVEY, N., BEN-AMI, D., RAMP, D. & CROFT, D. B. 2010. Survival behaviour of swamp wallabies during prescribed burning and wildfire. *Wildlife Research*, 37, 1-12.
- GIBBONS, P., VAN BOMMEL, L., GILL, A. M., CARY, G. J., DRISCOLL, D. A., BRADSTOCK, R. A., KNIGHT, E., MORITZ, M. A., STEPHENS, S. L. & LINDENMAYER, D. B. 2012. Land Management Practices Associated with House Loss in Wildfires. *PLoS ONE*, 7, e29212.
- GLOSSY BLACK CONSERVANCY 2010. *Glossy Black-Cockatoo Conservation Guidelines for South-Eastern Queensland and Far North-Eastern New South Wales.* Brisbane.
- HINES, F., TOLHURST, K. G., WILSON, A. A. G. & MCCARTHY, G. J. 2010. Overall fuel hazard assessment guide, 4th Ed. In: Department of Environment, Land, Water and Planning, D. O. S. A. (ed.). Melbourne, Victoria.
- LEASK J & SMITH R 2011. Guidelines for Plantation Fire Protection. In: FIRE AND EMERGENCY SERVICES AUTHORITY OF WESTERN AUSTRALIA (ed.). Perth, FESA.
- LLOYD, S. & LORD, B., . 2013. Fire and Grazing In: PAGE, T. & WALKER, J. (eds.) *Living in Somerset - Property Management Handbook.* Esk: Somerset Regional Council.
- MARSDEN-SMEDLEY, J. & SHERRIFF LJ 2013. *Planned burning manual - guidelines to enable safe and effective burning on private land.* Launceston TAS NRM North.
- MCGUFFOG, T. undated. The “how to” of fire breaks and aerial burns, *Practical advice from the Bushfires Council*, NT. Darwin: Bushfires Council Northern Territory.
- QUEENSLAND GOVERNMENT 2016. State Planning Policy—state interest guideline Natural hazards, risk and resilience, *Department of Infrastructure, Local Government and Planning*, Brisbane Queensland Government
- QUEENSLAND MURRAY DARLING COMMITTEE. 2012. *Whoa-boys: protecting your farm roads and reducing runoff into our streams* [Online]. Toowoomba Queensland Murray Darling Committee, Available: www.qmdc.org.au/module/documents/download/1300. [Accessed 20/05/2017].
- RESIDE, A. E., VANDERWAL, J., KUTT, A., WATSON, I. & WILLIAMS, S. 2011. Fire regime shifts affect bird species distributions. *Diversity and Distributions* 18, 213–225.
- RURAL AND LAND MANAGEMENT GROUP 2010. *Bushfire Glossary.* Melbourne: Australasian Fire and Emergency Services Authorities Council.
- RYAN, S. 2007. *Fire Management Guide for Timber Production - Eucalypt and Cypress Pine Forests* - Gympie. Private Forestry Southern Queensland.
- SEQ CATCHMENTS (undated). Roads and Tracks, erosion solutions for the Lockyer Valley. Version 3. Brisbane, SEQ Catchments.
- STATE OF VICTORIA 2015. Lancefield-Cobaw Fire Investigation, Issues not within the Terms of Reference. In: DEPARTMENT OF JUSTICE (ed.). Melbourne.
- THE AUSTRALIAN WINE RESEARCH INSTITUTE. 2013. Fires and smoke taint [Online]. Available: http://www.awri.com.au/information_services/ebulletin/2013/11/15/smoke-taint-and-frost/ [Accessed 20/05/2017].





Eucalyptus pilularis. (C. Welden, 2014)

8.0 PROPERTY INFRASTRUCTURE SYMBOLOGY

BUILT INFRASTRUCTURE	
Feature	Symbol
Bridge	
Building	
Chemical Storage	
Gate	
Recreation Area	
Silo or Storage	
Solar System	
Stockyard	
Building - Proposed	
Bridge - Proposed	
Chemical Storage - Proposed	
Gate - Proposed	
Recreation Area - Proposed	
Solar System - Proposed	
Silo or Storage - Proposed	
Stockyard - Proposed	
Public Road	
Power Line	
Gas Line	
Farm Track	
Fence	
Farm Track - Proposed	
Fence - Proposed	
Property Boundary	

VEGETATION & BIODIVERSITY	
Feature	Symbol
Significant Fauna	
Significant Flora (Habitat Features)	
Remnant Vegetation Zone	

CULTURAL SIGNIFICANCE	
Feature	Symbol
Cultural/ Historical Site	
Indigenous Site	

FIRE INFRASTRUCTURE	
Feature	Symbol
Fire Track	
Fire Track - Proposed	

FIRE HISTORY	
Previous Burn Area	

FIRE MANAGEMENT ZONES	
Asset Protection Zone	
Strategic Fire Advantage Zone	
Fire Exclusion Zone	
Land Management Zone	

WATER INFRASTRUCTURE	
Feature	Symbol
Bore	
Dam/ Weir	
Pump	
Swimming Pool	
Water Point	
Water Tank	
Windmill	
Bore - Proposed	
Dam/ Weir - Proposed	
Pump - Proposed	
Swimming Pool - Proposed	
Water Point - Proposed	
Water Tank - Proposed	
Windmill - Proposed	
Permanent Stream	
Ephemeral Stream	
Construction waterway/ pipeline	
Dam Overflow	
Construction waterway/ pipeline - Proposed	
Dam Overflow - Proposed	