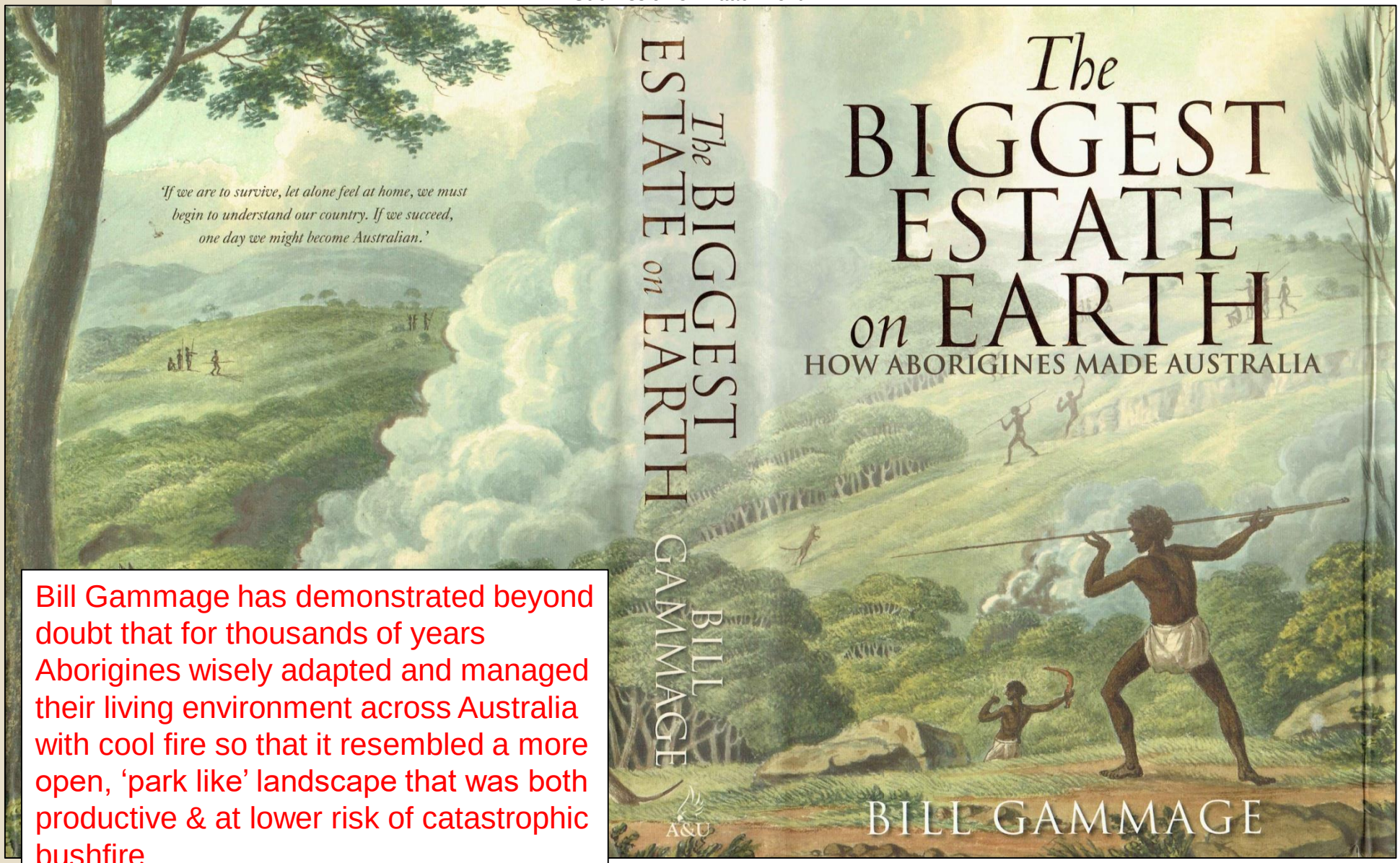
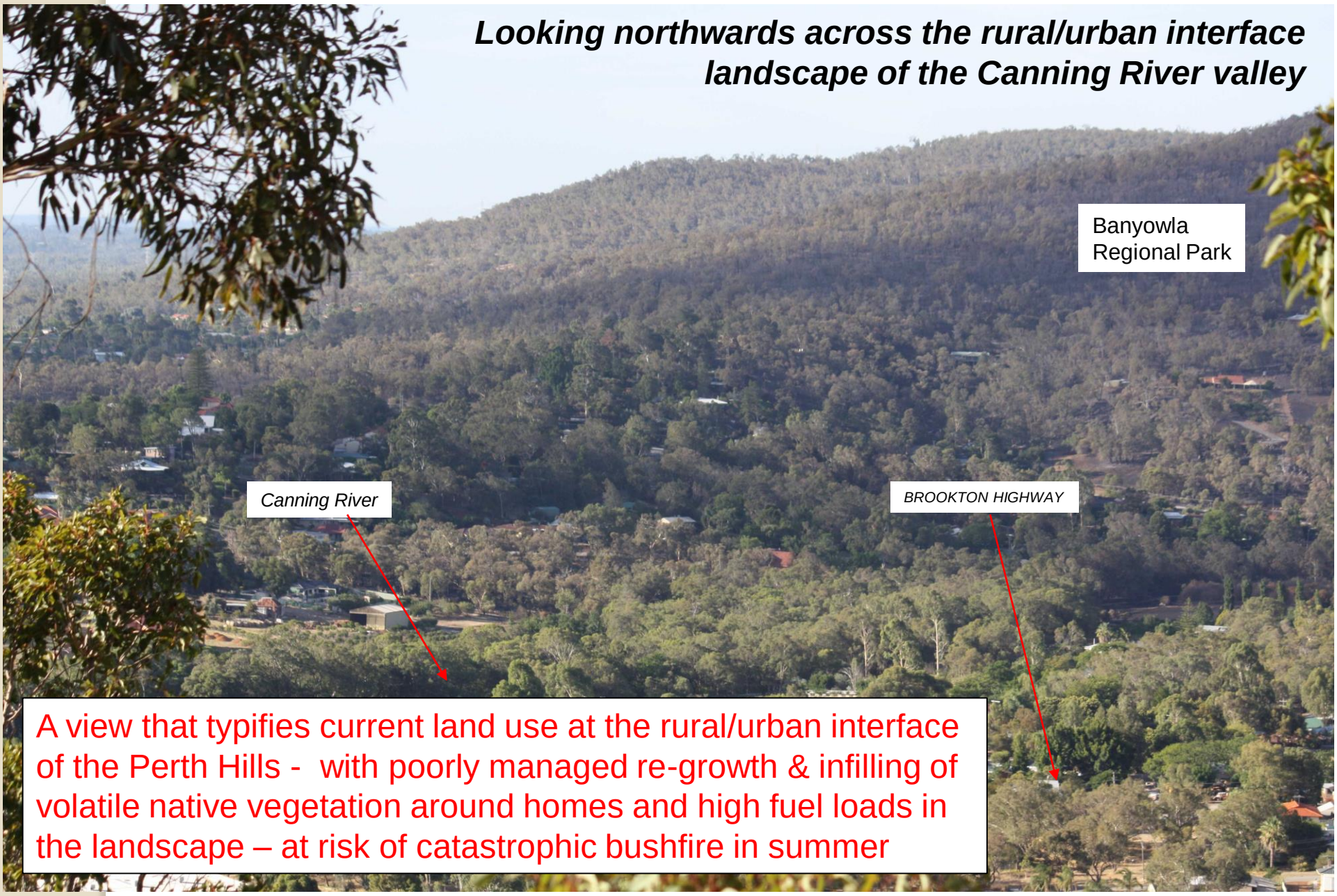
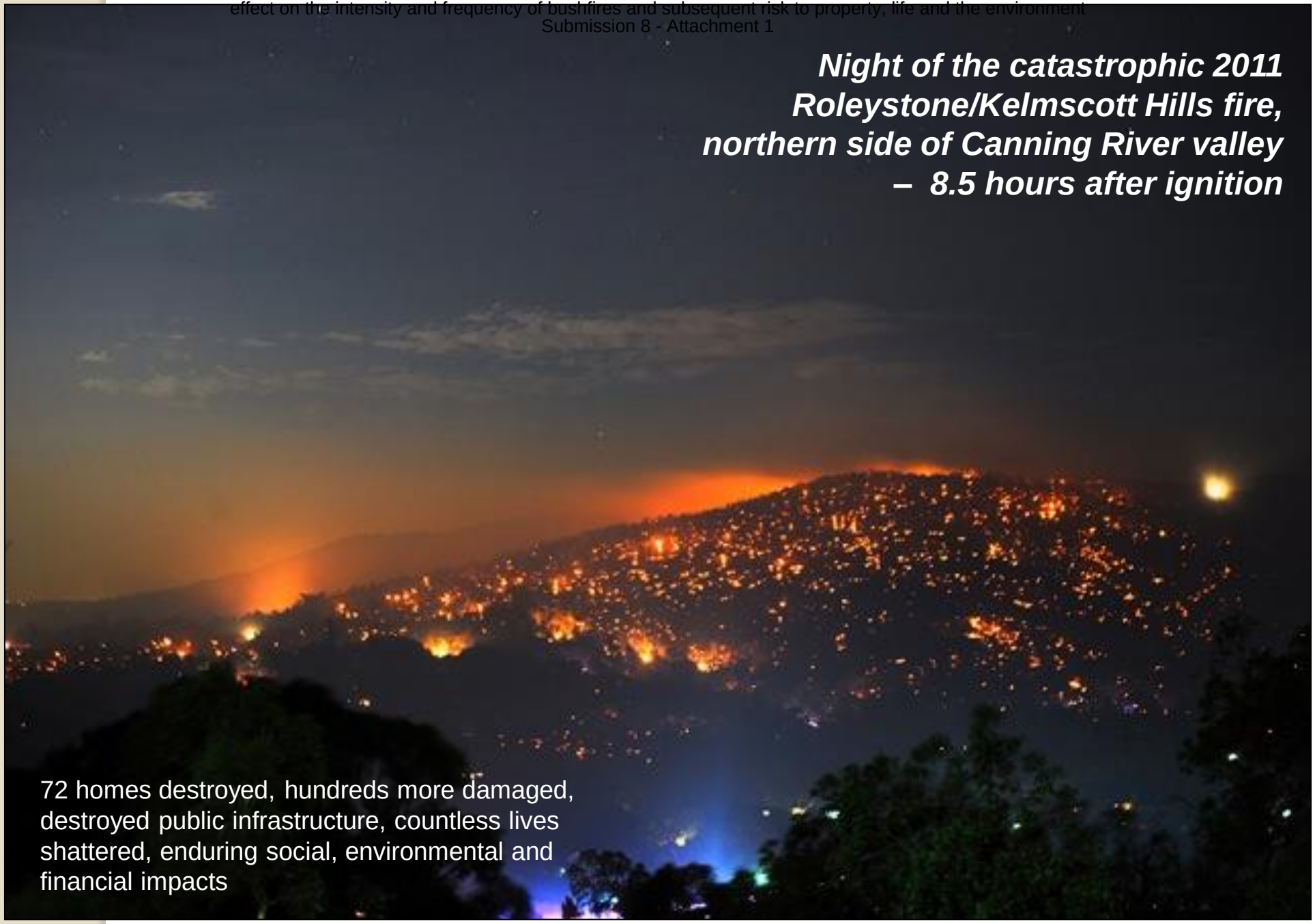
Firewise Landscape Adaptation for Bushfire in Australia



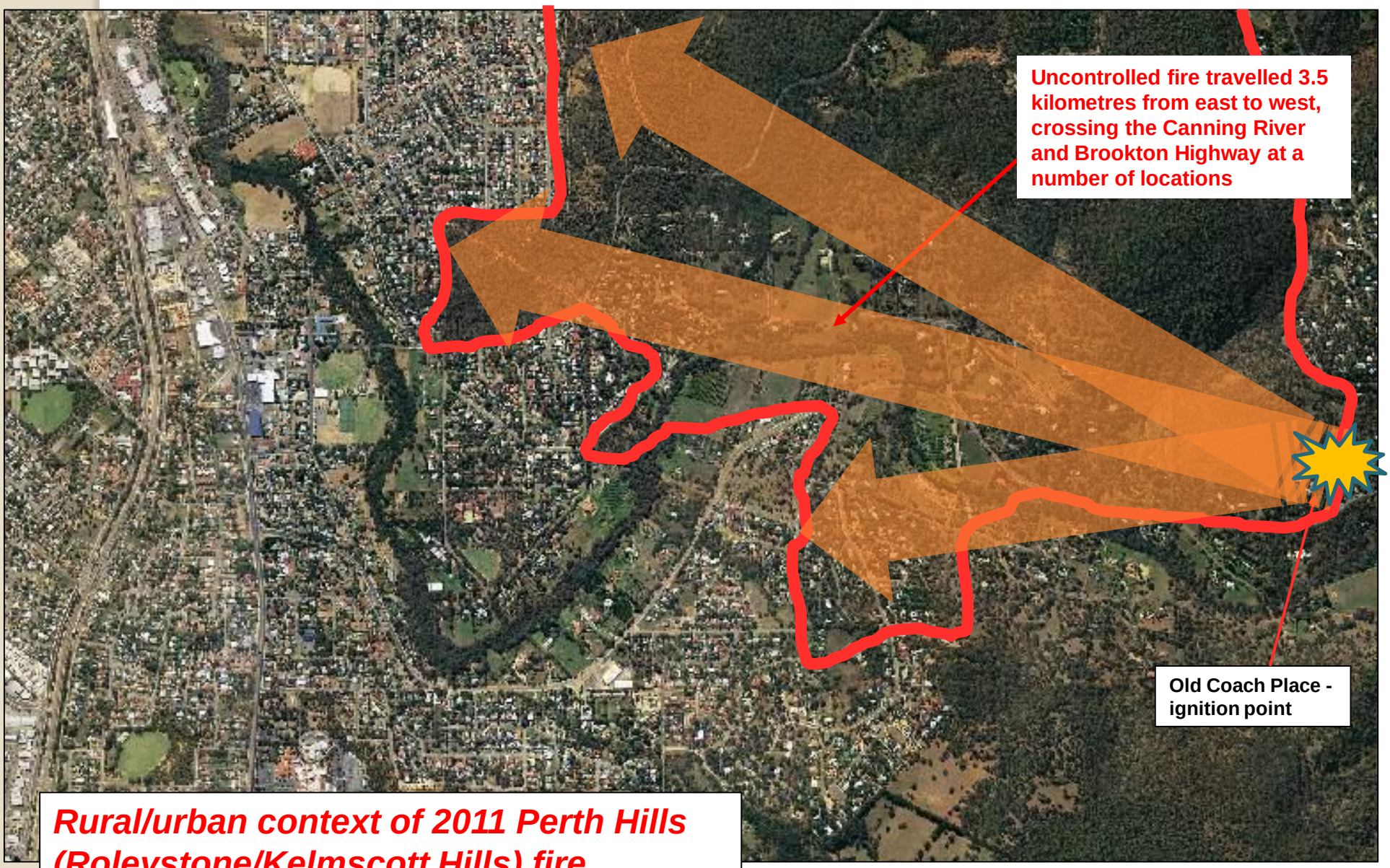
Bill Gammage has demonstrated beyond doubt that for thousands of years Aborigines wisely adapted and managed their living environment across Australia with cool fire so that it resembled a more open, 'park like' landscape that was both productive & at lower risk of catastrophic bushfire


Looking northwards across the rural/urban interface landscape of the Canning River valley
Banyowla Regional Park
Canning River
BROOKTON HIGHWAY
A view that typifies current land use at the rural/urban interface of the Perth Hills - with poorly managed re-growth & infilling of volatile native vegetation around homes and high fuel loads in the landscape – at risk of catastrophic bushfire in summer



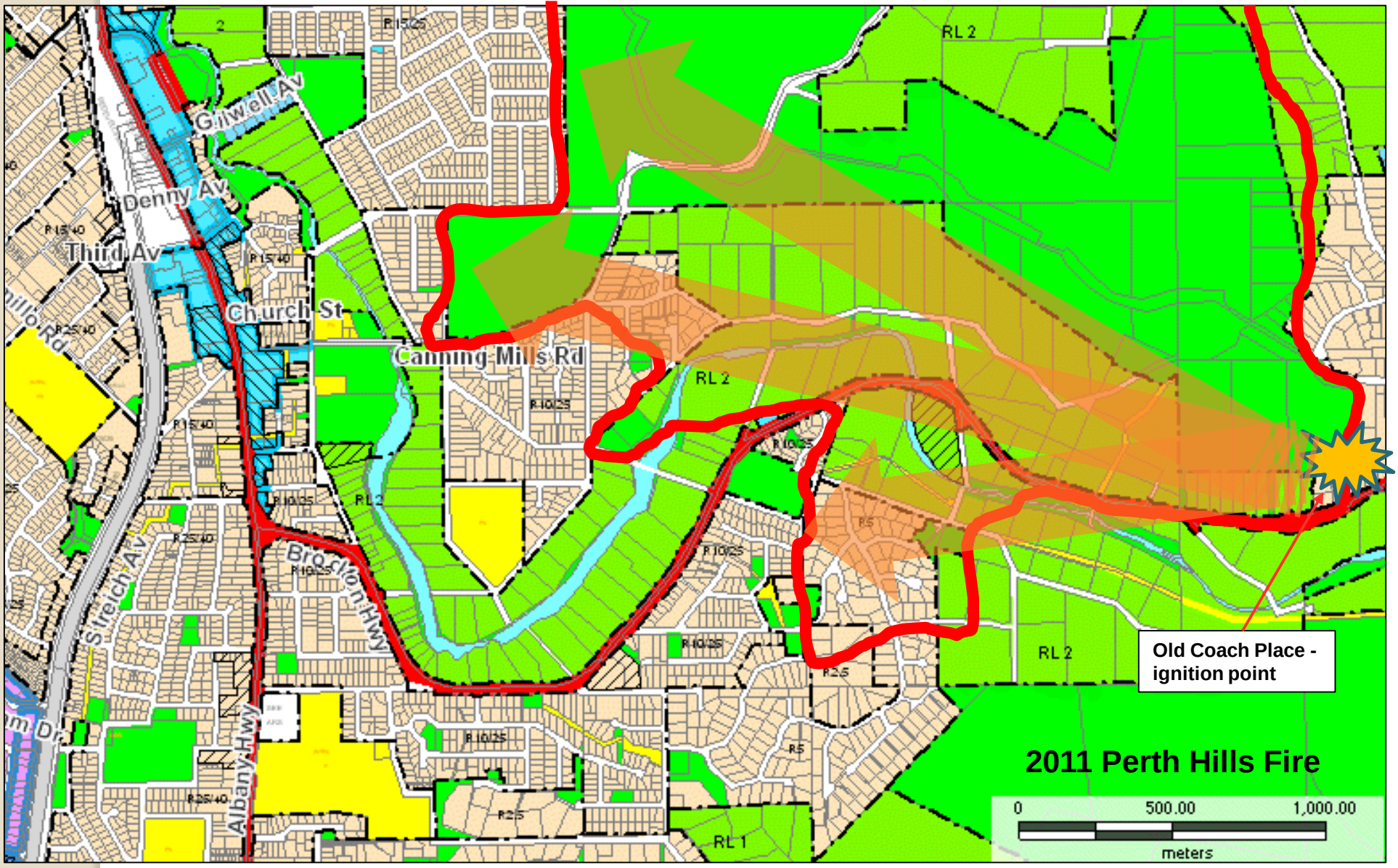
Night of the catastrophic 2011 Roleystone/Kelmscott Hills fire, northern side of Canning River valley – 8.5 hours after ignition

72 homes destroyed, hundreds more damaged, destroyed public infrastructure, countless lives shattered, enduring social, environmental and financial impacts



Rural/urban context of 2011 Perth Hills (Roleystone/Kelmscott Hills) fire

Land Use & Zoning Context



Typical RUI fire aftermath - Greendale Place to Grade Road hotspot

Typical RUI fire aftermath - Greendale Place to Grade Road hotspot

"If you own the fuel, you own the fire"

(Mick Keelty, Perth Hills Fire Review, 2011)

So what has changed to reduce the risk of damaging bushfires in established communities in WA over the last 10 years or so?

- More and more resources have been poured into research and response - fighting fires and cleaning up the mess afterwards.
- More money is being spent on fuel reduction burning in WA, but there is a big backlog and most of the dangerous territory is close to settlements and is poorly managed across a mix of public and private ownership.
- New bushfire planning and building regulations should make new development safer, but will not fix the bigger problem of vulnerable existing housing, towns and farms across much of the Perth Hills and South West of WA – where the impact of bushfires is typically greatest.
- Bushfire Risk Management Plans have been promised but yet to be implemented as intended by the Keelty and Ferguson Inquiries.

Adapting Fire Prone Landscapes for Safer Human Habitation

Goal:
To make it feasible and reasonably safe to actively defend established properties at a low BAL

Objectives:

1. **HAZARD SEPARATION** -To separate key assets (homes and infrastructure) from volatile vegetation by effective buffers (Building Protection Zones and Hazard Separation Zones)
2. **PLANTING** - To select, arrange and manage vegetation according to Firewise principles

QUESTION

Almost 90% of all the homes destroyed by bushfire in Australia have been close to bushland

So how far is “close”?

ANSWER

100 metres

"Distance between building location and bushland is not the only variable determining bushfire vulnerability, but it is demonstrably the most important."

Source: "Bushfire Penetration into Urban Areas in Australia: A Spatial Analysis", Chen and McAnerney, Risk Frontiers, January 2010. Commissioned for the Planning and Land Use Panel of the Victorian Bushfires Royal Commission by the Bushfire CRC

So adequate separation from the hazard is critical to landscape adaptation for bushfires

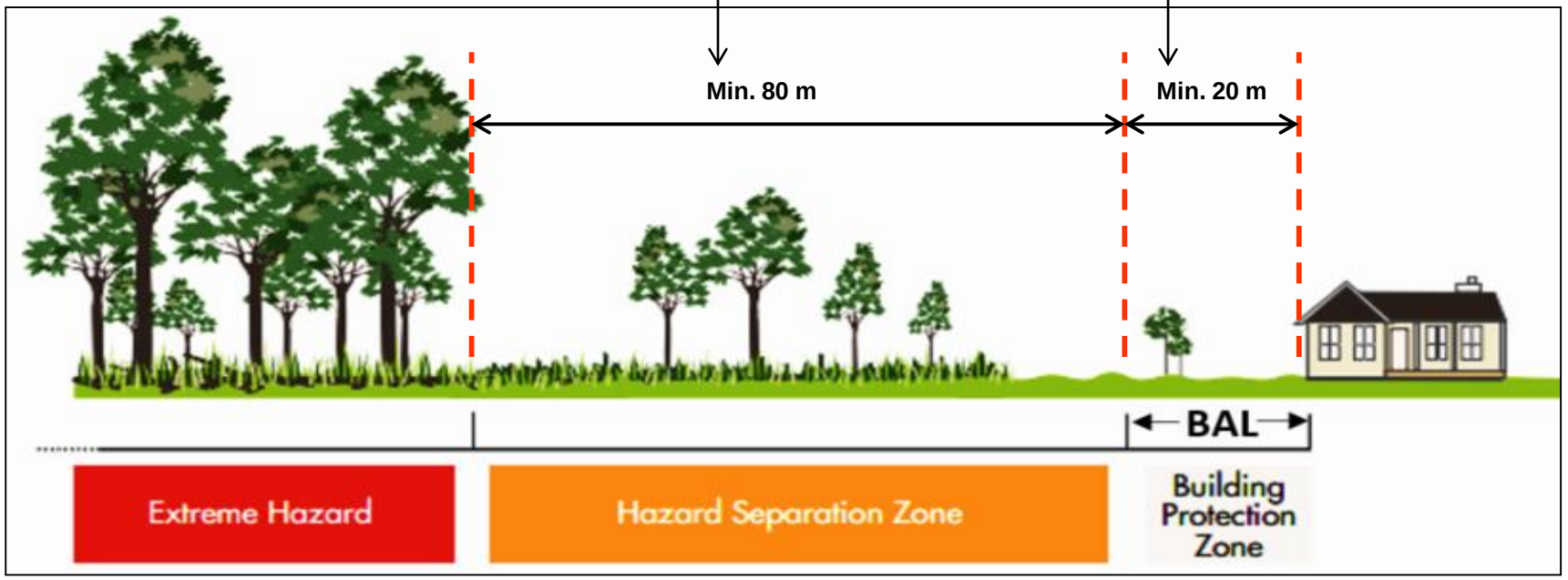
1. HAZARD SEPARATION

BUFFER TO HAZARD:
Maintain fuel load at < 6-8 t/ha

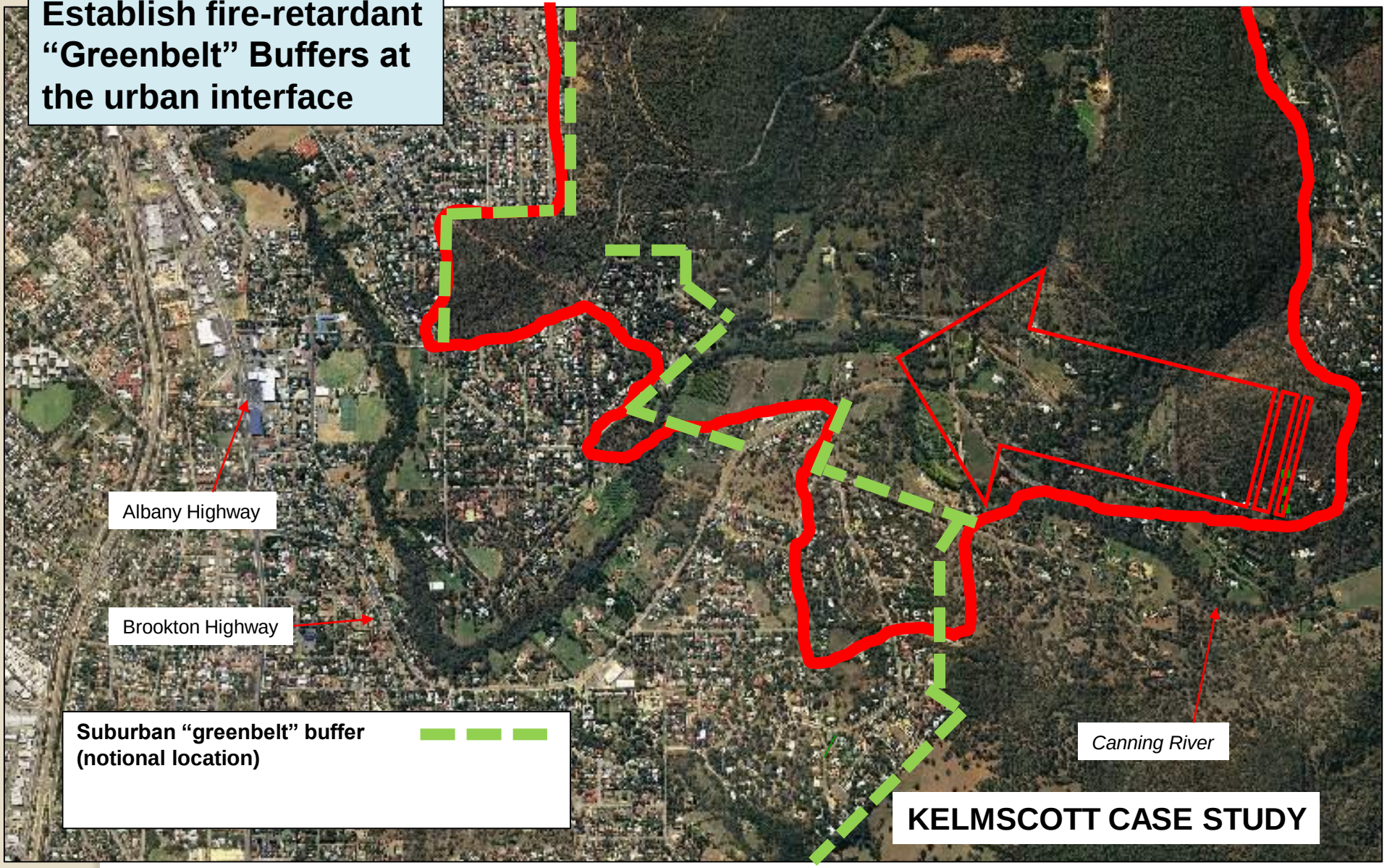
- Roads,
- Parkland clearing, no understorey
- Managed, botanical parkland
- Orchard, vineyard
- Mown paddock
- Sports fields, golf course
- Lake, dam or water feature
- Firewise windbreak plantings

DEFENDABLE SPACE:
Maintain fuel load at < 2 t/ha

- Driveways, paved areas
- Mown & watered lawn
- Pool, water feature
- Vegetable garden
- Firewise trees, (inc. most fruiting)

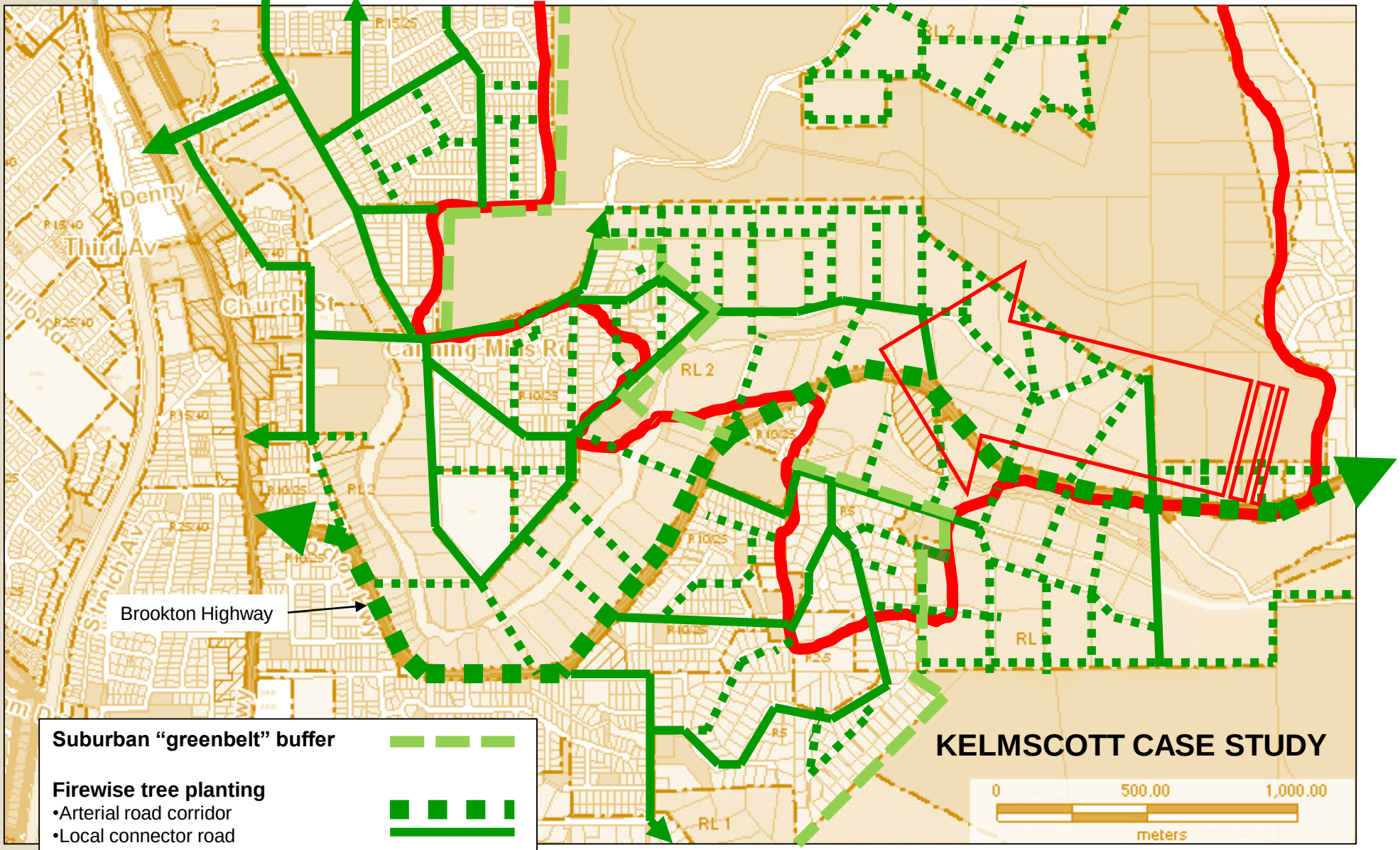


Firewise peri-urban landscape adaptation



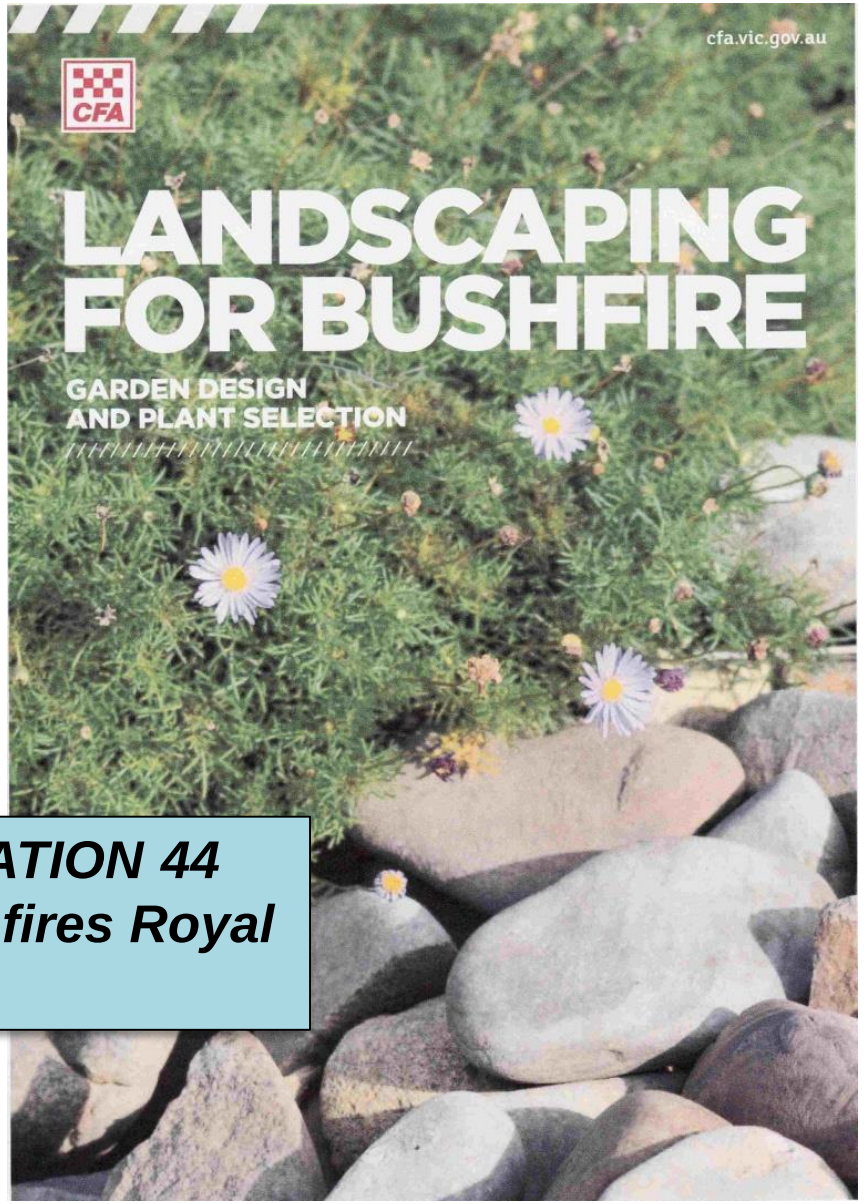
Note: Proposals are indicative only and subject to detailed investigation & consultation

Firewise peri-urban landscape adaptation – "Greenbelt Buffers" (Indicative)



Note: Indicative concept only - subject to detailed investigation in collaboration with stakeholders

2. PLANT SELECTION & ARRANGEMENT

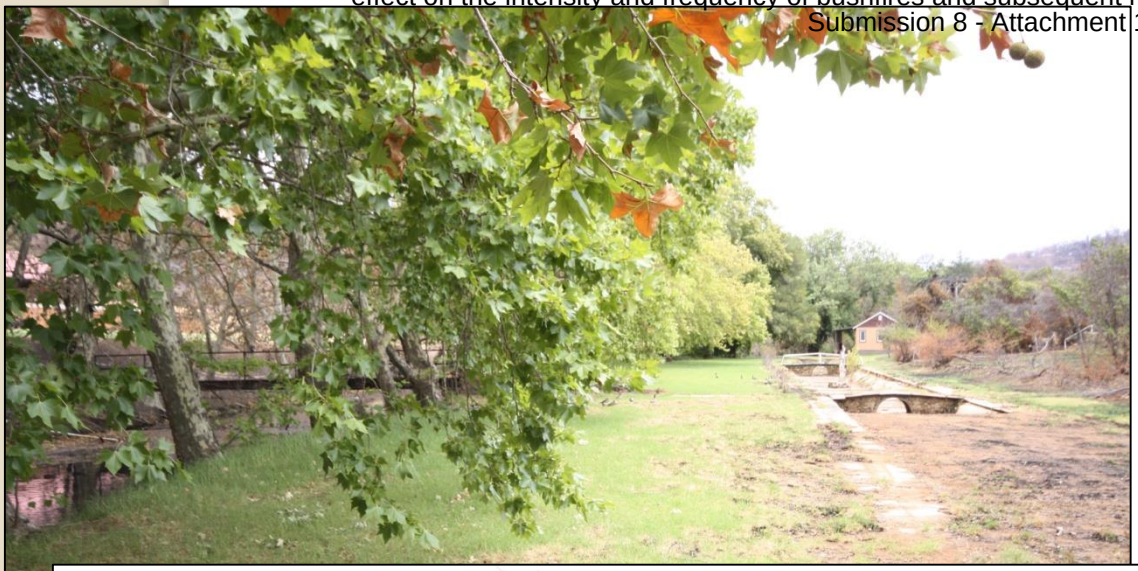


RECOMMENDATION 44 Victorian Bushfires Royal Commission*

*Source: Victorian Bushfires Royal Commission, Final Documents, Volume 2, Section 6: Planning & Building. p.246 & 247

Compare the fire performance of Firewise deciduous trees alongside the Canning River with that of more volatile eucalypts around a home next to Brookton Highway

Red roofed house on right gutted and flattened, red roofed house on left shielded, as fire jumped Brookton Highway and swept from east to west



Contrast the fire fuelling characteristics of eucalypts with the fire buffering characteristics of Firewise deciduous trees along the northern side of the Canning River

*Landscaping for Bushfires **

Well-placed Firewise vegetation with low flammability helps to protect houses by:

a) reducing the amount of radiant heat received by a house
b) reducing the chance of direct flame contact on a house
c) reducing wind speed around a house
d) deflecting and filtering embers
e) reducing flammable landscaping materials within the defendable space

*Adapted from Landscaping for Bushfires, Victorian CFA , 2011

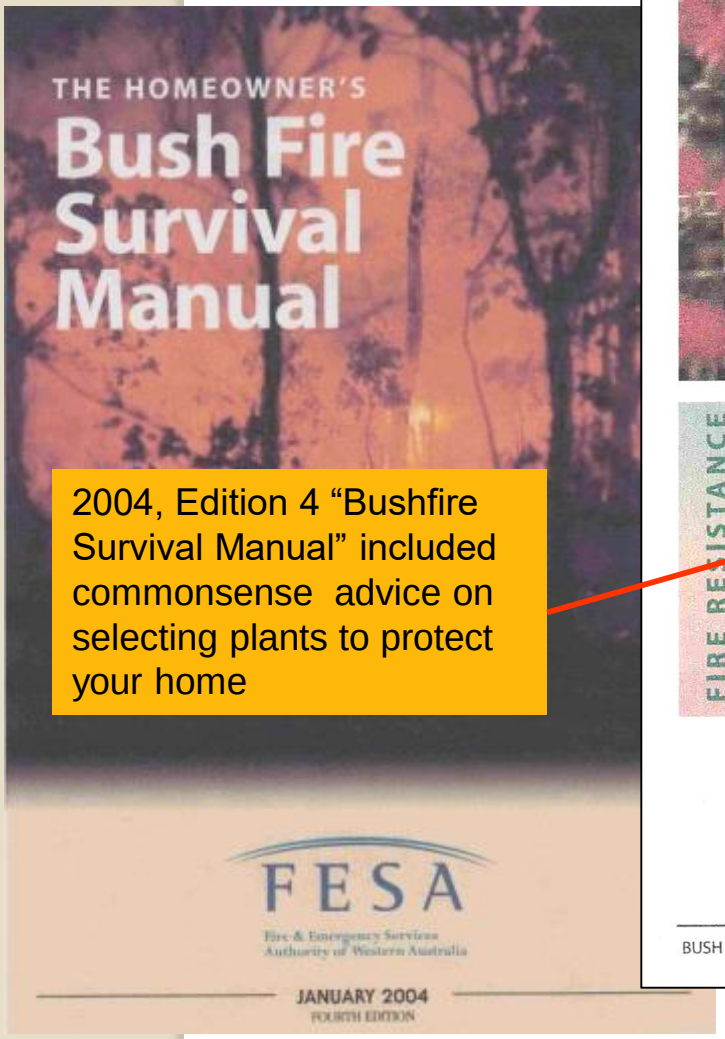
*Landscaping for Bushfires**

Firewise Landscape/Garden Design Principles:

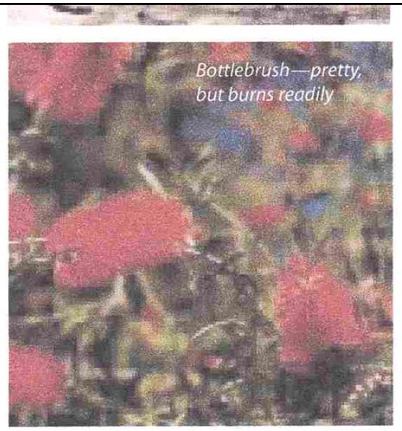
a) create defendable space (min.20/100)
b) remove flammable objects (incl. vegetation & chip mulches) from around the house
c) break up fuel continuity
d) carefully select, locate and maintain Firewise trees and ground covers

*Adapted from Landscaping for Bushfires, Victorian CFA , 2011

Seek credible advice on selecting trees & shrubs



2004, Edition 4 "Bushfire Survival Manual" included commonsense advice on selecting plants to protect your home



3. Pick your plants

Choosing plants to protect your home

Some plants are very flammable while others will provide good protection for your home. Those that provide the best protection in a fire contain plenty of water or salt in their leaves, don't contain volatile oils and don't have too many dead leaves and twigs (see table).

Fire resistance of trees and shrubs

FIRE RESISTANCE	Type	Example
More	Salt-rich plants	Salt bush, Tamarix, Boobialla.
	Succulent ground-covers	Pig-face, Ivy, Strawberries.
	Deciduous trees	Fruit trees, Oaks, Maples, Elms, Poplars, Willows.
	Evergreen hardwoods	Peppercorns, Pittosporum.
	Introduced conifers	Pines, Firs, Cypresses, Cedars.
	Eucalypts	Smooth-barked varieties are safest.
Less	Some native shrubs	Acacias, Melaleucas, Callistemons, Grevilleas, Hakeas, Tea Trees, Banksias.

The main difference between a high-risk tree and a safe tree is the amount of dry fuel underneath it. Before you pick a list of plants, ensure they are appropriate for your area. Choose plants that will not become a weed in your area.

BUSH FIRE SURVIVAL MANUAL 17

Many “Firewise” trees are also “Waterwise”

http://www.watercorporation.com.au/save-water/waterwise-plants-search/plants-details?p={9005968B-6513-4BA5-82D8-A8E16C73E24B}

Pin Oak, Swamp Oak, Spanish Oak

FAGACEAE
Quercus Palustris
Origin: **Exotic** Lifespan: **Perennial**

Regions: South Coast, South West, Perth

Availability: Readily available
Flowers in Spring
Suits: Mediterranean, Sun, Sand, Loam, Gravel, Clay,
SoilpH: 6.0-8.0

Large, dense, deciduous tree to 25 m high and 12 m wide. Branches often weep
Deeply lobed leaves with good autumn colour of red to purple then to brown. Br
through winter until pushed off by new growth in spring. Only recommended for
parks. Often confused with Q. ellipsoidalis.

WATER CORPORATION

http://www.watercorporation.com.au/save-water/waterwise-plants-search/plants-details?p={A9BEA46A-7B94-453B-A797-5758FB5FA272}

Liquidambar

HAMAMELIDACEAE
Liquidambar Styraciflua
Origin: **Exotic** Lifespan: **Perennial**

Regions: Great Southern, South East Coast, Perth, South West

Availability: Readily available
Suits: Mediterranean, Sun, Sand, Loam, Clay, Gravel,
SoilpH: 6.0-8.5

A large, fast growing upright deciduous tree to 20 m high and 8 m wide. Bright gre
in spring turning golden red before dropping in autumn. Attractive bark on mature t
recommended for large gardens and parks.

WATER CORPORATION

http://www.watercorporation.com.au/save-water/waterwise-plants-search/plants-details?p={0AED54B5-9103-4B57-8BD6-2378B2007289}

Callery Pear

ROSACEAE
Pyrus Calleryana
Cultivar: Cultivars
Origin: **Exotic** Lifespan: **Perennial**

Regions: Central Wheatbelt, Great Southern, South Coast, South East Coast, Perth, South West

Availability: Readily available
Flowers in Spring
Colour: White
Suits: Mediterranean, Cottage, Sun, Sand, Loam, Clay, Gravel,
SoilpH: 6.0-8.0

Hardy ornamental deciduous tree from China. Clusters of white flowers on bare wood in spring,
followed by dark green leaves. Cultivars include Aristocrat (to 11 m high, leaves persistent and
from autumn into winter), Bradford (to 12 m, dark green glossy rounded leaves with
yellow and purple), Capital (upright to 10 m, large dark green leaves
upright to 10 m, large dark green leaves tinged
ple in autumn. Good for windy sites), Cleveland
ood autumn colour), Edgehill (to 8 m high and 6
autumn colour), Red Spire (upright to 10 m with
ones of crimson and burgundy), Southworth
er foliage) and Winter Glow (to 6 m high and 4 m
Dancer (to 7 m high 5 m

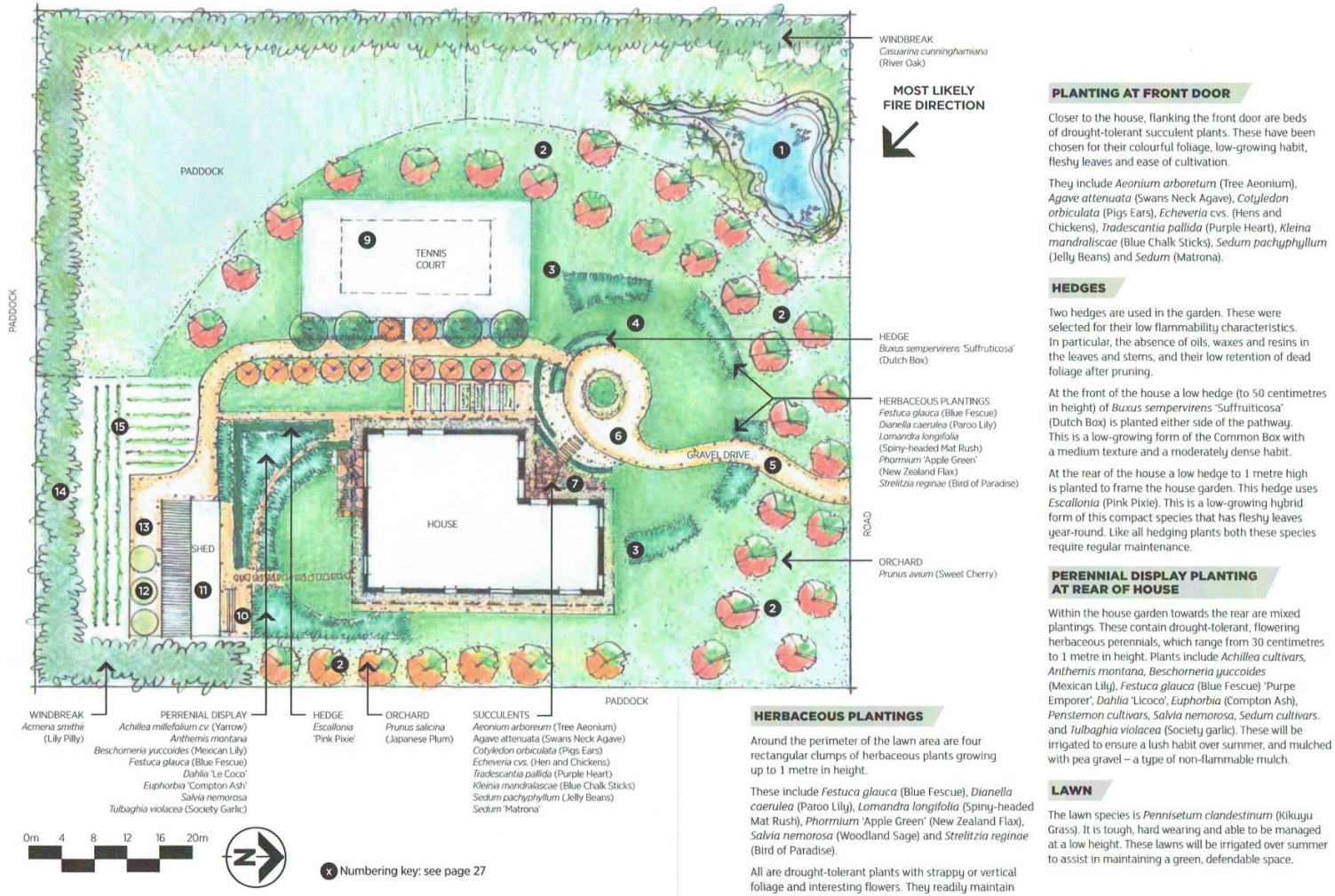
Page 38 of 44

WATER CORPORATION

http://www.watercorporation.com.au/save-water/waterwise-plants-search/plants-

Landscaping for Bushfires*

Indicative Concept - Firewise Rural, or RUI Garden



HERBACEOUS PLANTINGS

Around the perimeter of the lawn area are four rectangular clumps of herbaceous plants growing up to 1 metre in height.

These include *Festuca glauca* (Blue Fescue), *Dianella caerulea* (Paroo Lily), *Lomandra longifolia* (Spiny-headed Mat Rush), *Phormium* 'Apple Green' (New Zealand Flax), *Salvia nemorosa* (Woodland Sage) and *Strelitzia reginae* (Bird of Paradise).

All are drought-tolerant plants with strappy or vertical foliage and interesting flowers. They readily maintain a green and lush habit over summer.

PLANTING AT FRONT DOOR

Closer to the house, flanking the front door are beds of drought-tolerant succulent plants. These have been chosen for their colourful foliage, low-growing habit, fleshy leaves and ease of cultivation.

They include *Aeonium arboretum* (Tree Aeonium), *Agave attenuata* (Swans Neck Agave), *Cotyledon orbiculata* (Pigs Ears), *Echeveria* cvs. (Hens and Chickens), *Tradescantia pallida* (Purple Heart), *Kleina mandraliscae* (Blue Chalk Sticks), *Sedum pachyphyllum* (Jelly Beans) and *Sedum* (Matrona).

HEDGES

Two hedges are used in the garden. These were selected for their low flammability characteristics. In particular, the absence of oils, waxes and resins in the leaves and stems, and their low retention of dead foliage after pruning.

At the front of the house a low hedge (to 50 centimetres in height) of *Buxus sempervirens* 'Suffruiticosa' (Dutch Box) is planted either side of the pathway. This is a low-growing form of the Common Box with a medium texture and a moderately dense habit.

At the rear of the house a low hedge to 1 metre high is planted to frame the house garden. This hedge uses *Escallonia* (Pink Pixie). This is a low-growing hybrid form of this compact species that has fleshy leaves year-round. Like all hedging plants both these species require regular maintenance.

PERENNIAL DISPLAY PLANTING AT REAR OF HOUSE

Within the house garden towards the rear are mixed plantings. These contain drought-tolerant, flowering herbaceous perennials, which range from 30 centimetres to 1 metre in height. Plants include *Achillea cultivars, Anthemis montana, Beschorneria yuccoides* (Mexican Lily), *Festuca glauca* (Blue Fescue) 'Purpe Emporer', *Dahlia* 'Licoco', *Euphorbia* (Compton Ash), *Penstemon cultivars, Salvia nemorosa, Sedum cultivars.* and *Tulbaghia violacea* (Society garlic). These will be irrigated to ensure a lush habit over summer, and mulched with pea gravel – a type of non-flammable mulch.

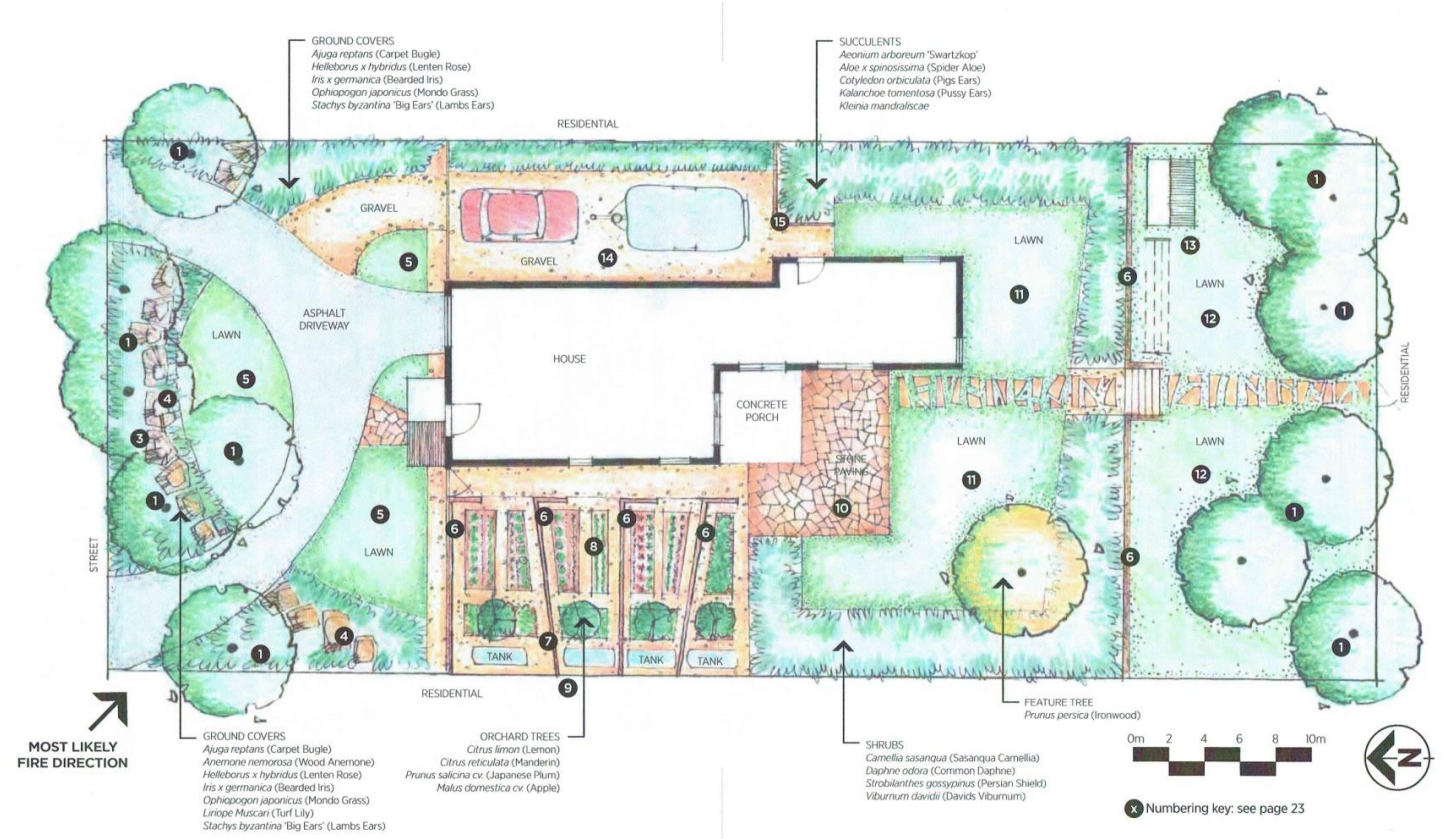
LAWN

The lawn species is *Pennisetum clandestinum* (Kikuyu Grass). It is tough, hard wearing and able to be managed at a low height. These lawns will be irrigated over summer to assist in maintaining a green, defendable space.

*Source: 'Landscaping for Bushfires', Victorian CFA , 2011

Landscaping for Bushfires*

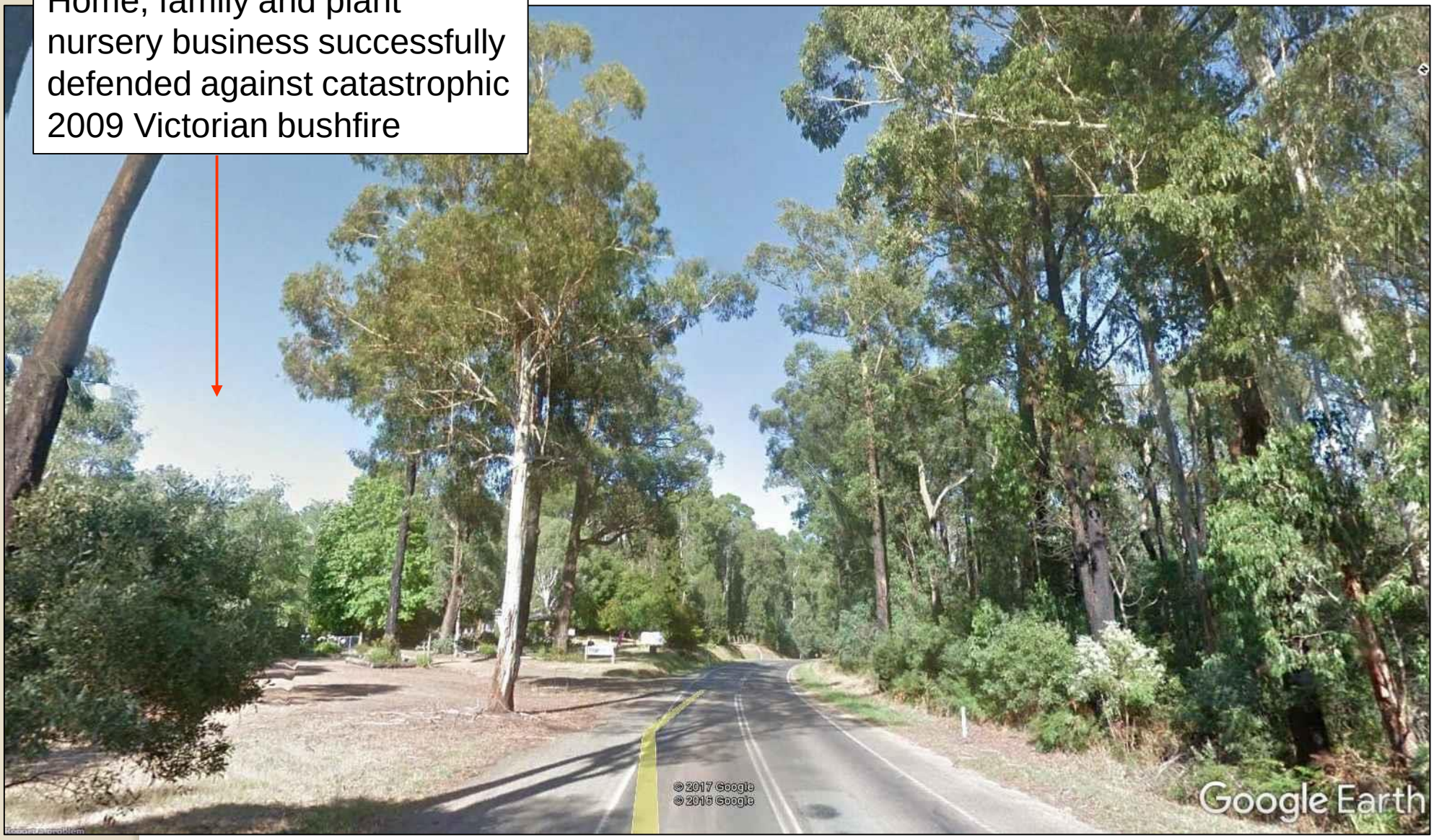
Indicative Concept – Firewise Hills Garden, Adapted Landscape



*Source: 'Landscaping for Bushfires', Victorian CFA , 2011

Case Study 1- Firewise garden - Kinglake West, Victoria

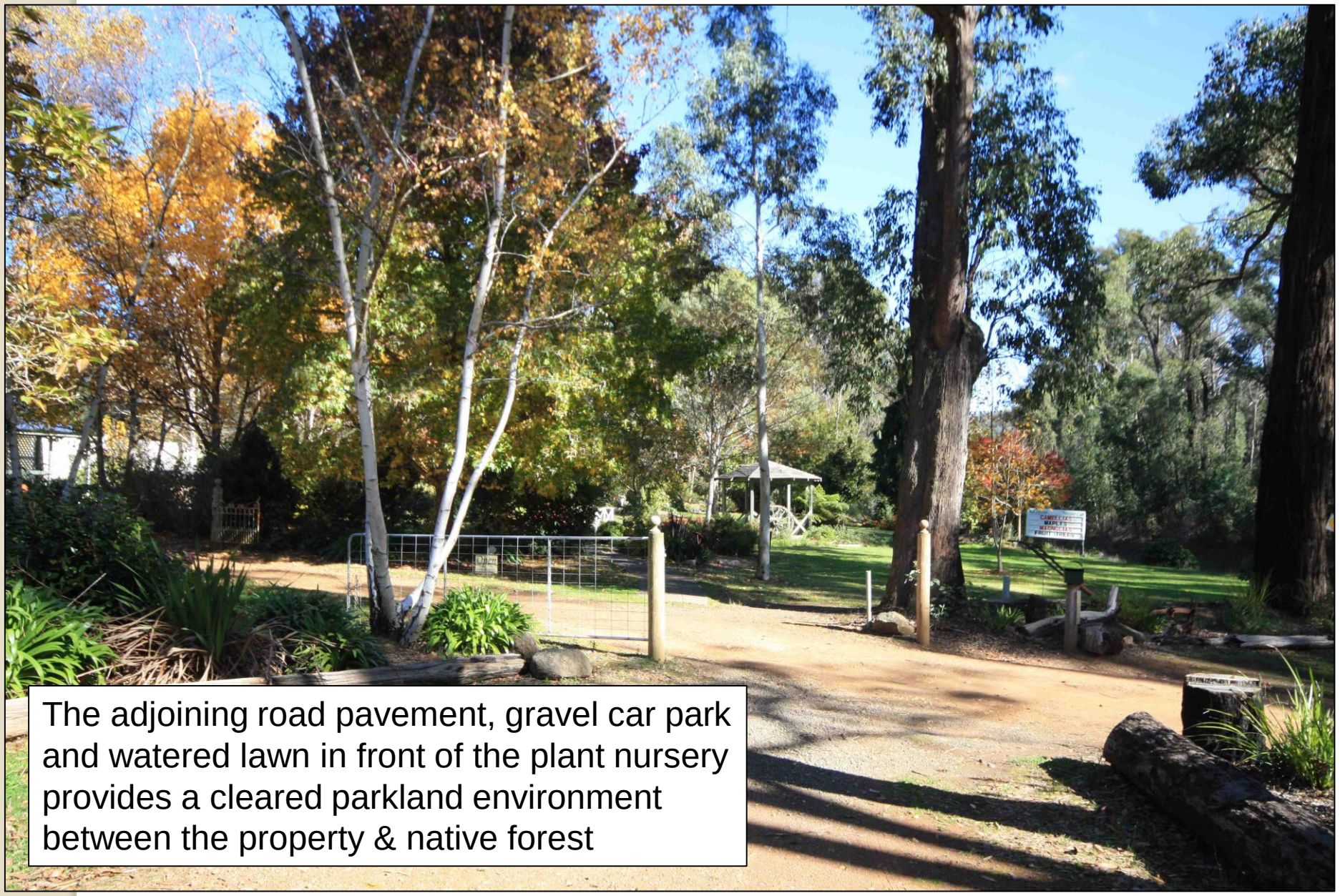
Home, family and plant nursery business successfully defended against catastrophic 2009 Victorian bushfire



Case Study 1 - Firewise garden & property – Kinglake West, Victoria

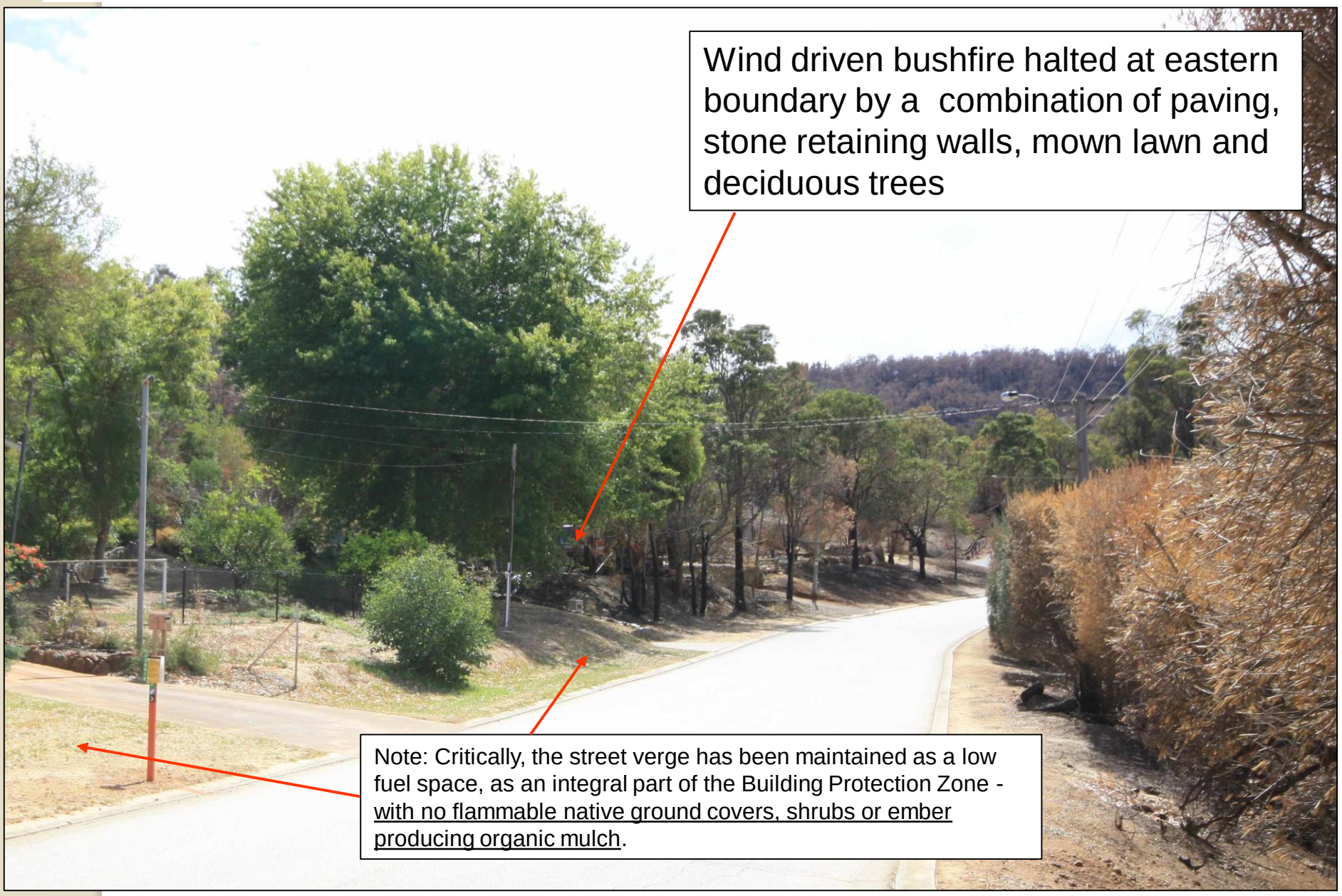
A well planned and maintained garden consistent with Firewise principles facilitated active defence of property and family from bushfire attack in February 2009

Case Study 1 - Firewise garden & property – Kinglake West, Victoria

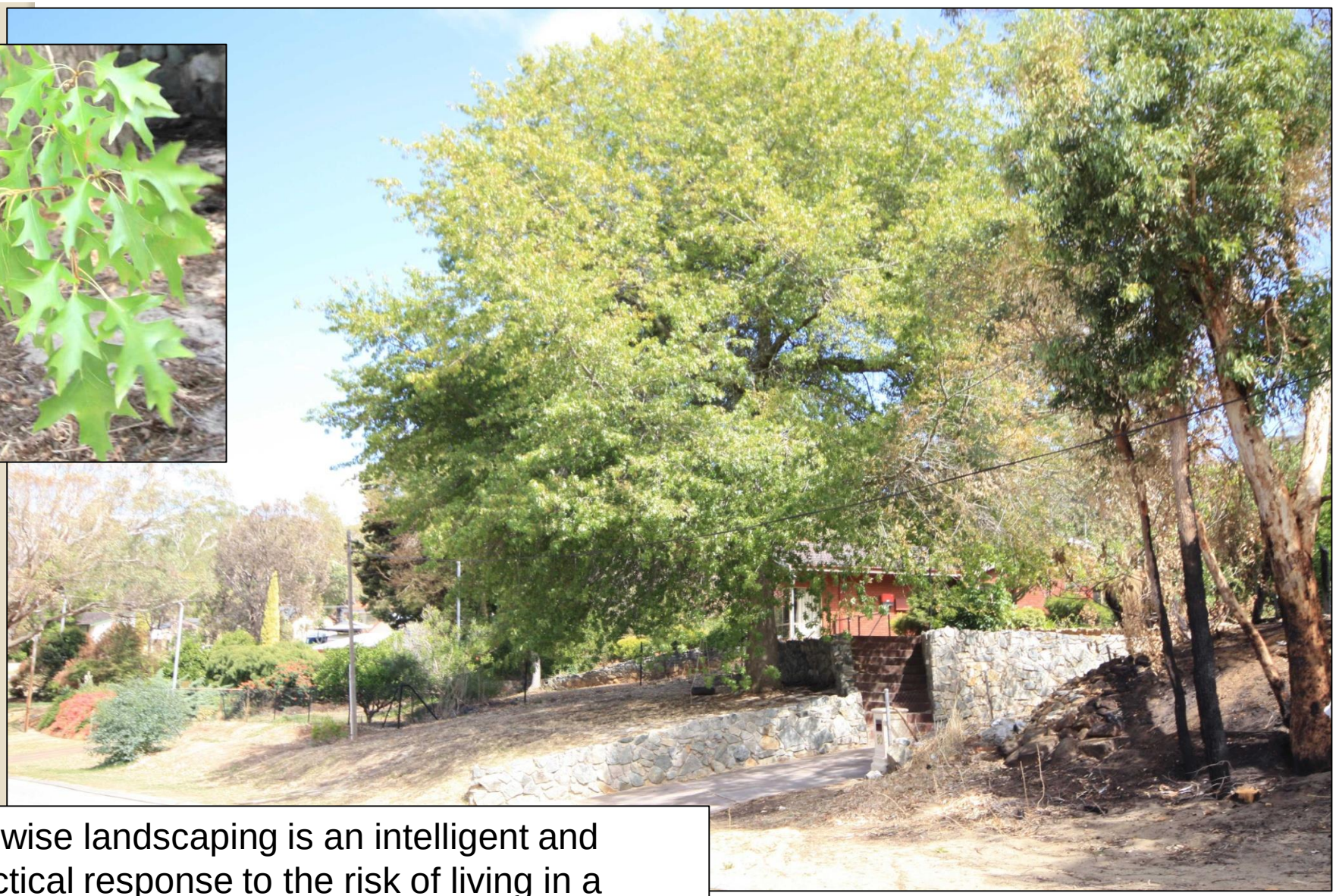


The adjoining road pavement, gravel car park and watered lawn in front of the plant nursery provides a cleared parkland environment between the property & native forest

Case Study 2 - A simple and proven Firewise garden in the 2011 Kelmscott Hills fire zone



Case Study 2 - A simple and proven Firewise garden in the 2011 Kelmscott Hills fire zone



Firewise landscaping is an intelligent and practical response to the risk of living in a bushfire prone area at the rural/urban interface

Case Study 3 - Firewise trees around public places & streets can act as living fire-breaks

Firewise deciduous street trees helped to shield the Marysville Bakery & Cafe from the catastrophic 2009 bushfire that destroyed most of the town - the Bakery famously supplied bushfire survivors with food the following morning

ACKNOWLEDGEMENTS

Much of the information has been sourced and adapted from "Landscaping for Bushfires",Victorian CFA, 2012

The author has referred to findings from research carried out for the "Bushfire CRC". The report, "Bushfire Penetration into Urban Areas in Australia: A Spatial Analysis", summarises research commissioned for the Planning and Land Use Panel of the Victorian Bushfires Royal Commission and was prepared for the Bushfire CRC by Chen and McAnerney from Risk Frontiers in January 2010.