

Building wildfire resilience into Forest Management Planning

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Wildfire is defined as a risk in the following policy documents in the United Kingdom:

- National Risk Register (2013 and 2014)
- Climate Change Risk Assessment (CCRA)
 - High risk in both Natural England's and the Chief Fire Officers Association (CFOA) response to CCRA
- National Adaptation Programme (NAP)
- National Planning Policy Framework (NPPF)

- UK Forestry Standard, Guidelines and Technical/Practice Guides

Locally:

- Community Risk Registers
- Fire and Rescue Service's Integrated Risk Management Plans

Adaptation - Forestry Planning:

- Plan for forest resilience using a variety of ages, species and stand structure; consider the risks to the forest from wind, fire, and pest and disease outbreaks
- Fire in Contingency Planning

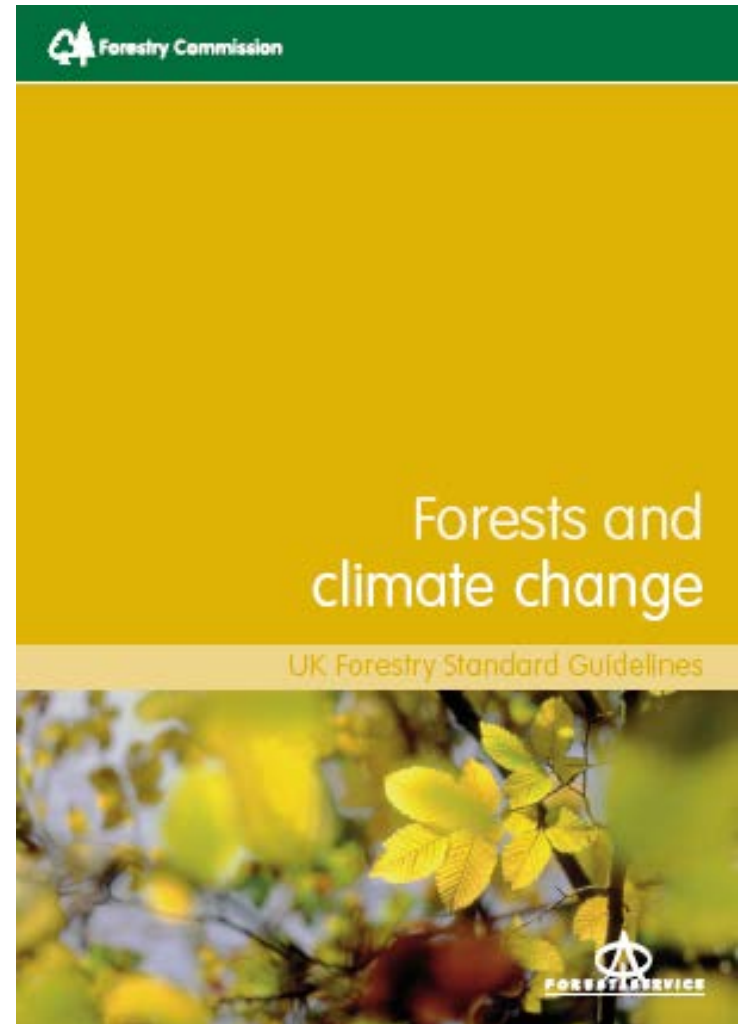


Mitigation

- Carbon in forest products
- Carbon in soils
- Carbon in forest ecosystems
- Operational carbon footprint

Adaptation

- Tree and species selection
- Forestry Design Planning
- Adaptive Management
- Landscape ecology
- Environmental protection



- Wildfire in the UK
- Fire behaviour
- The importance of planning
- Forest management plans
- The planning process
 - Scoping
 - Survey
 - Analysis
 - Synthesis
 - Implementation
 - Monitoring
 - Review
- Forest management techniques



Practice Guide

Building wildfire resilience into
forest management planning

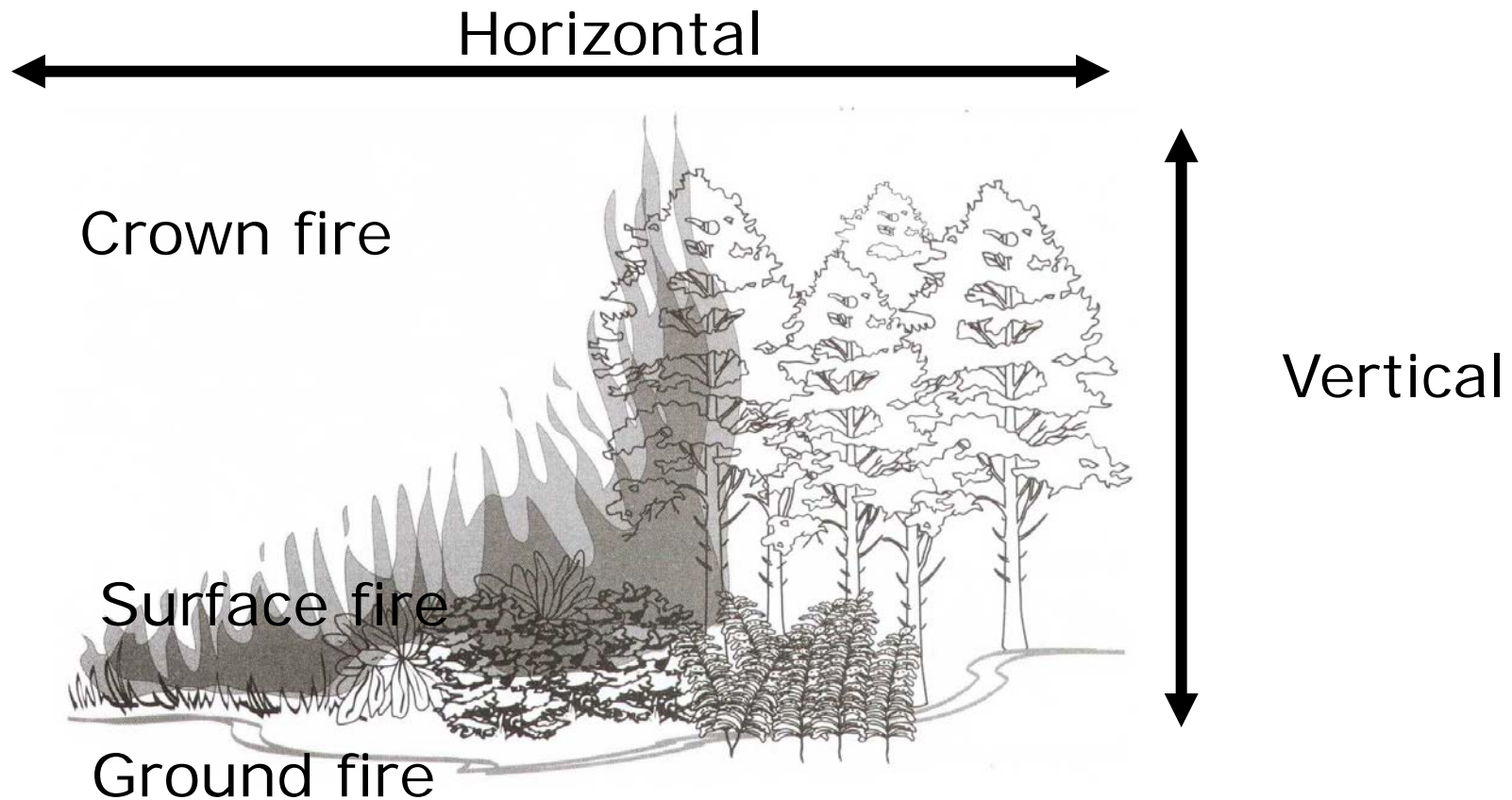


There are three types of wildfires:

- **Topological driven fire** – slope, valleys and gulley's
- **Fuel driven fire** – fuel hazards i.e. type, alignment, arrangement, volume, continuity and condition
- **Wind driven fire** – wind speed and direction

- Scottish FRS Wildfire Operations Guidance
- Eurofire

http://www.fire.uni-freiburg.de/eurofire/en/EuroFire_Training_EF2_Technique.pdf







Definition:

- The **forest management plan** is the reference document for the monitoring and assessment of forest holdings and forest practice.
- It is also used for communicating proposals and engaging with interested parties.
- The plan itself should be proportionate to the scale, sensitivity and complexity of the Forest Management Unit (FMU).
- Can considers requirements forestry for 70 to 120 years but only provides details plans for approx. 10 years.

Definition:

- **Operational plans** can make forest practice more efficient and ensure that important site features are known about and protected in advance.

Definition:

- **Contingency plans** address potential threats to the forest environment and accidental events, such as spillages, and help prevent or remedy environmental damage.

Objectives:

- Proportionate and evidence based
- Research, evidence and professional experience based (national and international)
- Apply to private and public forest estate
- Move from 'fire breaks' to 'whole site and landscape' prevention measures
- Focus on preparedness and prevention to improve response and recovery
- Apply to both new woodland creation and existing woodlands
- Applies to upland, lowland and Rural / Urban Interface (RUI)

Woodland Composition

- **Habitat** (i.e. coniferous woodlands or open habitats)
- **Species** (i.e. eucalyptus, pine, spruce and fir as well as heather, gorse, purple moor grass etc.)
- **Age class** (i.e. young and even aged coniferous crops)
- **Silviculture systems** (i.e. certain stages in Clearfell and/or Continuous Cover Forestry)
- **Standing and fallen deadwood** (i.e. inappropriate build up of deadwood in risk areas).
- **Windthrow** (i.e. increasing ladder fuels from the surface to the crown)
- **Management and maintenance** (i.e. lack of or inappropriate management)
- **Tree health** (especially pests and diseases)
- **Design and layout** of woodlands, especially in the landscape

Appendix 1 – Wildfire risk assessment

A wildfire risk assessment is based on evaluation of the likelihood of a wildfire starting and the severity of damage it might cause. It uses the formula:

Wildfire risk = likelihood x severity

Details of the risk assessment should be recorded using the Wildfire risk assessment template (see overleaf) and kept with the forest management plan for reference.

Likelihood of a wildfire starting

Scale	Likelihood	Chance (%)	Description
1	Very unlikely	0-20	Event may occur only in exceptional circumstances
2	Unlikely	21-40	Event could occur at some time
3	Moderate	41-60	Event will occur at some time
4	Likely	61-80	Event could occur in most circumstances
5	Very likely	81-100	Event will occur in most circumstances

Severity of a wildfire

Scale	Severity	Chance (%)	Description
1	Negligible	0.005	Life: Minor local first aid treatment (e.g. minor cuts/abrasions) Property/business: No financial loss or damage. Environment: Minor damage; habitats and species will recover in less a year.
2	Minor	0.05	Life: Injury requiring first aid treatment Property/business: Minor financial losses (up to 1% of profit), disruption or damage Environment: Minor damage; habitats and species will recover in 1-5 years.
3	Serious	0.5	Life: Medical treatment required. Property/business: Serious financial losses (up to 5% of profit), disruption or damage Environment: Serious damage; habitats and species will recover in 5-10 years.
4	Major	5	Life: Permanent or life changing injuries. Property/business: Major financial losses (up to 10% of profit), disruption or damage. Environment: Major damage; habitats and species will recover in 10-20 years.
5	Fatalities	50	Life: Single or multiple deaths Property/business: Destruction of the property (total loss) or business. Environment: Irreversible impact on habitats or species.

Calculate the wildfire risk and assess whether the risk is Low, Moderate, High or Unacceptable by using the matrix below. A Moderate, High and Unacceptable risk rating will require the use of control measures to reduce the risk rating to Low.

Calculating the wildfire risk rating

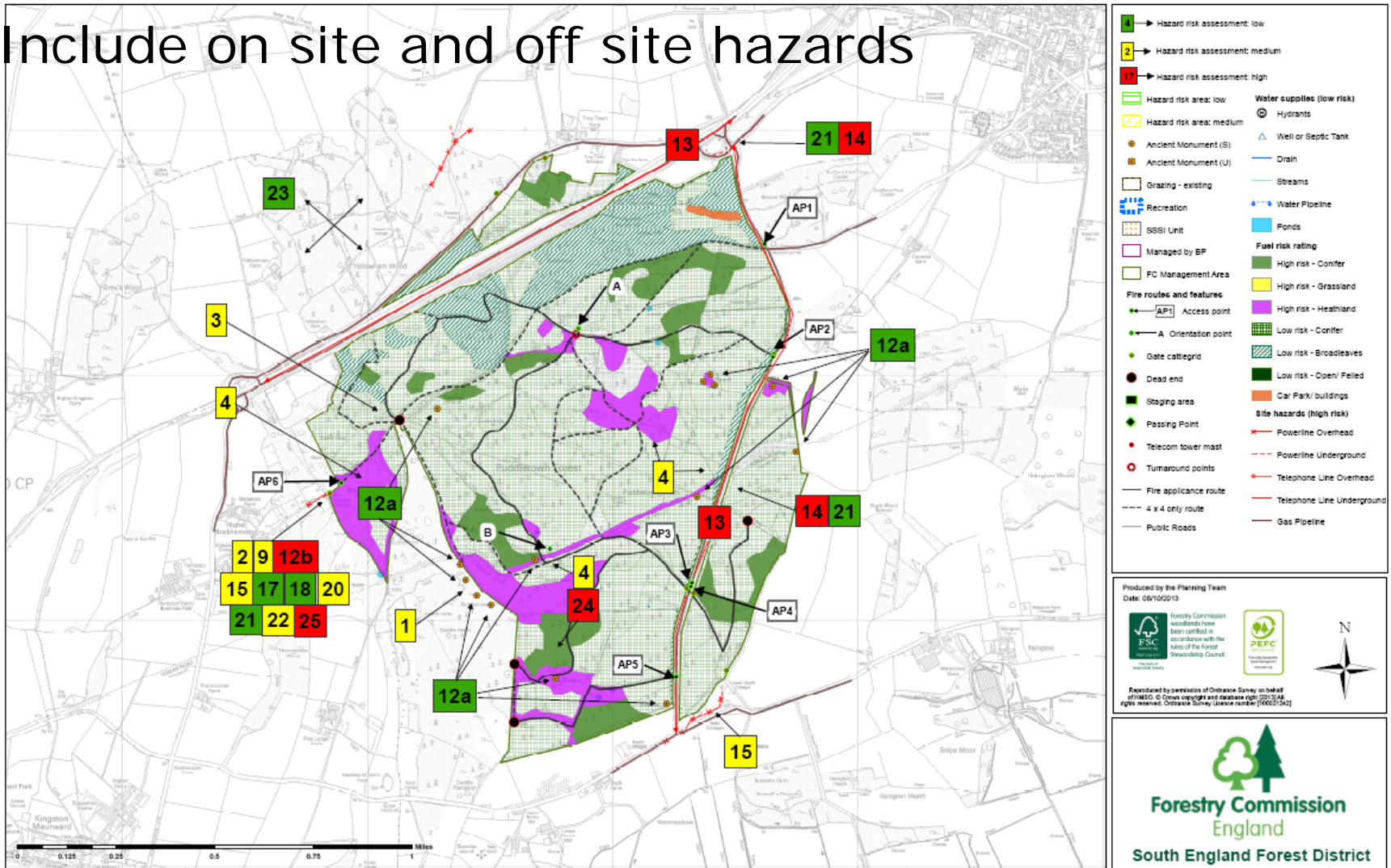
		Likelihood								
		1	2	3	4	5				
Severity	1	1	2	3	4	5		1-5	Risk rating 1	Low
	2	2	4	6	8	10		6-10	Risk rating 2	Moderate
	3	3	6	9	12	15		12-16	Risk rating 3	High
	4	4	8	12	16	20		20-25	Risk rating 4	Unacceptable
	5	5	10	15	20	25				

Wildfire risk assessment template with worked example

[illegible]

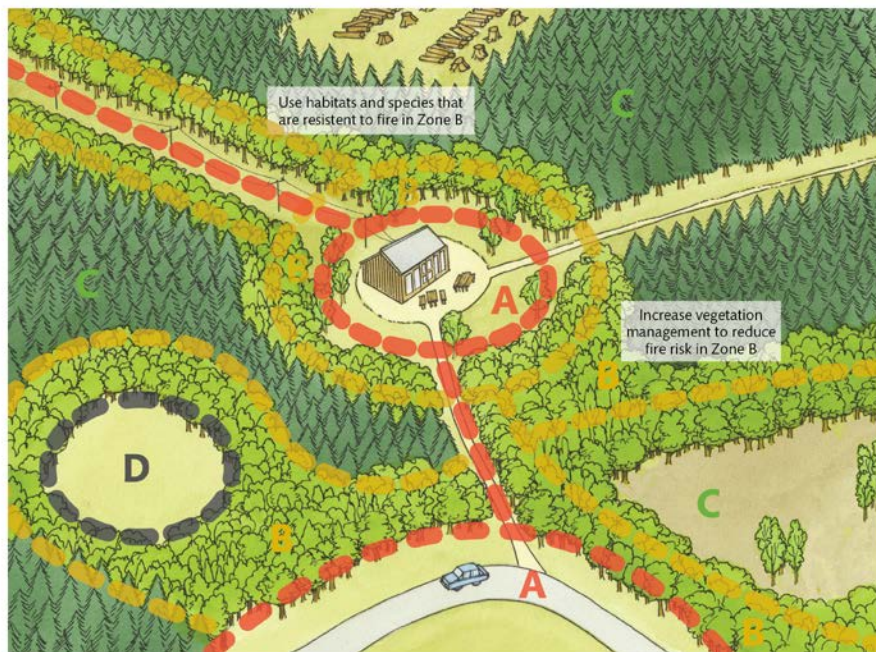
Present Wildfire Risk Assessment Puddletown

Include on site and off site hazards



Zone A is the asset zone, where health and safety and important assets and infrastructure must be protected from wildfire. This zone requires a high level of fire prevention such as fuel management. To achieve this Zone A can be broken up into smaller zones with appropriate vegetation management regimes (see diagram overleaf).

Zone B is the buffer zone, where increased fuel management is carried out in areas at a high risk of wildfire to protect Zone A. The aim should be to reduce the rate of spread and intensity of a fire. The width of Zone B should be proportionate to the level of risk and the potential impact of radiant heat, smoke and spot fires on Zone A. In low-risk areas of forest it may be as narrow as a fire belt. In higher-risk landscapes, the width will be increased.



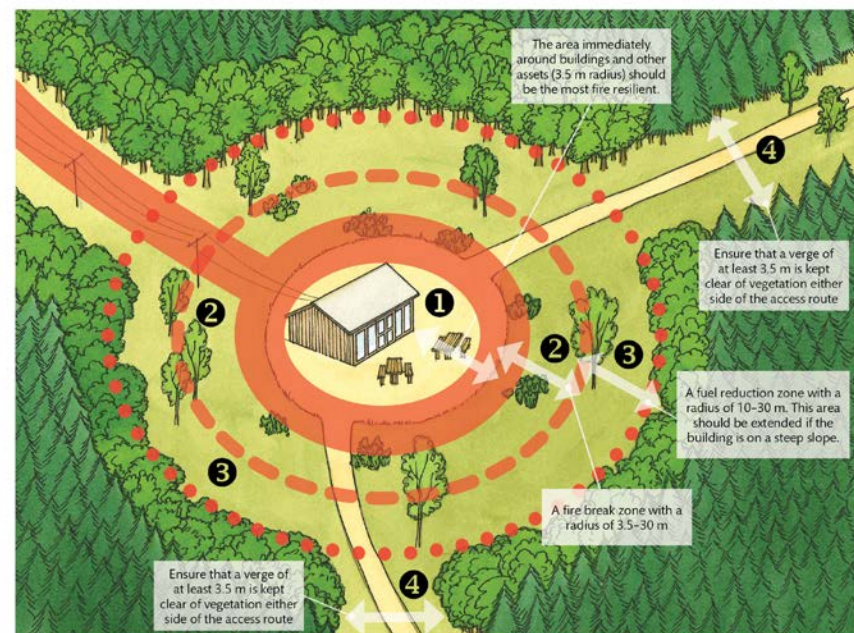
Zone C is an area of low wildfire risk where normal land management activities are carried out. However, it is recommended that wildfire fire prevention measures are considered where Zone C is adjacent to, or could threaten Zone B.

Zone D is a fire exclusion zone, where operations such as prescribed burning or suppression fires should not be permitted as they could damage important ecosystems and habitats such as deep peat, heaths and wetlands.

Landscape scale

1 Keep vegetation sparse and well irrigated and use fire resistant species. Carry out annual maintenance before the start of the fire season. Do not burn cleared vegetation in this area – cut, chip and remove. Regularly clear the area of deadwood and remove leaves and needles from rooftops and gutters.

2 Trees and shrubs in this area should be comprised of fire resistant species and kept at a low density. Larger areas of forest or woodland should be fragmented to increase resilience and trees thinned or pruned to minimise ladder fuels. Areas of grassy open space should be increased and deadwood kept to a minimum.



3 Larger areas of forest or woodland should be fragmented in this outer area. Plant fire belts of fire-resistant tree species and manage the undergrowth so that it remains suppressed. Bonfires and prescribed burning (with appropriate control measures) take place here outside of the fire season.

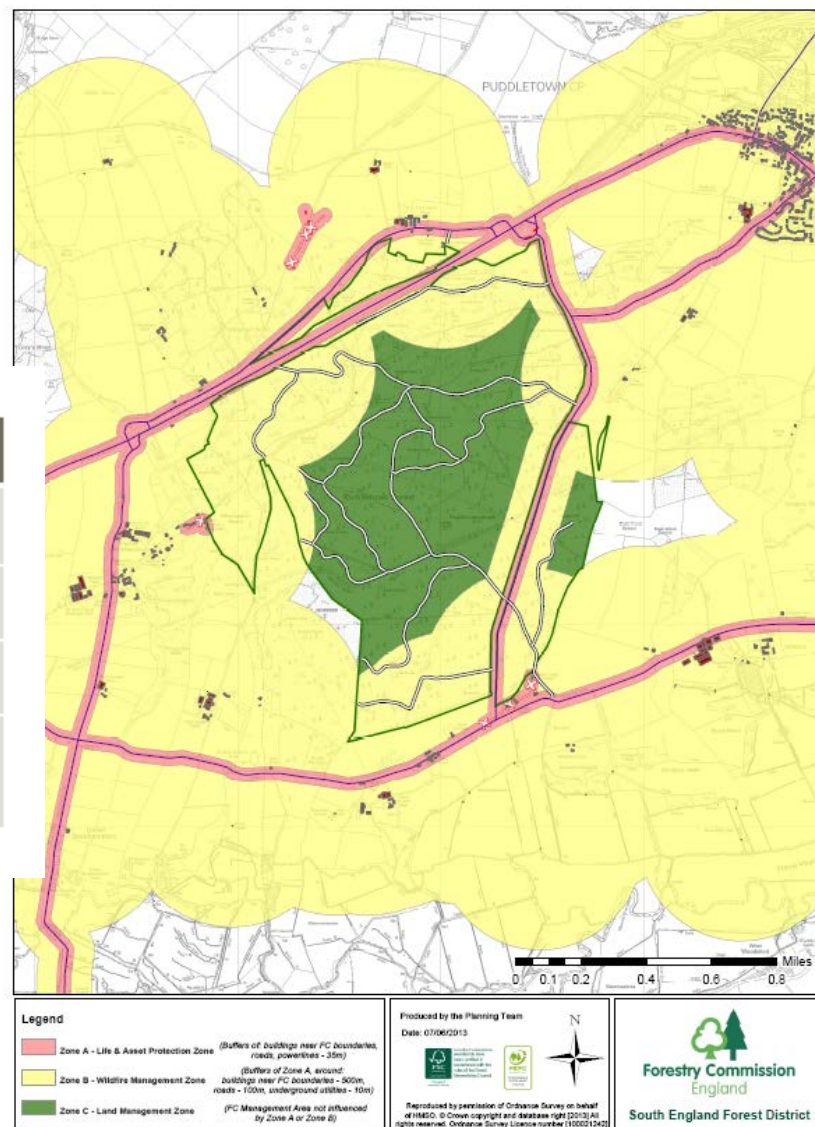
4 Trees and shrubs should be kept at low volumes along access routes and all vegetation should be composed of fire resistant species. All ladder fuels should be removed. Ensure that trees and other vegetation does not grow too large and close in across the zone.

Assets

Table 3 Wildfire management zones.

Zone	Name	Purpose
A	Life and asset protection zone	To protect human life and important assets and infrastructure from wildfire
B	Wildfire management zone	To provide a buffer zone around Zone A where the focus is wildfire prevention measures
C	Land management zone	To identify low-medium risk areas where normal land management activities can occur.
D	Fire exclusion zone	To protect vulnerable habitats and species.

Fire Management Zones Puddletown Forest



121. Planning policies and decisions should also ensure that:

- the site is suitable for its new use taking account of ground conditions and land instability, including from ***natural hazards*** or former activities such as mining, pollution arising from previous uses and any proposals for ***mitigation*** including land remediation or impacts on the natural environment arising from that remediation;

164. Local planning authorities should:

- ***work with local advisors*** and others to ensure that they have and ***take into account the most up-to-date information about higher risk sites*** in their area for malicious threats and ***natural hazards***, including steps that can be taken to ***reduce vulnerability and increase resilience***.

94. 99. 156. Climate change adaptation, mitigation and resilience

Analysis - Spatial representing Constraints, Opportunities & Threats (COT)

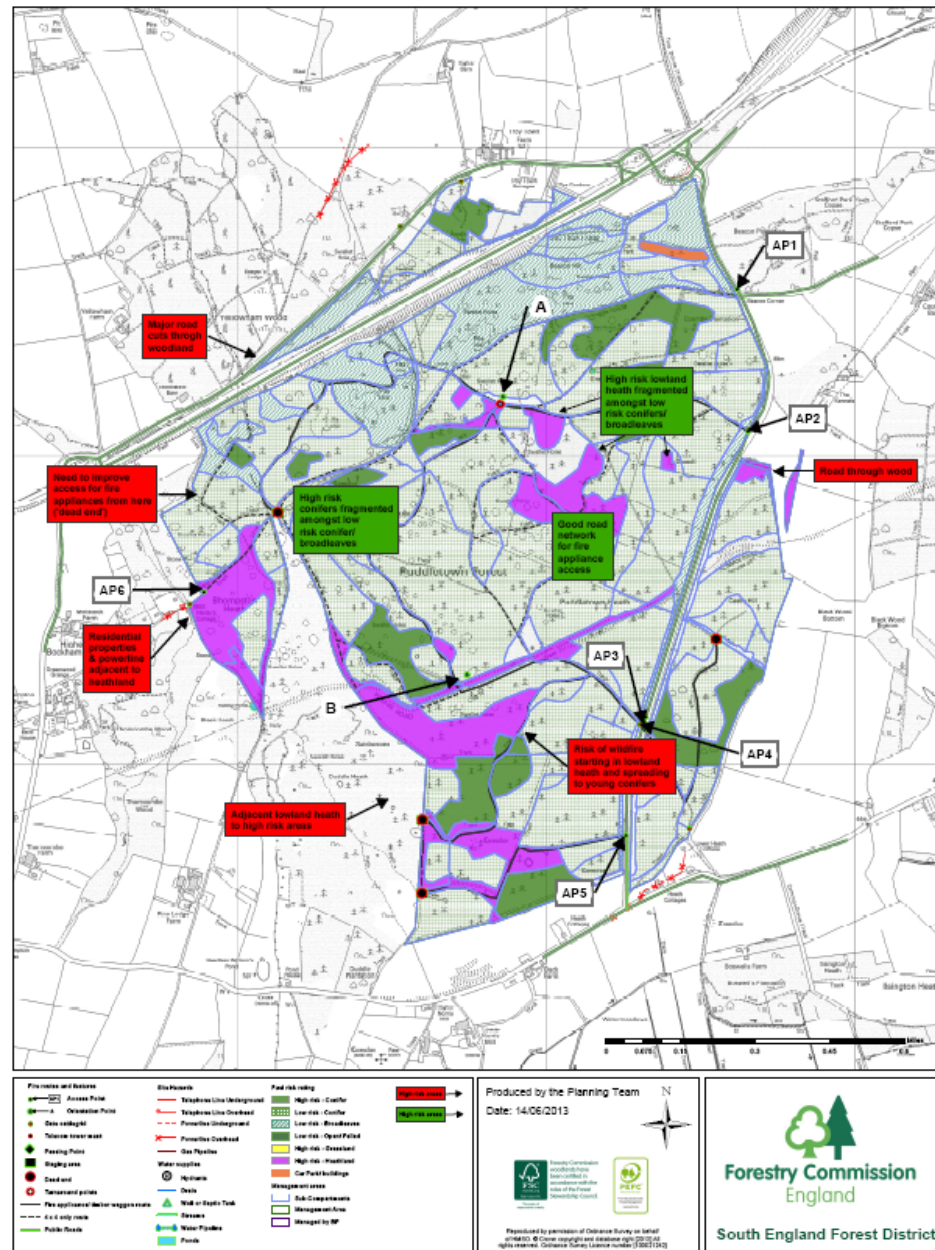
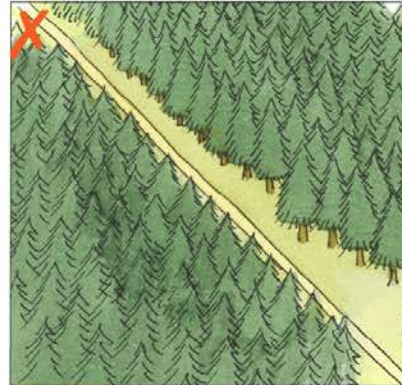


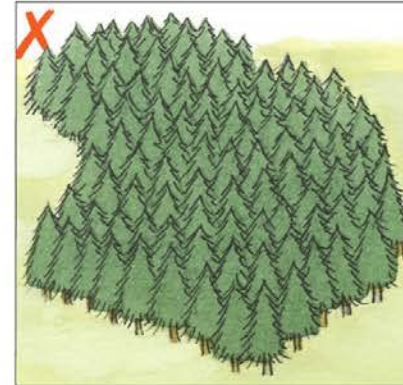
Figure 10 Principles of good planning for building wildfire resilience in forest design.



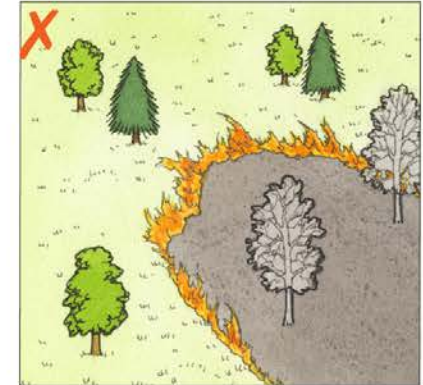
Fire breaks improve wildfire resilience but should not be the only control measure.



Greater risk of fire spread/crown fires in these stands managed using a single silvicultural system.



Greater risk of fire spread/crown fires in this large, uniform stand with no breaks in tree cover.



Isolated/scattered trees are more vulnerable to wildfire, especially where there is a build up of surface fuel.



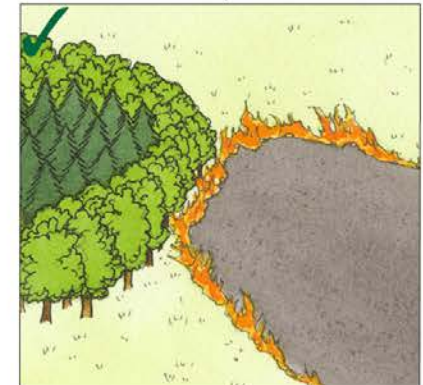
Consider managing vegetation to reduce fuel across an entire site, e.g. along the edges of roads and rides.



Use an appropriate mix of silvicultural systems to create a diverse woodland structure.



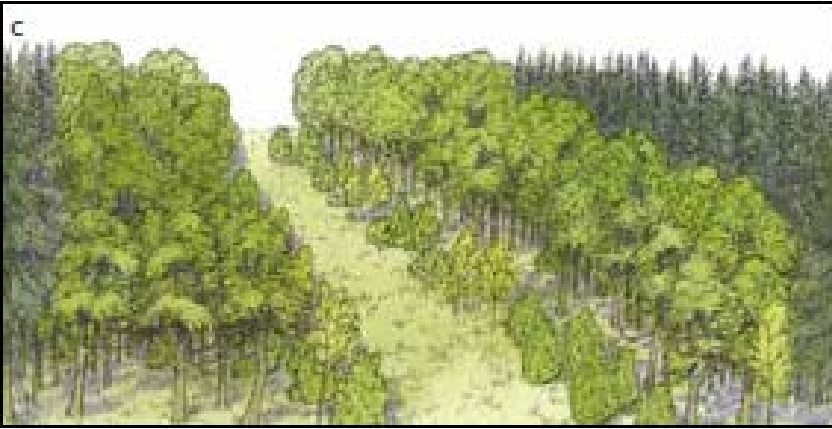
Fragment high-risk species and habitats into smaller areas to reduce the risk of fire spread.



Maintain trees in groups, such as woodlands or copses, where surface fuels are suppressed.

Techniques:

- Managing vegetation and fuels
- Creating fire and fuel break & fire belts
- Improving forest design
- Building silvicultural resilience
- Planning for people
- Providing access to water sources
- Allowing access for fire fighting

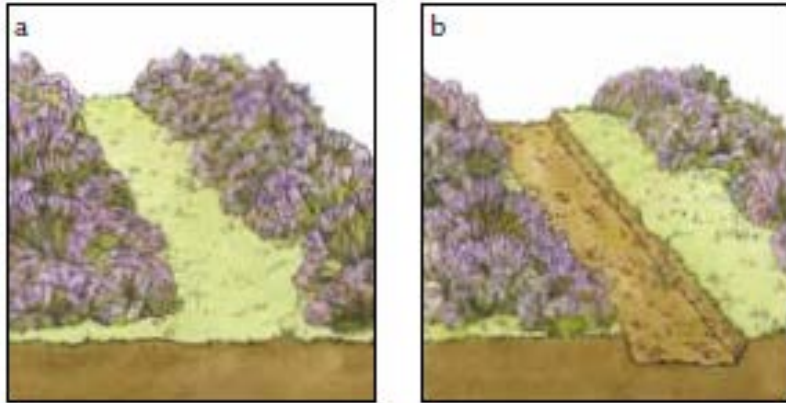


Surround high risk plantations with fire resilience species

Consider the following species:

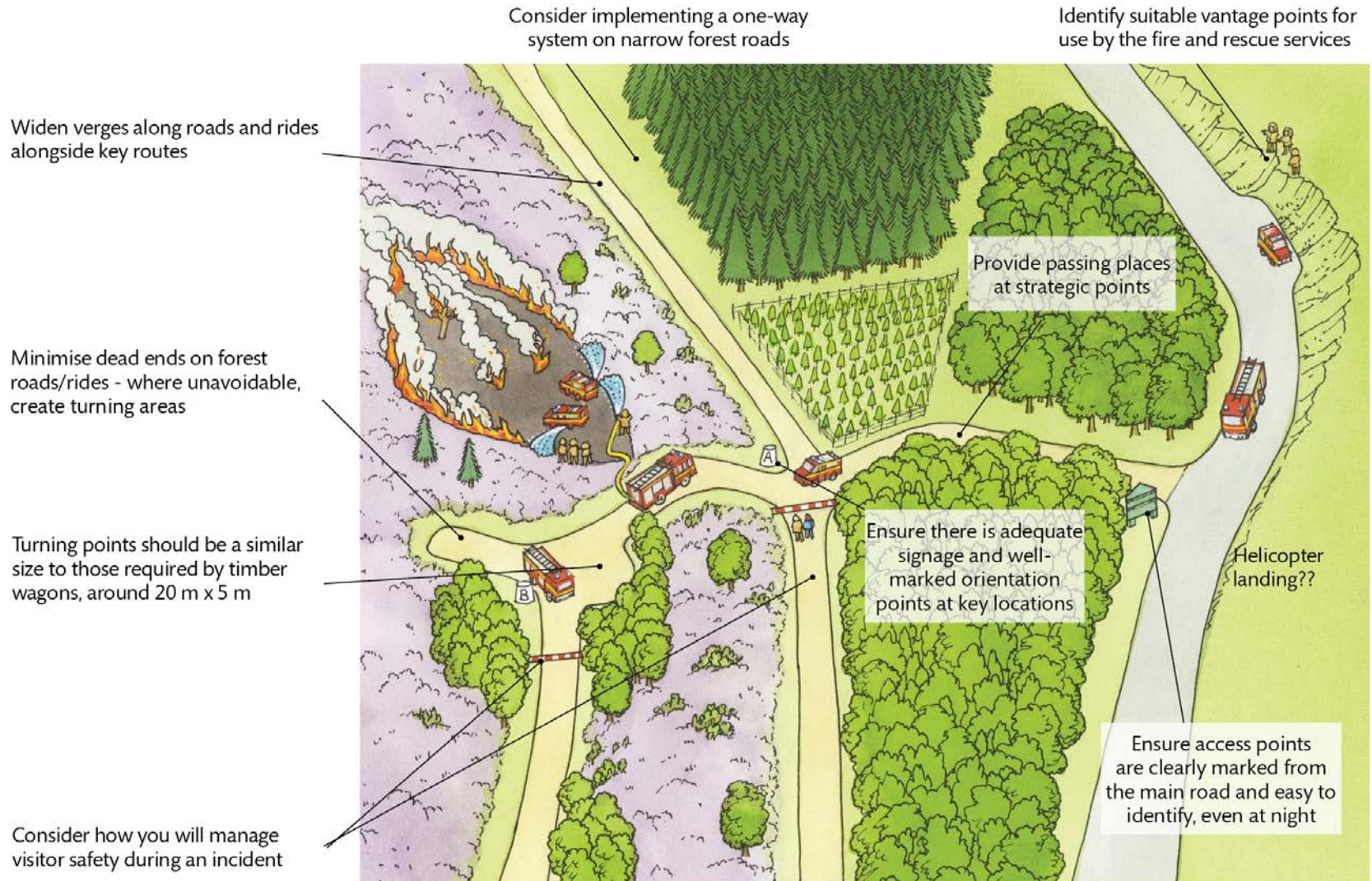
- Sweet chestnut
- Oak (sessile / pedunculate)
- Birch

Fuel and fire break and control lines



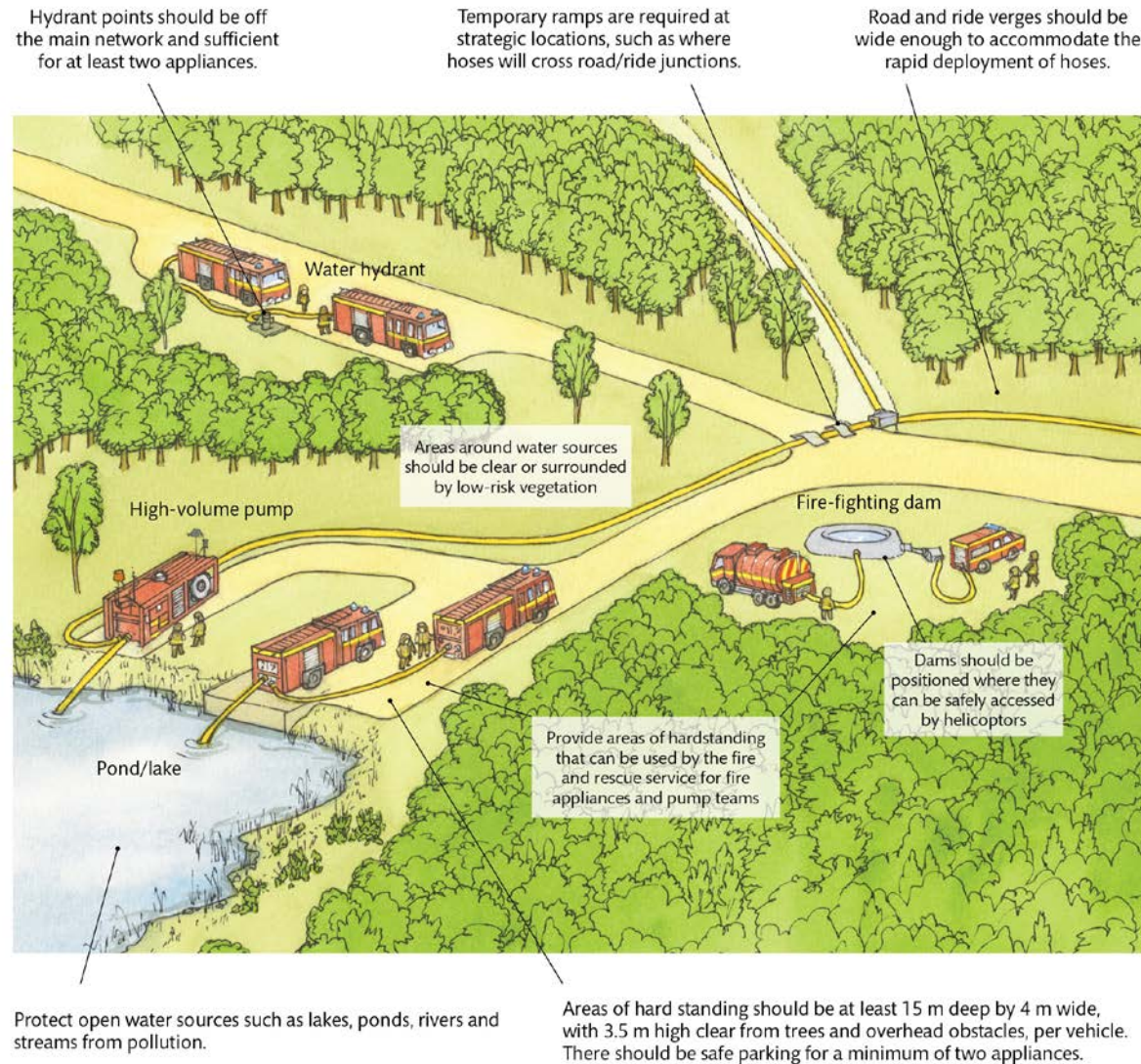
Allowing access for fire fighting

Figure 22 Planning to facilitate an incident response. All such features should be marked on the Wildfire response plan.



Providing access to water sources

Figure 20 Diagram to show different types of water sources and an 'ideal' water supply layout.

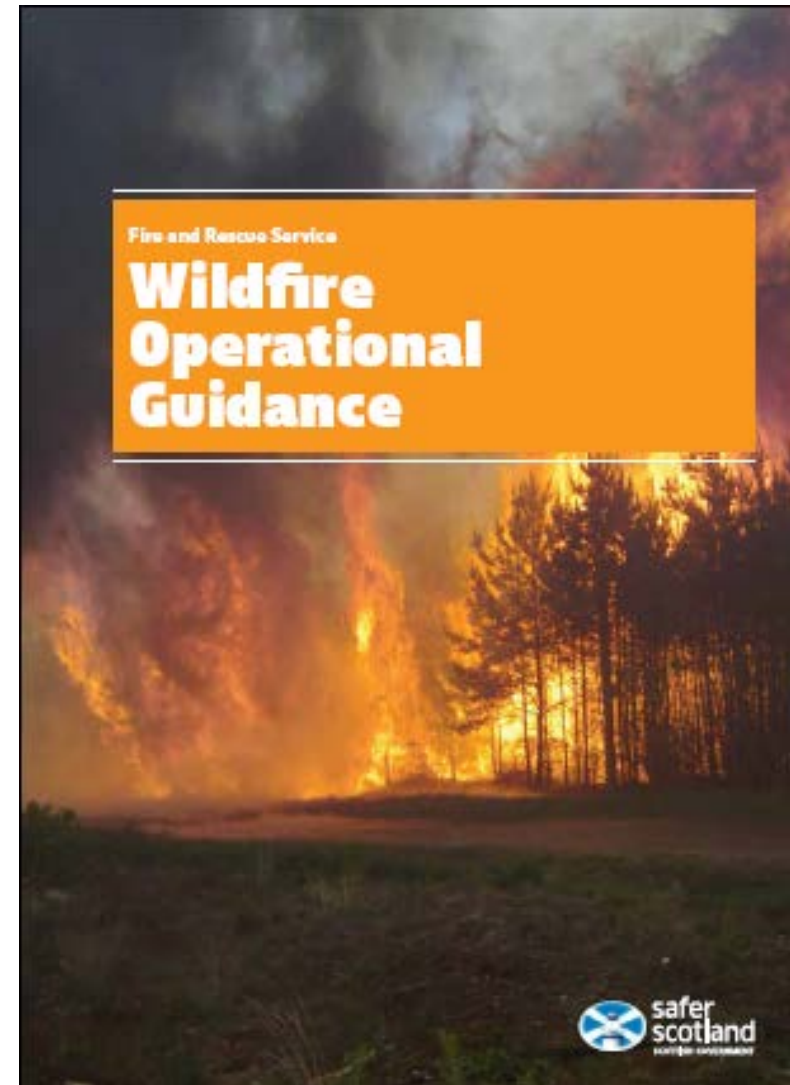


- Forestry Commission England and Scotland
- Natural Resources Wales
- Northern Ireland Forest Service
- Forest Research
- Confederation of Forest Industries (CONFOR)
- Institute of Chartered Foresters
- 'Eurofire Project' and funders Leonardo da Vinci
- Chief Fire Officers Association
- Fire Brigades Union
- England and Wales Wildfire Forum
- National Fire Protection Association (USA)
- Dept of Environment and Primary Industries (Australia)
- National Rural Fire Authority (New Zealand)
- Natural England
- Cabinet Office (Civil Contingency's Secretariat)
- Northumberland, Dorset, Surrey and Hampshire FRS

References and further reading:

- Fire on Earth
- Scottish FRS Wildfire Operations Guidance
- Eurofire Project

http://www.fire.uni-freiburg.de/eurofire/en/EuroFire_Training_EF2_Technique.pdf



Thank you

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