The causes and prevention of wildfire on heathlands and peatlands in England (NEER014)

Appendix 12: Uplands Management Group moorland Wildfire Risk Assessment and wildfire planning

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Information on the Upland Management Group including the original version of this guidance can be accessed from: https://www.uplandsmanagement.co.uk/.

Wildfire Risk Assessment

A wildfire risk assessment is an evaluation of the likelihood of a wildfire occurring and the severity of damage it might cause if it does occur.

The Risk Assessment should record both on and off-site factors and features that are relevant in the consideration of wildfire risk. The relevant factors and features should be identified at the individual site level through site inspection and drawing on local knowledge and experience. The assessment should take account of short-term factors such as weather and should be reviewed annually to take account of changing circumstances.

The identification of what is at risk and hazards

Consider what is valuable on the land and at risk from wildfire. Both could be represented in map form to help indicate where action could be taken to reduce risk, especially if it is also possible to predict fire behaviour and map that as well.

The Wildfire Risk Assessment should include:

- The identification of hazards, both direct and indirect
- The identification of assets vulnerable to wildfire, including environment, people and property
- An evaluation of the risk, including likelihood of fire occurring and severity of incidents
- An analysis of the risk to agree appropriate actions.

Potential hazards include:

Factors that influence the risk of a fire starting:

- People (visitor use and numbers)
- Access points (public rights of way, car parks, open access land)
- Presence of ‘honeypot’ areas (eg picnic sites, campsites)
- Land management/land use type
- Adjacent land management/land use
- History of wildfires in the area (including identification of ignition points).

Factors that influence fire behaviour (intensity and rate of spread):

- These factors help in understanding of the potential scale of a fire and where actions may be necessary to reduce scale and rate of spread so that fires can be brought under control.
- Vegetation type (susceptibility to drought and fire)

- Vegetation growth (biomass/fuel loading)
- Extent of habitat features / presence of natural firebreaks (continuity of fuel)
- Distribution of habitats (continuity and arrangement of fuels)
- Topography
- Soil type / soil moisture content
- Presence of ground fuels (peat soils).

Factors that influence the effect of fire:

- Access for firefighting
- Availability of firefighting equipment
- Areas that are difficult to access
- Presence of buildings and other property.

Assets Potentially at Risk from Wildfire include:

- People
- Critical infrastructure (radio / TV masts, roads, railways, sub stations, overhead powerlines, gas mains)
- Property and business units (on the land or in close proximity)
- Sporting (habitat and infrastructure)
- Tourism assets
- Drinking water catchment
- Public access and highways
- Cultural heritage
- Food production (crops, grazing resources)
- Livestock
- Timber
- Priority habitats
- Priority species
- Protected sites
- Historic environment features
- Recreation and aesthetic assets
- Air quality
- Carbon-rich peat soils.

The Risk Assessment Process

Two stages of assessment of risk are proposed:

Stage 1: Wildfire Risk Scoresheet

A starting point is evaluation of the factors that may affect the likelihood of fire starting and fire severity to determine where more detailed risk assessment is required. The Wildfire Risk Scoresheet allows evaluation of the factors that a land manager should consider and provides a threshold score, above which further risk assessment is recommended. This is in effect a screening process. It encourages all land managers to consider wildfire.

The Scoresheet records both on and off-site factors and features that are relevant in the consideration of wildfire risk. They should be identified at the individual site level drawing on local knowledge and experience. Local Wildfire Groups or Fire and Rescue Services (FRS) may be able to help identify particular local issues to consider in the assessment process.

After completion, a total score of 40, or more, indicates that the wildfire risk is significant and a more detailed Wildfire Risk Assessment should be carried out. This may lead to the development of a Wildfire Response Plan and a Wildfire Management Plan.

Land managers who are already aware of and plan for wildfire would be likely to move to the Stage 2 risk assessment process instead of this first step.

The Wildfire Risk Scoresheet is suitable for simple open country cases but is unlikely to be suitable for use on forested land or where there is complex infrastructure. In these cases, the Stage 2 risk assessment process is likely to be required from the outset.

Stage 2: Wildfire Risk Assessment

Where indicated by a scoresheet total of 40 or above, or where the risk is initially assessed as being significant, the development of a full Wildfire Risk Assessment (WRA) is recommended.

Use of a risk assessment framework to identify fire risk will bring focus to those risk factors and hazards that may be mitigated by management (Table 1). This will aid decision making and provide the evidence base for the development of a Wildfire Response Plan and Wildfire Management Plan. Fire risk is a combination of the probability of a wildfire occurring and its potential impact at a particular location. It can be quantified using the formula: 'Fire Risk = Likelihood x Severity'.

Likelihood means the probability that a wildfire will start and or become established. This will be influenced by possible sources of ignition, weather conditions and the presence of suitable fuel to allow a fire to become self-sustaining.

Severity is measure of how much damage will be done by a wildfire once established. This will be influenced by the type and quantity of fuel load available, weather conditions, topography and the presence or absence of assets at risk.

Both likelihood of fire starting and likely severity vary from place to place and from time to time including on short timescales. This makes risk assessment complex and a precautionary approach should be adopted, considering expected conditions that are most likely to be supportive of wildfire.

When assessing severity an important factor is how hot a fire will burn. This is a product of weather, topography and fuel load. It is important to assess the fuel load correctly. Fuel load is a combination of the volume of material available and its composition. Once established a wildfire can recruit further fuel load by heating and drying out material that would otherwise not have burned.

In wildfire terms, hazards are factors that could result in fire starting or that affect its severity. The risk is the chance that someone or something could be harmed.

The level of detail required for a WRA should be proportionate to the wildfire risk. It can be presented in map or matrix form, depending on the scale and nature of the land being assessed.

Table A12.1. Steps in a Wildfire Risk Assessment.

Step	Details
1	Identify the hazards.
2	Decide who/what might be harmed and how.
3	Define what is already being done to manage risk and what could be done.
4	Evaluate the risks and decide on precautions.
5	Record findings and implement them.
6	Review the assessment and update if necessary.

Evaluating the Wildfire Risk

A wildfire risk assessment is an evaluation of the likelihood of a wildfire occurring and the severity of damage it might cause if it does occur. The assessment may be carried out on a broad scale for large areas where map-based approaches may be useful. Wildfire Risk will vary considerably within most large sites and over time and a flexible responsive sub division of large will sites will likely be appropriate in most instances.

A matrix-based approach, described below, may be suitable for small areas, premises or specific locations, especially where employees or the public may be at risk.

Wildfire risk is difficult to quantify because it varies from place to place even over small areas and from day to day. The Tables below suggest a means of scaling risk that may be used as a means of quantifying risk. Where the assessment of severity may differ between Property/business, environment and people use the highest value in the analysis.

Table A12.2: Likelihood of a wildfire starting and becoming established.

Scale	Likelihood	Description
1	Very unlikely	Event may occur only in exceptional circumstances - there are either no ignition sources or fuel to allow a fire to establish.
2	Unlikely	Event could occur at some time.
3	Moderate	Event will occur at some time – the combination of ignition source, fuel supply and weather conditions conducive to fire are likely to coincide infrequently.
4	Likely	Event could occur in most circumstances – presence of ignition sources and fuel mean that fires are likely whenever supportive weather conditions occur.
5	Very likely	Event will occur in most circumstances – there are frequent periods of supportive weather conditions in combination with ignition sources and fuel load.

Table A12.3: Determining the severity of a wildfire.

Scale	Severity	Description
1	Negligible	**Property/business:** No financial loss or damage. **Environment:** Minor damage; habitats and species will recover in less than a year. **People:** Minor local first aid treatment (e.g. minor cuts/abrasions).
2	Minor	**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. **People:** Injury requiring first aid treatment.
3	Serious	**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. **People:** Medical treatment required.
4	Major	**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. **People:** Permanent or life-changing injuries.
5	Severe	**Property/business:** Destruction of the property (total loss) or business. **Environment:** Irreversible impact on habitats or species. **People:** Single or multiple deaths.

Table A12.4. Severity scale for assessment of likely impact on habitats.

Scale	Severity	Habitat			
		Heathland	Blanket bog	Grassland	Scrub
1	Negligible	Perennial plants singed but not killed. Moss layer, seed bank and soil intact	Above-ground vegetation damaged but surface moss layer unaffected	Spring fire of infrequent occurrence removing litter	Damage to plants but structure survives
2	Minor	Most plants singed but not killed, some old heather may not reshoot from root. Moss layer singed and bleached but not killed. Seed bank and soil intact	Above-ground vegetation damaged and surface moss layer affected by heat but not burned	Spring fire removes litter and short term impacts on fire-sensitive species	Loss of structure but scrub species regrow
3	Serious	On moorland most or all plants killed, moss layer damaged or destroyed. Seed bank and soil affected. Organic soils become hardened and impervious but no loss. Bare areas colonised by cushion mosses	Above-ground vegetation killed and surface moss damaged by fire	Fire in growing season impacting species composition and abundance in more than one year	Loss of scrub species and replacement by open habitat
4	Major	Total loss of all plants and seed bank. Loss of some organic soils depth resulting in resulting in erosion on steep slopes and delayed recolonisation by key species such as heather	Above-ground vegetation killed and surface moss killed and bare peat exposed so that there are impacts on hydrological properties of the peat	Fire removes vegetation	Loss of habitat. Soil surface affected by heat. Populations of key / rare species affected
5	Severe	Loss of vegetation, seedbank and organic soils so that recolonization by moorland species is severely delayed. Restoration action (eg re-seeding) required	Loss of vegetation and consumption of peat by fire. Major changes to habitat structure and hydrological properties. Recovery of blanket bog vegetation unlikely	Fire removes vegetation. Soil surface affected by heat resulting in erosion on steep slopes. Loss of seedbank and changes to species composition at re-growth. Populations of key / rare species loss	Loss of habitat, damage to soils resulting in erosion on steep slopes. Loss of key / rare species

Wildfire Risk Assessment Matrix

Severity \ Likelihood	1	2	3	4	5	Cate-gory	Score	Risk Rating
1	**1**	**2**	**3**	**4**	**5**	**1**	1 - 5	Low
2	**2**	**4**	**6**	**8**	**10**	**2**	6 - 10	Moderate
3	**3**	**6**	**9**	**12**	**15**	**3**	12 - 16	High
4	**4**	**8**	**12**	**16**	**20**	**4**	20 - 25	Unacceptable
5	**5**	**10**	**15**	**20**	**25**			

The Risk Assessment matrix is a tool that may be of use in specific circumstances such as in small intensively used areas or around buildings, where likelihood and severity of fire are relatively constant.

The matrix offers a means of making the assessment process more objective. Where the risk assessment exceeds the threshold for acceptability mitigation measures should be built into the WMP (Forestry Commission 2014)[1].

A High or Unacceptable risk rating will require the use of prevention or other control measures to reduce the rating to an acceptable level. These may be measures that reduce the risk of fire starting, reduce severity or, in respect of risk to people, prevent access to the hazard.

Note that the calculation of wildfire risk should include any existing mitigation measures that are in place in order to assess their effectiveness.

Details of the risk assessment can be recorded by using the Wildfire Risk Assessment Template as included below.

[1] Forestry Commission. 2014.*Practice Guide: Building wildfire resilience into forest management planning*: https://www.forestresearch.gov.uk/research/building-wildfire-resilience-into-forest-management-planning/.

Wildfire Risk Assessment Template

Name of Land Holding	Location	Date of assessment and date of review

What are the fire hazards?	Who/what might be harmed and how?	What is already being done to manage risk?	Initial Risk Rating				What else needs to be done?	Revised Risk Rating			
			Likelihood	Severity	Risk Rating	Assessment		Likelihood	Severity	Risk Rating	Assessment

Wildfire Risk Scoresheet

This scoresheet is to give an indication as to whether there is a high risk of a severe wildfire occurring on your land and therefore whether you need to consider producing a:

Wildfire Response Plan – to effectively manage a wildfire incident, if one should occur, and/or a:

Wildfire Management Plan – to reduce risk of fire starting and reduce its impact.

This scoresheet is intended as a simple tool that encourages consideration of wildfire risk. If you are already aware of, and plan for, wildfire on your land, you should consider the more in-depth risk assessment process instead of this first step.

Note: Use a separate scoresheet for each parcel of land, or group of parcels, where there is comparable risk and similar factors apply.

Site name:	
Name of persons completing the risk assessment:	
Agreement Reference and agreement holder:(If relevant)	
Date of Completion of assessment:	
Review date: (within 5 years or less where changes which could alter the score occur)	

Section	Question	Score if answer to question is 'yes'	Score	Notes
Wildfire history	Has there been a wildfire (including a controlled burn that has got out of control) on the land in the past 20 years?	35		
	Has there been a wildfire (including a controlled burn that has got out of control) on your immediate neighbours' land in the past 20 years?	25		
Fires started by third parties using the land e.g. public, organised groups	Do third parties currently light fires or cause fires to start on your land (e.g. Arson, campers, disposable BBQs, discarded cigarettes, due to military training)?	40		
	Do third parties currently light fires or cause fires to start on your neighbours' land (e.g. arson, campers, disposable BBQs, discarded cigarettes, due to military training)?	30		
Current management burning	Does controlled/prescribed burning take place on your land? This includes burning of heather/grass/gorse/brash.	40		
	Does controlled burning take place on your neighbours' land? This includes burning of heather/grass/gorse/brash.	20		
Introduction of controlled burning	Are there plans to introduce controlled burning in the next five years on your land after a period of more than 5 years of no burning being undertaken?	40		
	Are there plans to introduce controlled burning on your neighbour's land after a period of more than 5 years of no burning being undertaken?	25		
Changes in land management practices over the last 20 years	Was controlled/prescribed burning undertaken on your land but now stopped?	35		
	Was controlled burning undertaken on your immediate neighbour's land but now stopped?	20		
	Has grazing been significantly reduced during the growing season on moorland, heathland or grassland? (You should answer 'yes' to this question, if you expect there to be a change in the vegetation structure and/or type of cover in the next 5 years.)	30		

Section	Question	Score if answer to question is 'yes'	Score	Notes
Changes in land management practices over the last 20 years (cont.)	Has grazing been significantly reduced during the growing season on moorland, heathland or grassland on your immediate neighbour's ground?	15		
Crops and stored materials	Do you harvest ripened or desiccated crops that may be dry enough to burn in a normal summer?	10		
	Do you have cropped land close to sources of fires – e.g. barbecues, garden waste fires, industry?	10		
	Do you store straw, hay or other crops that may be liable to spontaneously combust with a risk of fire spreading to crops or other vegetation?	5		
Possibility of third-party fires	Are there car parks, other access points / areas where users' behaviour suggests there is a high possibility of a fire being started?	35		
Fuel load: peat	Do you have any large areas (>10ha) of peat that could burn during extremely dry periods?	10		
Fuel load: vegetation in open habitats	Do you have any moorland / heathland / grassland / bracken (more than 2.5 acres / 1ha) that is never grazed / cut / managed?	10		
Fuel load: vegetation in open habitats	Do you have any moorland / heathland / grassland / bracken (more than 25 acres / 10ha) that is never grazed / cut / managed?	20		
Fuel load: vegetation in open habitats	Do you have any moorland / heathland / grassland / bracken (more than 50 acres / 20ha) that is never grazed/cut/managed?	40		
Fuel load: scrub & woodland	Do you have any areas of scrub, including gorse over 0.5 acres (0.2ha)?	10		
	Have you planted any woodlands or allowed woodland or scrub to develop on your land in the past 20 years, or are you going to plant some in the next 2 years?	10		

Section	Question	Score if answer to question is 'yes'	Score	Notes
Fuel load: scrub & woodland (cont.)	Have any woodlands been clear felled on your land in the last 10 years, leaving woody debris that has not been removed. (Note if this area has been replanted and so you answered yes to the question above, no need to count again)	10		
Fuel load: neighbouring ground	Does your neighbour(s) have areas of moorland / heathland / grassland / scrub / woodland adjacent to your boundary that could enable a fire to spread onto your land?	10		
Impact of wildfire	On / adjacent to your land, do you have any sites of national / regional importance (e.g. settlements, major roads, SSSI) and/or important infrastructure (e.g. electricity substation/generation, gas pipeline, communications mast)?	30		
	Do you have any large areas (>20ha) of peat that could burn during dry conditions?	30		
Add up all the above columns to give **Total Wildfire Risk Score**				
Any other comments				

If the total **Wildfire Risk Score is 40 or more** you should consider producing a **Wildfire Response Plan** and a **Wildfire Management Plan**, which will include a more comprehensive risk assessment to show how the risks are mitigated and managed.

Wildfire Management Plan Template

Introduction

Fires require a source of ignition and a supply of fuel and measures to address wildfire risk should address both.

A first stage in developing a Wildfire Management Plan is to decide what is the purpose of the WMP, and what it will achieve. This may include one of more of the following:

- Reduce likelihood of a wildfire starting.
- Reduce fire severity (i.e. the amount of organic matter burnt); minimise the burned area and the effects of fire on vegetation including roots and dormant seeds, and peat soils.
- Reduce impact – for example, minimise or prevent damage or disruption to: business, livestock and wildlife, buildings, infrastructure, water quality and special features.

A comprehensive plan would aim to achieve all of these objectives but emphasis will vary from place to place.

Plans should consider the full range of options to coordinate and integrate an approach. Care should be taken to ensure unintended consequences are avoided.

Plan Template

See notes for advice about what to include.

<table>
<tr><td>Title
(see note 1)</td><td colspan="2"></td></tr>
<tr><td>Name of Estate / Farm:</td><td colspan="2"></td></tr>
<tr><td>Plan produced by:</td><td colspan="2"></td></tr>
<tr><td rowspan="5">Contributors:</td><td colspan="2">1</td></tr>
<tr><td colspan="2">2</td></tr>
<tr><td colspan="2">3</td></tr>
<tr><td colspan="2">4</td></tr>
<tr><td colspan="2">5</td></tr>
<tr><td colspan="2">Date:</td><td>Expected review date:</td></tr>
<tr><td colspan="3">Linked Response Plan Reference:</td></tr>
</table>

Summary of risks on the land: (see note 2) *This section is intended to make sure that you include all the relevant issues*
List of risks identified in the Risk Assessment

Proposed Actions: (see note 3)
1 Management of behaviours (see guidance note 4)
2 Use of strategic firebreaks – purpose, siting, scale, management, monitoring and maintenance (see note 5)
3 Changing vegetation type and structure and soil wetness (see note 6)
4 Fuel Load management (see note 7)
4 Infrastructure (see note 8)

5 Protection of critical infrastructure, property and biodiversity or archaeological sites (see note 9)

6 Strategic wildfire management (see note 10)

Engagement Record (see note 11)			
List and summarise engagement			
	Engaged		Comments
	Y	N	
Planning Authority			
Environment Agency			
County Council			
Highways Authority			
Natural England			
Rural Payments Agency			
Historic England			
National Park			
Area of Outstanding Natural Beauty			
Fire and Rescue Service			
Commons Committee			
Tenant(s)			
Neighbour(s)			
Grazier(s)			
Other			

Notes to aid completion of the wildfire management plan

Note 1: Title

Include here information about the authors of the Plan and who has contributed. This will help with revision. The Plan should be reviewed at intervals to make sure it remains fit for purpose. Reviews should be carried out whenever there has been a significant change on the land, for example, change of personnel. We suggest a thorough review at least every 5 years.

Note 2: Summary of risks on the land

This section is intended to make sure that all the relevant issues are included and that the focus is on key risks identified in the Risk Assessment.

Include here a concise description of the land, indicating the areas where fire is most likely with a summary of habitats, structures, commercial interests or other assets at risk, the likely sources of ignition and the potential impacts of fire.

Record here any key infrastructure assets, such as: roads, electricity supplies, water resources, fuel pipelines, masts, wind turbines.

Record here any likelihood of risk to the public and how this might arise.

Supporting this summary by mapping values, assets (including infrastructure) and risk would be very valuable. One or more annotated maps may be needed depending on the complexity of the site which might include:

Map 1: Access and High Risk Areas

- Access points and routes for firefighting
- Historical wildfire ignition points
- Human behaviour hotspots – car parks, camping sites, BBQ areas
- Rights of Way – roads, footpaths, bridleways
- CRoW[2] open access land
- Location of infrastructure
- Property (residential, commercial and industrial)
- Priority habitats at risk
- Commercial assets at risk
- Historic or archaeological sites at risk
- Designated sites[3] protected by legislation.

Map 2: Fire Risk Management

- Vegetation types
- High fuel load areas
- Areas with ground fuels (peat)

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[2] Countryside & Rights of Way Act 2000

[3] See: https://magic.defra.gov.uk

- Topographic features that affect fire behaviour
- Environmental Scheme options (Higher Level Stewardship /Countryside Stewardship agreement/ELMS options
- Areas where peatland restoration work is in progress
- Target areas for strategic management
- Target areas for re-wetting.

These maps are to help you and others understand the relationships between features on the land. It is suggested that you annotate the map with a list of any of the features above that are not relevant so that it is clear that they have been omitted deliberately.

Maps could be updated annually to show progress on fire risk management, and shared with local Fire and Rescue Service and/or local wildfire groups to facilitate co-ordination between holdings as part of annual liaison.

Each of the issues noted here as relevant to the land should be addressed in the risk assessment.

Note 3: Proposed land management actions

Describe here what actions you will take and how they are expected to achieve reduction or mitigation of the risks identified in the risk assessment. Explain here how the actions reduce specific risks. Actions can include the full range of land management activities including vegetation management. Ensure you have consulted the relevant authorities to ensure relevant permissions have been given.

Note 4: Management of behaviours

Consider how you can change your activity and the behaviour of others both generally and at times of heightened fire risk to reduce likelihood of fires starting. Options include:

- Suspension of management actions (eg cease management burning, avoid use of vehicles or machinery likely to generate sparks or hot exhaust gases) when risk is high.
- Use of posters and other awareness raising (consider how will you ensure that information posted remains relevant?).
- How can you work with others to raise awareness – for example:
    - The local police force may be able to help stress that arson is a crime through press or signage,
    - Fire & Rescue Services or Wildfire Groups/Fire Operations Groups may help co-ordinate messages, and
    - Local Authorities may be able to use road signage or signage on rights of way to alert the public.
- Use of media, including social media, to alert heightened risk / need for vigilance and encouraging reporting.
- Asking visitors to report fires.
- Adopt a local fire watch initiative.
- Deployment of staff or volunteers as lookouts.
- Closing access points / routes, where this is possible.
- Regular management of hotspots of human activity to reduce litter and biomass.
- Monitoring of ignition points (such as, vehicle parking on vegetation, BBQ use etc.).
- Patrolling - for moorlands close to urban areas there may be options for Police and/or Fire and Rescue Service support in terms of weekend or Bank Holiday presence, for instance via patrols by

Community Police Officers. There may be capacity to deploy estate staff, countryside rangers etc. to fire watch duty.

Note 5: Use of strategic firebreaks – purpose, siting, scale, management, monitoring and maintenance

Be clear about the purpose of fire and fuel breaks. Do you intend the break to stop a fire or slow fire spread to help tackle it? Firebreaks may be intended to cause fire behaviour to change, rather than stop fire altogether, so may be used as firefighting control lines.

A map (Map 2 above) would be useful to show the location of breaks and more resilient wet areas in relation to assets at risk, likely sources of ignition, prevailing wind(s), and topographic factors that will influence fire behaviour.

Plan for wildfire by working out where a fire may be brought under control or may stop due to changes in topography or vegetation. Firebreaks should be sited taking account of wind direction, slope, aspect, history of ignition points, surrounding fuel load as well as special features, infrastructure and habitats to be protected. Experience of previous fires (wildfire and prescribed burning) may help to predict how a fire may behave and the direction it may take.

Breaks can also be sited where fire behaviour can be predicted to change anyway, so reducing intensity, and in these situations may be co-ordinated with firefighting ‘control lines’, for example where a vegetation fire break runs up to a hard track, allowing access to a fire front of reduced intensity.

Firebreak width will depend on purpose, soil and vegetation type and on expected fire characteristics. As a rule of thumb break width needs to be a minimum of 2.5 times expected flame height.

Naturally exposed mineral soil is the most effective firebreak but creating bare mineral soil may not be appropriate or desirable on open moorland.

Where there are peat soils, even a bare peat surface represents a residual fuel load. Severe fires can propagate through or beneath the peat.

Breaks that remain vegetated will require frequent and repeated maintenance and may have limited effect if any remaining vegetation or brash provides large quantities of rapidly drying fine fuels. Breaks may require less frequent maintenance if they become and remain dominated by Sphagnum or other moss species. Cut vegetation may create a mulch that helps retain moisture and reduces vegetation regrowth but must be chopped fine so that it stays in contact with the ground and remains damp. All vegetation will burn if it is dry enough.

Where cutting is used to create firebreaks, it may be possible to adopt techniques to reduce the likelihood that brash forms readily drying fine fuels. Forage harvester type machinery can fine-chop dwarf shrub canopies so that material is blown away from cut areas and dispersed. Fine-chopped material left on the ground surface is more likely to remain in contact with the ground and resist drying.

Fire breaks may be used to ‘compartmentalise’ a moor or isolate locations identified as likely ignition sources, fire pathways (e.g. gullies) or to isolate features, habitats or infrastructure that require specific protection.

Firebreaks should incorporate existing infrastructure, such as tracks, which may form a starting point for firebreak development. Other features such as ribbon ponds, walls and patches of less fire-prone vegetation such as wet flushes or short grazed grass may also be used as part of the firebreak network. Drainage or erosion gullies, blocked as part of a re-wetting scheme, can maintain networks of wet areas and provide a water resource where dams maintain deeper permanent pools. Strategic siting of plastic piling dams could be considered as a method of pool creation.

Lines of grouse butts could be integrated into the plan as infrastructure that needs to be protected. Butts often have access routes that may be used for firefighting and where vegetation is kept short for picking up it may be built into the network of firebreaks.

Areas of short grazed grassland can act as a firebreak. Where there are neutral or alkaline soils, grazing stock are more likely to take off the herbage and dead plant material decays more quickly leaving less litter as fuel load.

Firebreaks will need to be monitored regularly to assess build-up of vegetation and review effectiveness. Indicate here when that will be carried out and by whom.

Note 6: Changing vegetation type and structure and soil wetness

Describe here measures to modify vegetation for example, to change fuel quantity or type and changes to habitat.

Changing vegetation composition by rewetting and peatland restoration will in most cases result in vegetation with lower biomass and wetter soils that are less likely to be severely damaged by fire. For example, restored bog vegetation will be likely to have more moss and other low growing vegetation that is naturally damp and in contact with the ground and so less likely to dry out. By comparison, unrestored areas may have a canopy of heather, which, if not managed, dries readily to form flammable fine fuel.

For blanket bogs, management to achieve abundant moss (especially Sphagnum) will naturally ensure ground is damp and also support a varied and often sparse fuel load. Even at relatively low coverage, patches of moss, especially Sphagnum, dominated vegetation will break up the homogenous higher fuel-load vegetation typical of drier habitats.

Low stocking rates will often allow the increased development of moss in the field layer, both Sphagnum mosses and also 'feather-mosses' that are still relatively good at holding moisture, inhibiting the dense high fuel load vegetation growth that is seen in mono-cultures of heather and purple moor-grass.

On deep peat, suitable management of heather or purple moor-grass dominated vegetation can likewise promote the development of a more moss-dominated vegetation, particularly if accompanied by work to re-wet peat by drain or gully blocking and inoculation of bog plant species.

Change can take place in only a few years where a combination of reduced grazing, water table restoration and Sphagnum restoration is carried out.

Such changes will not prevent fire. In the right conditions, all vegetation and peat will burn and facilitate fire spread but retaining more moisture in vegetation and soils reduces the severity of fire and its impact.

Consider here the options for re-wetting and peatland restoration including blocking grips and gullies and restoring peatland vegetation. These measures are likely to be part of a vegetation management or restoration plan to which you could refer.

Where there is vegetation made up of native grasses that are relatively palatable to grazing stock low biomass can be achieved though effective utilisation of herbage. In some situations, grazing livestock can be used to maintain or create breaks in the continuity of fuels across the landscape.

Note 7: Fuel load management

For effective wildfire resilience consider the types, structure and composition of vegetation, which can be described as 'fuel loading', across the whole site.[4]

Describe here where fuel load management is required and why and what actions you will undertake to reduce fuel loads. Describe how fuel load reduction will be achieved and how build-up of load will be monitored.

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[4] See Wildfire Management Zones in the FC Practice Guide (Appendix 2): https://www.forestresearch.gov.uk/research/building-wildfire-resilience-into-forest-management-planning/.

Reduction of fuel load is likely to be most effective around ignition points or in high risk areas, but can be challenging in areas with significant open access. Fuel includes both man-made litter and vegetation. Management of vegetation to reduce fuel load around access points will require repeated and possibly frequent management.

Over a wider area, management could be undertaken to reduce biomass and break the continuity of fuels.

In naturally wet areas, such as active blanket bog, re-wetting work and restoration management, for example following the Blanket Bog Land Management Guidance (see Further Information) will help reduce the fuel load over time. As described in the section above, wet ground and wetland vegetation, particularly Sphagnum moss, inhibits the growth of more combustible vegetation, and the combination of wet pools and moss cover keeps the peat damp through some drier weather periods. All vegetation will dry out in prolonged and exceptionally warm periods.

Grazing may contribute to management of fuel load but at the levels required to be effective on its own may conflict with other objectives for the land especially on protected sites.

Note 8 Infrastructure

Include here details of any infrastructure (eg tracks, ponds, firefighting equipment left on the land) that is intended to contribute to reducing the risk and effects of wildfire.

Include measures required to maintain infrastructure to ensure that it is fit for purpose.

Include measures to protect public or utility infrastructure on or adjacent to the site (e.g. roads, powerlines). Some utilities may require protection as part of wayleaves and this will normally be the responsibility of the utility company. Nevertheless, any vegetation management to protect wayleaves could be incorporated in the Plan.

Include details of buildings or other infrastructure at risk.

Note 9: Protection of critical infrastructure, property and high value natural heritage or archaeological sites

Some features may require specific protection over and above that normally required.

Consider creating ‘defendable space’[5] for properties and critical infrastructure to improve fuel loading and to improve fire suppression.

Detail here any specific measures required to protect critical infrastructure or high value natural heritage or archaeological sites that would justify measures that might not otherwise be considered as acceptable. This information will be crucial in engagement with statutory agencies about your Plan.

Note 10: Strategic wildfire management

Consider how any of the measures adopted in the Plan contribute to wildfire risk management at the landscape scale. How can you work in co-operation with neighbours to reduce fire risk in the wider landscape?

Share your Plan with the local Fire and Rescue Service, and where there is one, the local Fire Operations Group.

Operate an early warning system with neighbours.

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[5] See Appendix 2 of FC Practice Guide for more details: https://www.forestresearch.gov.uk/research/building-wildfire-resilience-into-forest-management-planning/.

Note 11: Engagement Record

This section is to help you ensure that any statutory requirements have been met and that there has been useful engagement with others who may be affected by the Plan or who may be able to contribute to it. In some cases, there may be a 'duty' or courtesy reason to consult neighbours or those with interest in the land. You may not need or wish to discuss your plan with all the bodies listed and there may be others relevant to your circumstances. The Table below suggests those who might be consulted and reasons for doing so.

Keeping a record may help in discussions with statutory bodies and will serve as an audit trail for the future.

Include here a summary of why the engagement took place and of any response. Suggested consultees are those listed below.

Organisation	Details of Engagement
Planning Authority	Where proposals require or may require planning permission
Environment Agency/ County Council	May be required where watercourse or land drainage consent is needed
Highways Authority	Where proposals affect access or Rights of Way
Natural England	Where the land is SSSI. NE may also comment on implications for landscape
Rural Payments Agency	Where there are agri-environment agreements and the Plan affects prescriptions
Historic England	Required where proposals affect a Scheduled Monument
National Park / Area of Outstanding Natural Beauty	Where proposals require or may require planning permission, affect access etc.
Fire and Rescue Service	Wildfire Response Plans should be lodged with the FRS
Commons Committee	Local knowledge and site history. Resource for actions
Tenant(s)	Local knowledge and site history. Resource for actions
Neighbour(s)	Local knowledge and site history. Resource for actions
Grazier(s)	Local knowledge and site history. Resource for actions
Other	

Wildfire Response Plan

The Response Plan should cover the following topics:

- Contact names and telephone numbers
- Communications
- Rendezvous points
- Important hazards
- Access points
- Water supplies
- Equipment
- Priority protection areas
- Neighbouring landowners
- Helicopter authorisation
- Audit, monitoring and quality assurance
- Further documents

Introduction

This Wildfire Response Plan (WRP) provides specific risk and tactical information for Fire and Rescue Services (FRS) personnel responding to wildfire incidents on or near the land.

The WRP should provide a description of the farm / estate and an outline of the activities that take place on it.

The Plan should also identify the key people to contact in event of a wildfire and the resources that are available on the farm / estate to assist the FRS with suppressing the fire.

Contact names and telephone numbers

List all key estate/farm personnel with contact numbers (landline and mobile). Give a primary contact and list others in order that they should be contacted if the primary contact is not available.

Communications

Insert details of any communications equipment and explain any other relevant considerations regarding communications. For example, consider any radio frequencies used, any mobile phone or radio black spots etc.

Rendezvous points (RVPs)

List rendezvous points with grid reference (use a six-figure reference for use with paper maps and/or 12 figure references within Mobile Data Terminals - to be added by the FRS).

Important hazards

Many hazards are found in most locations but list specific hazards on the farm / estate and their locations.

Access points

Provide details about access points to moorland and other areas.

Identify other access issues, such as: locked gates, restricted road width, turning areas.

Water supplies

List locations of reliable water supplies with grid references (preferably 8 figure).

Identify if the farm / estate has other equipment that could be used for moving or storing large volumes of water, such as: bowsers, pressure washers, slurry tankers, 45-gallon drums etc.

Equipment

List equipment that can be requested for use at a wildfire incident.

Priority protection areas

Insert details about any areas which should be protected as a priority – consider sites that have protected status (e.g. SSSI, SAC) and areas of particular economic value to the estate.

If the estate is unsure about the location of protected status areas, then consult https://magic.defra.gov.uk or contact Natural England or other relevant agencies, e.g. National Park Authority, AONB.

Neighbouring landowners

List neighbouring landowners who may need to be contacted or who may be able to help with labour or equipment.

Helicopter authorisation

Set out if there are any arrangements for requesting a helicopter.

Acknowledgement

This information is based on the format provided by Northumberland Fire Group for the Wildfire Operation Manual produced for the Scottish Government that was later adopted as National Operational Guidance for the UK Fire & Rescue Services.

An example of a widely accepted fire plan format (from Northumberland FRS) is available here: https://www2.gov.scot/Publications/2013/10/6118/27.

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Should an alternative format of this publication be required, please contact our enquiries line for more information: 0300 060 3900 or email enquiries@naturalengland.org.uk.

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