Wildfire Wise Wales
Doeth am Dân Cymru

Wildfire Prevention and Mitigation Strategy Wales

February 2024

Llethrau Llon
Healthy Hillsides

Cronfa Amaethyddol Ewrop ar gyfer Datblygu Gwledig: Ewrop yn Buddsoddi mewn Ardaloedd Gwledig
European Agricultural Fund for Rural Development: Europe Investing in Rural Areas
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Wildfire Wise Wales Doeth am Dân Cymru - A Community Based Approach

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Wildfire Wise Wales Doeth am Dân Cymru: A Community Based Approach

Executive Summary

The Healthy Hillsides project is a collaborative approach to wildfire management, supported by the European Agricultural Fund for Rural Development through Welsh Government. Steered by four core partners; Natural Resources Wales; South Wales Fire & Rescue Service; Wildlife Trust for South & West Wales; and Rhondda Cynon Taf County Borough Council, the initiative champions a collaborative working for integrated wildfire management on a Landscape scale.

Working with key organisations, stakeholders, and communities, the Healthy Hillsides project focuses on creating a proactive year-round solution to a seasonal wildfire problem through evidence building and demonstration trials within the South Wales Valleys. We have taken a co-productive approach to exploring the issues and making recommendations.

Healthy Hillsides explores wildfire as an environmental, socio-economic, cultural, and incident response challenge. The project has looked at the many and varied environmental and social connections to wildfire. It is recognised that no one action can tackle the challenge of wildfire, to irradicate, minimise or reduce impact. A suite of actions across society are needed to ensure a resilient landscape, resilient communities, and resilient public services.

Prevention: To adapt and change behaviours which will create a wildfire wise culture across communities, public services, and land managers. This will act to reduce the behaviours which increase risks and build resilience to wildfire.
Response: Actions to reduce risk, tackle ignitions, fuels, and ways in which we manage the landscape, our interaction with the environment and tactical response to wildfire.
Education: Increase understanding of the wildfire cycle, how actions can reduce or increase risk. Raise awareness of the environmental and social connections to wildfire and the Welsh landscape. Build capabilities to adapt and to act preventatively to reduce wildfire, to build resilience in the environment and social, wellbeing and economic resilience in communities.

This report captures the learning from the Healthy Hillsides demonstration project, particularly the community and wider engagement. This report takes the learning and makes a series of recommendations to build wildfire resilience within communities, through action and awareness on the ground and the need for a more integrated strategic approach in policy. This report looks at how a community can adapt and change behaviours to mitigate the risks of wildfire, particularly on the urban – rural interface.

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Wildfire Wise Wales Doeth am Dân Cymru: Dull Cymunedol

Crynodeb Gweithredol

Mae prosiect Llethrau Llon yn ddull cydweithredol o reoli tanau gwyllt, wedi'i gefnogi gan Gronfa Amaethyddol Ewrop ar gyfer Datblygu Gwledig trwy Lywodraeth Cymru. Wedi'i lywio gan bedwar partner craidd, sef Cyfoeth Naturiol Cymru, Gwasanaeth Tân ac Achub De Cymru, Ymddiriedolaeth Natur De a Gorllewin Cymru, a Chyngor Bwrdeistref Sirol Rhondda Cynon Taf, mae'r fenter yn hyrwyddo cydweithio ar gyfer rheoli tanau gwyllt mewn ffordd integredig ar raddfa'r dirwedd.

Gan weithio gyda sefydliadau, rhanddeiliaid, a chymunedau allweddol, mae prosiect Llethrau Llon yn canolbwyntio ar lunio datrysiad rhagweithiol gydol y flwyddyn i broblem dymhorol tanau gwyllt trwy ddatblygu tystiolaeth a threialon arddangos yng Nghymoedd De Cymru. Rydym wedi mabwysiadu dull cydgynhyrchiol o archwilio'r materion a gwneud argymhellion.

Mae Llethrau Llon yn archwilio tanau gwyllt fel her amgylcheddol, economaidd-gymdeithasol, diwylliannol ac o ran ymateb i ddigwyddiadau. Mae'r prosiect wedi edrych ar y cysylltiadau amgylcheddol a chymdeithasol niferus ac amrywiol â thanau gwyllt. Cydnabyddir na all un cam gweithredu fynd i'r afael â her tanau gwyllt, i'w hatal neu i leihau eu heffaith. Mae angen cyfres o gamau gweithredu ar draws cymdeithas i sicrhau tirwedd wydn, cymunedau gwydn a gwasanaethau cyhoeddus gwydn.

Atal: Addasu a newid ymddygiad a fydd yn creu diwylliant doeth am danau gwyllt ar draws cymunedau, gwasanaethau cyhoeddus a rheolwyr tir. Bydd hyn yn lleihau'r ymddygiadau sy'n cynyddu'r risgiau ac yn meithrin gwytnwch rhag tanau gwyllt.
Ymateb: Camau i leihau'r risg, mynd i'r afael â thaniadau, tanwydd a ffyrdd yr ydym yn rheoli'r dirwedd, ein hymwneud â'r amgylchedd ac ymateb yn dactegol i danau gwyllt.
Addysg: Cynyddu dealltwriaeth o'r cylch tanau gwyllt, sut y gall gweithredoedd leihau neu gynyddu'r risg. Codi ymwybyddiaeth o'r cysylltiadau amgylcheddol a chymdeithasol â thanau gwyllt a thirwedd Cymru. Meithrin galluoedd i addasu ac i weithredu'n ataliol i leihau tanau gwyllt, i feithrin gwytnwch yn yr amgylchedd a gwydnwch mewn cymunedau o ran lles, cymdeithas a'r economi.

Wildfire Wise Wales Doeth am Dân Cymru: A Wildfire Prevention Strategy

Llethrau Llon
Healthy Hillsides

Introduction

A wildfire is defined as 'an uncontrolled vegetation fire which requires a decision or action regarding suppression'. Wildfires can have devastating impacts for people, communities, property, businesses, infrastructure, and the environment.

Data and anecdotal evidence show that wildfire is a significant problem in Wales. Under climate change scenarios wildfire will become an increased risk to the environment and communities of Wales.

Wildfire hazards and risks can be reduced with proactive planning and best practice land management. Wildfire prevention work, and planning, can reduce the likelihood of wildfires occurring, small incidents escalating into large incidents, and the severity and impacts of a wildfire if they do occur. Planning and preparation can aid fire suppression and minimise incident response times, resource requirements and impacts.

The Healthy Hillsides Project has explored all aspects of wildfire and we have found that an integrated approach of land management, education, and planning is the most effective and sustainable way to reduce wildfire risk. Wildfire is a challenge to be tackled through multiple actions and a collaborative approach by different practitioners.

Through strong partnership working with key decision makers and communities, we have developed an evidence-based toolkit as a model of how to deal with wildfire across a range of habitats and interfaces with communities in Wales. Our ambition is this toolkit will guide all those who can build in wildfire resilience into the management on the ground, policy, strategic planning, and incident response. The toolkit seeks to embed a proactive, preventative and integrated approach to wildfire management consistently across Wales.

Recommendations

- Recommendation 1: Inclusion and integration of wildfire resilience into sustainable land management practices and policies, forestry planning and creation, climate adaptation strategies and other relevant policies and guidance in various sectors across Wales.

- Recommendation 2: Creation of long-term funding mechanisms for integrated wildfire resilience programmes across various sectors within Wales.

- Recommendation 3: Create a Wales accredited training programme and associated guidance documents to ensure consistent capabilities across relevant sectors in wildfire awareness, prevention, and response across Wales.

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- Recommendation 4: Identify or recruit strategic leads of key wildfire practitioners and policy makers within Wales across multi agencies to ensure long-term coordination, management and development of wildfire resilience within Wales.

- Recommendation 5: Develop, share and implement evidence driven measures and ways of working to support strategic direction and delivery on the ground.

Current Impact of Wildfire in Wales

Wales has faced a significant issue with wildfire throughout its history. Wildfires are predominantly caused by deliberate actions, with relatively few recorded as accidental. This can be from prescribed burns gone wrong or antisocial behaviours. Out of control prescribed burns can be avoided by following the advice of the local Fire and Rescue Service[1] and adhering to the Heather and Grass Burning Code[2]. There is training available from Farming Connect[3] to make prescribed burning safe and reduce risks. For deliberate fires set through antisocial behaviours, the root cause of wildfire arson is complex and no one solution or intervention can tackle the problem.

South Wales is one of the worst affected areas of the UK for wildfires, having multiple effects on the socio-economic, environmental and health of our communities and the landscapes we live in.

In the summer of 2018, a fire at Cwmcarn Forest on the Welsh Government Woodland Estate cost an estimated £1.5 million, with significant setbacks in timber production, impacts to biodiversity and local community disruption.

	Number			Percentage		
	Deliberate	Accidental	All	Deliberate	Accidental	All
Primary fires						
2017-18	48	20	68	71	29	100
2018-19	176	71	253	70	28	100
2019-20	81	31	112	72	28	100
2020-21(r)	123	57	180	69	31	100
2021-22(p)	99	41	140	71	29	100
Secondary fires						
2017-18	1,588	436	2,024	78	22	100
2018-19	2,686	1,075	3,761	71	29	100
2019-20	1,604	472	2,076	77	23	100
2020-21(r)	1,520	529	2,049	74	26	100
2021-22(p)	1,721	598	2,319	74	26	100
All fires						
2017-18	1,636	456	2,092	78	22	100
2018-19	2,862	1,152	4,014	71	29	100
2019-20	1,685	503	2,188	77	23	100
2020-21(r)	1,643	586	2,229	74	26	100
2021-22(p)	1,820	639	2,459	74	26	100

(r) Revised data
(p) Provisional data.

[1] South Wales Fire and Rescue Service, North Wales Fire and Rescue Service, Mid and West Wales Fire and Rescue Service
[2] https://www.gov.wales/sites/default/files/publications/2018-01/heather-and-grass-burning-code.pdf
[3] https://businesswales.gov.wales/farmingconnect/skills-and-training/e-learning/using-fire-manage-vegetation

Table 1[4]: Number and percentage of grassland, woodland and crop fires by motive

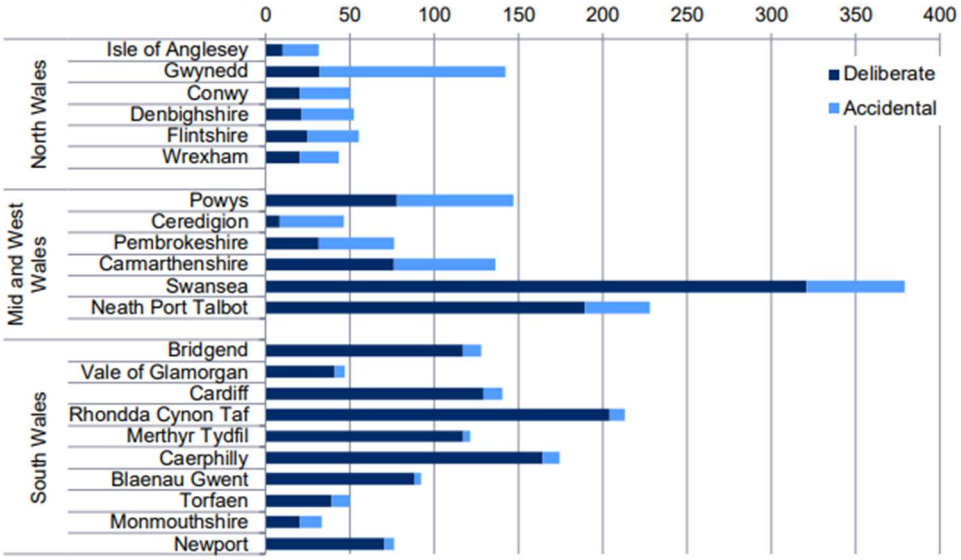

Table 2[5]: Numbers of grassland, woodland and crop fires by Local Authority and motive 2021-22 (a) (p)

Currently NRW works alongside partners in the Fire and Rescue Services of Wales to respond to wildfire incidents and offer tactical firefighting tools including helicopter and ground preparation contract frameworks, primarily to protect the Welsh Government Woodland Estate asset, but also to reduce the environmental and public safety risk to the communities of Wales.

A Global Perspective

There are over 300 million hectares burned annually[6], the wildfire problem is an increasing one in all parts of the world with countries which traditionally do not suffer from wildfires experiencing a new problem, and countries with a wildfire adapted environment experiencing increasingly extreme wildfires and causing more severe impacts on populations and ecosystems.

There is a huge amount of research on wildfires looking at health impacts, danger rating, incident response, integrated land management and much more. Whilst wildfires are complex issues associated with climate change, past management changes and the periodic changes in culture, policy and necessity, there is consensus across the globe that wildfires must be tackled across the landscape and through an integrated approach, not reliant upon one solution, agency or perspective. There is a diversity of causes, a growing number of stakeholders with different visions and solutions and a sliding emphasis on prevention and response.

- **Landscape Fire Governance Framework**

[4] Grassland fires, 2021-22 (gov.wales)
[5] Grassland fires, 2021-22 (gov.wales)
[6] https://www.wildfire2023.pt/conference/framework

An integrated approach to the landscape is the most sustainable and appropriate way to tackle the challenge of wildfire whilst providing wider cultural, environmental, and economic benefits. The 2023 launch of the Landscape Fire Governance Framework [7] at the International Wildland Fire Conference 2023, highlights the importance of agreed governance, adaptive strategies, policies, across the landscape for fire management.

The framework identifies sustainable landscape management as critical, and the need for agreements and shared policy across different leading organisations and key stakeholders. The framework advocates bringing together and valuing the collaborations between a diverse scientific, cultural and political discussion which values knowledge and collaborative working.

The framework follows the principles concluded from the Healthy Hillsides project where action is needed to bring different parties together as the best solution to such a complex problem. Similarly, valuing the role of traditional rural land management, recognising how integrated land management can both reducing exposure and vulnerability to wildfires and be a response to the Nature and Climate Emergencies.

- **Mediterranean Wildfire Strategy**

The 2023 Mediterranean Wildfire Strategy[8] highlights the importance of integrated fire management in the Mediterranean region. The strategy highlights the significant improvements in incident response but stresses the importance of prevention measures in preparation for wildfire incidents. The importance of collaborative working with stakeholders to creating resistant and resilient landscapes to reduce the impacts of wildfires and increase the ability of quick recovery. As has been a point of discussion in the Healthy Hillsides project, the shared roles and responsibility of wildfire management across different sectors is essential. Governance is the identified mechanism to ensuring the collaborative approach to cross sector management of wildfires.

Six key recommendations for wildfire prevention in the Mediterranean have been developed by the European Forest Institute and the Ministry for the Ecological Transition and Demographic Challenge of Spain, in collaboration with Mediterranean stakeholders. These recommendations cover: planning, governance, developing sustainable financial mechanisms to deliver wildfire management measures, knowledge and evidence, education, and awareness of society, information sharing and international cooperation.

Climate Change Predictions

Under climate change predictions annual temperatures in Wales are expected to rise by approximately 1.2°C by the 2050s and between 1.3 and 2.3°C by the 2080s. This will increase the likelihood of more extreme heatwave events, impacting on people's health and wellbeing. The Wales rainfall trends in the future, depending on the season are also set to

[7] Integrated Landscape Fire Governance Framework
[8] Wildfire prevention in the Mediterranean (efi.int)

change. With winter, rainfall expected to increase by approximately 6% by the 2050s and by between 7% to 13% by the 2080s. This is projected to lead to an increase in the likelihood of flooding of infrastructure, businesses, and homes. The summer rainfall is expected to decrease by approximately 15% by the 2050s and by between 18% to 26% by the 2080s. With increased periods of water scarcity under these scenarios. Despite, overall increased temperatures and drought conditions, projections suggest that when it does rain, the rainfall will be more intense.[9]

The frequency and intensity of extreme temperature and rainfall events may also increase in future. In 2022 Wales and all parts of the UK recorded record temperatures. The UK's new record-high temperature of 40.3°C at Coningsby, Lincolnshire on July 19th 2022, with Wales recording it's highest temperature of 37.1°C on the day previous July 18th 2022 at Hawarden Airport, Flintshire. [10] These record-breaking temperatures coincided with the wildfires in London, which was recorded as the London Fire Brigade's busiest day since World War II. In this major incident there were more than 1,146 incidents with more than 40 houses and buildings were destroyed after wildfires spread to nearby buildings[11].

The 2011 Forest Research Wildfire in Wales[12] review commissioned by the Forestry Commission Wales highlighted the wildfire challenge in Wales, being 8 times more likely to have wildfire incidents than any other UK country. Given the additional evidence and policy direction around Climate change in Wales the issue of wildfire is greater than predicted in 2011. It is now evidenced that climate change will produce conditions which increase wildfire risk and promote fuel growth and conditions, increasing the extent and severity of wildfires.

Wildfire Risks associated with Climate Change

There are multiple drivers that affect wildfire frequency and intensity including human triggers, vegetation type and wind patterns. Projected hotter conditions and more frequent periods of water scarcity are likely to increase wildfire risk as a direct result of climate change. The risk could double in a 2°C global temperature increase scenario and quadruple in a 4°C scenario.

Climate change can increase the extent and severity of wildfires. The Organisation for Economic Co-operation and Development (OECD) Report; "Taming Wildfire in the context of Climate Change" [13] has evidenced the connection between Climate Change and wildfire, stating that the frequency and severity of extreme wildfires are set to increase in the future due to climate change. As outlined in the Climate Change Risk Assessment (CCRA) Evidence Report for Wales Summary[14], wildfire is a significant concern to terrestrial species and habitats, and agricultural and forestry production with climate change predictions. It

[9] CCRA-Evidence-Report-Wales-Summary-Final.pdf (ukclimaterisk.org)
[10] Record high temperatures verified - Met Office
[11] London Fires Report
[12] Forest Research 2011: Wildfire in Wales
[13] OECD: Taming Wildfires in the Context of Climate Change
[14] CCRA Evidence Report for Wales Summary

recommends that a set of plans and actions be created for habitat (or fuel) management within Wales over the next 5 years to address climate threats which includes wildfire.

A recent report from the National Fire Chiefs Council[15] has issued a UK wide warning that the state of wildfires is set to increase with climatic change predictions[16]. Without significant change and landscape scale management of our vegetation, Wales is likely to see wildfires increase in severity posing a risk to health, well-being, culture, communities, and nature.

Although wildfire has been highlighted as a significant concern and threat to all within Wales, our Prosperity for All – A climate conscious Wales report 2019 [17] has little outline any mitigating measures for this climate change prediction. Wales declared a Climate Emergency in April 2019, highlighting the need for collective solution; "*Tackling climate change is not an issue which can be left to individuals or to the free market. It requires collective action and the government has a central role to making that collective action possible."*[18] It is vital that we work collaboratively across the public and private sectors within Wales to reduce the impact and severity of wildfires in the future.

Recommendations from both global evidence reviews such as the OECD Wildfire report and local projects like Healthy Hillsides provides clear integrated approaches around land management, community resilience and prevention activities, which can build climate resilience alongside ecological, economic and health and well-being benefits.

Wildfire and the Nature Emergency

Since Wales declared a Nature Emergency in June 2021, there has been a significant shift in the view of long-term management of our landscape for nature and biodiversity. Wildfire poses a significant risk to key ecological resilience in Wales. One of the leading factors in high fuel loads is under management or abandonment of semi improved agricultural landscapes. The Biodiversity Deep Dive highlights the importance of sustainable land management to deliver more for the wider landscape and the importance of connectivity, shared resources and embedding Nature Recovery in public bodies.

Evidence has shown that at greatest risk from wildfires are heath and moorland habitats, including peatlands. Wildfires on peat soils can lead to the release of large amounts of carbon into the atmosphere, contributing further to climate change. These are semi-improved habitats which are not managed to previous levels.

In South Wales the characteristic valleys' ffridd habitat, a landscape rich in biodiversity and cultural heritage pose the highest risk and are where most wildfire incidents have occurred. There have been over 760000 wildfires in South Wales in the last 20 years. This is a recovering landscape from the industrial pollution of coal mining, coal spoil biodiversity and

[15] National Fire Chiefs Council Report
[16] Forest Research: Projected warmth and doughtiness changes in the climate of Wales
[17] Prosperity for All – A climate conscious Wales report
[18] Quote by Minister for Environment, Energy and Rural Affairs Lesley Griffiths

the surrounding ffridd and woodlands are found to be biodiverse and unique. These habitats are very vulnerable to wildfire now and even more in the future.

Managing the ffridd hillsides, rhos pasture meadows, woodlands, and moorland, sustainably through grazing management can restore ecological resilience and benefit some of our most iconic species such as the skylark, marsh fritillary, slow worm or water vole. These measures will also build climate resilience in the landscape benefiting flood, drought and wildfire resilience.

Wildfire and Public Health and Well-being.

Wildfires can also cause serious localised air pollution, leading to implications for human health. Globally, wildfire-induced air pollution is associated with 340 000 premature deaths annually. Wales has its own challenges with air quality, with South Wales having some of the worst air quality in Britain. Public Health Wales[19] has described outdoor air pollution is the largest environmental risk to health, recognising the link that air pollution has with poor health and deprivation. The wildfires in South Wales are closely linked to areas of significant health deprivation.

In addition to chronic air quality challenges the added acute impacts of wildfire smoke are an important pressure in South Wales. Wildfire smoke is a mixture of air pollutants of which particulate matter is the principal public health threat. Resulting air pollution can cause a range of health issues, including respiratory and cardiovascular problems. Another significant health effect of wildfires is on mental health and psychosocial well-being.

Children, pregnant women, older adults and those with pre-existing respiratory conditions or heart disease, are more susceptible to health impacts from smoke and ash, which are important air pollutants. The safety of firefighters is also a principal concern, having a greater risk to injuries, burns and smoke inhalation[20].

Climate change is known to impact upon poorer communities increasing the inequalities within in our societies[21]. The worst affected areas for wildfire are some of the most deprived communities economically and in health in Wales.

Wales has declared a nature emergency; the impacts of wildfires are further eroding ecological resilience.

There will be benefits from further cooperation between national and local bodies working to reduce wildfire risks and manage fires when they occur, and strengthening a strategic proactive approach to wildfire, as well as building further capability to predict and respond to wildfire risk including through national assessments like the National Security Risk Assessment (NSRA).

[19] Public Health Wales - Wildfire and air quality
[20] Wildfires (who.int)
[21] Climate Change and Social Inequality. UN Dept. of Economic and Social Affairs October 2017.

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Education: Increase understanding of the wildfire cycle, how actions can reduce or increase risk. Raise awareness of the environmental and social connections to wildfire and the Welsh landscape. Build capabilities to adapt and to act preventatively to reduce wildfire, to build resilience in the environment and social, wellbeing and economic resilience in communities

Community Engagement

Through the Healthy Hillsides project, we have trialled a number of different initiatives to evidence and demonstrate the opportunities and challenges around engagement with the public and professional communities.

In developing our engagement programme we undertook a stakeholder mapping exercise. A key element of this has been identifying the different impacts of wildfire, and then how these impacts can affect different parts of society and the landscape. This has led to us identifying different pathways and types of engagement most appropriate to the risk and impact from wildfire:

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- **Communities** – Homes, streets, families, businesses owners, community services who are within the Rural-Urban Interface (RUI) – buildings or assets which are immediately adjacent to areas of open habitat. Classically the ffridd or coed cae valley sides or open mosaic habitats in flatter landscapes.
- **Wider Public** – This is the wider community who may not live immediately adjacent, but do work within the landscape, recreational users and wider community members. Embedding Wildfire Wise messaging into wider opportunities such as health messaging or Countryside code.
- **Public Services/Community support services** – Housing associations, Councils, Public Bodies and NGOs who own and manage land, manage community services or are consulted and make decisions on and around the WUI. Key messages and information available through any engagement opportunities.
- **Land managers** – farming community, graziers, farming unions, conservation and land management organisations and public bodies.

It is recognised that there are differing levels of action and mitigation required depending on the location and landscape people live in, work or use. The level of recommended intervention within each stakeholder also differs. We have developed a series of recommendations considering these different levels – community and public service engagement is discussed in detail in the Wildfire Wise Community Strategy.

There will be a need to identify different levels of action depending on the perceived risk of the place, asset or individual. There will be a series of recommendations which aim to empower different stakeholders to take action or support others to act to reduce wildfire risk.

In each instance there will be actions and behaviour changes which will recognise the wildfire risk and be able to apply the appropriate mitigation. There are also tools, recommendations and communications which can be embedded into all aspects of support services.

Given the greatest number of wildfire incidents is on the rural - urban interface, in mostly deprived communities, this was an opportunity to explore engagement opportunities to inform future engagement recommendations.

Throughout the Healthy Hillsides project there have been a wealth of discussion across different networks and communities to inform a series of recommendations to me taken forward through identified stakeholders, in general and key partners such as Welsh Government, the Fire and Rescue Services and NRW. However there needs to be recognition that there will be a need for different approaches to different communities and this project reflects the discussions which have primarily taken part within the South Wales Valleys as the place in Wales with the highest number of wildfire incidents. In south Wales there is a history of antisocial behaviours, deliberate wildfires and high levels of socio-economic deprivation. These are also the communities who have high levels of health deprivation and poor education. However, there are also close community ties across communities, there are many and frequent community events, local groups and initiatives to work with to connect with communities.

The different types of community and stakeholder engagement is discussed in detail in the Wildfire Wise – Community Strategy.

Strategic Prevention

As discussed wildfire risks are complex and can be affected by a host of different pressures. Stakeholder discussion has highlighted the need for a holistic approach to wildfire risk reduction, supporting delivery on the ground through policy, regulation, and legislation are essential components of integrated wildfire management. Policy, regulation and legislative drivers provide a structured framework to address the diverse aspects of wildfire prevention, response, and recovery, ensuring the safety of communities and the sustainable management of ecosystems.

For a wildfire to take hold the right conditions, fuel and ignition are needed, this risk is altered by the fuel, ignition source and climate and weather. As climate change is increasing our risks, and management of ignitions can be extremely resource dependant, management of fuels is an important aspect of risk reduction.

Policy, regulation and legislation can also alter risks. Integrating wildfire resilience through landscape planning, National regional policy and strategy is essential to ensure interventions are being delivered and supported in the places most needed. A combination of action on the ground and drivers through legislation, regulation and subsidy driven change is required to act upon the challenges appropriate for the Place. The Area Statements should guide this, highlighting key pressures such as wildfire.

As climate change contributes to an increase in the frequency and intensity of wildfires, regulations and policies need to be adapted to take account of the highest climate risk factors, to take account of the evolving challenges. This may involve updating building codes, land-use planning, and resource allocation strategies to account for changing climate conditions. Policy such as the Sustainable Farming scheme, where the current basic payment scheme and the sustainable land management scheme (Glastir) are being combined, can be a significant opportunity to embed landscape resilience in areas at high wildfire risk.

Practical Mitigation and Prevention

Throughout the landscape there are various mechanisms, receptors and landscape features which are at risk or increase wildfire risk. We have explored the landscape and the interactions of land management, land uses and people across the landscape.

As most wildfire incidents are caused by deliberate acts the whole landscape can be at risk from wildfire. Wildfires are typically started through antisocial behaviours usually in an around more deprived areas. Or, associated with large open landscapes where agriculture

and forestry are the dominant land uses, here wildfires result from prescribed burns becoming out of control or illegal control burns out of season and done recklessly.

When considering climate change scenarios increasing the likelihood and severity of wildfires it is prudent to build wildfire resilience into the whole landscape based upon risk assessment, supported through legislative and policy drivers. The mitigation measures and preventative approaches we have trialled and explored are designed to build in sustainability and multiple benefits and therefore will contribute towards an integrated resilient landscape approach.

We have explored some broad definitions of landscape features or land uses to highlight how wildfire resilience can be built into the management of the site or to mitigate the risk to others:

- **Agricultural and Conservation land management Activity** – considers land in public and private ownership for traditional agricultural management, land managed for conservation including designated sites and open access land often covered by Countryside and Rights of Way Act (CRoW) Act.
- **Forestry and Woodland Management** – considers productive timber woodlands, conservation woodland and amenity woodland.
- **Rural-Urban Interface** – considers the land either on the urban or rural side of the fence.
- **Managed green space** – Considers country parks, National Nature Reserves and Recreation grounds.
- **Infrastructure and private assets** – Significant infrastructures for public service or private within the open landscape.

• Agricultural, conservation and open habitats land management activity

There are areas of open habitat in the landscape, this can be land within agricultural management, common land, conservation or designated sites and unmanaged areas in public or private ownership. Areas of common land and open habitats, to the most part covered by the definition as open countryside, as described and covered by CRoW Act are also covered here. These areas are designated as open access land providing a right of access on foot for the public. Here we discuss these areas of open habitats, within Wales this is predominantly semi natural habitats; ffridd, mire, moorland or modified bog. Characteristically they are mosaic habitats which naturally have species such as Molinia, bracken or gorse as parts of the habitat, though due to land use change and lack of appropriate management, these high-risk fuel species become dominant and increase wildfire risk.

There are significant areas of open habitat once managed, but are now unmanaged for a variety of reasons. Changes in agricultural policy, decline in financial markets, farm diversification and land ownership have all contributed to a decline in management of the open habitats in the landscape.

Agricultural and conservation land which are managed for a specific outcome or state, this can be at different scales. Where habitats are left unmanaged or they are managed at large scales they can pose a risk of wildfire. Though even at small scales, where adjacent land is unmanaged with high fuel loads, land is at risk from fire spreading from neighbouring under-managed land, open common land or others.

As seen in the London Wildfires of 2022, the impacts to agricultural and managed open habitats were directly caused through wildfire spread from areas that were undermanaged and created significant fuel loading.

Wildfire itself can cause damage to crops or protected species or habitats, infrastructure (fences and boundaries) impacting assets, productivity and long term resilience of the land. There are some agricultural or designated land that can be left under-managed due to:

- Difficult terrain and steep slopes where mechanised managed cannot be utilised to manage the land.
- Environmental Schemes focusing on removing grazing animals or managed mechanisms to allow the area to 're-wild'.
- Designation which means to exclude any 'damaging' management mechanisms including grazing animals, mechanised management or other.

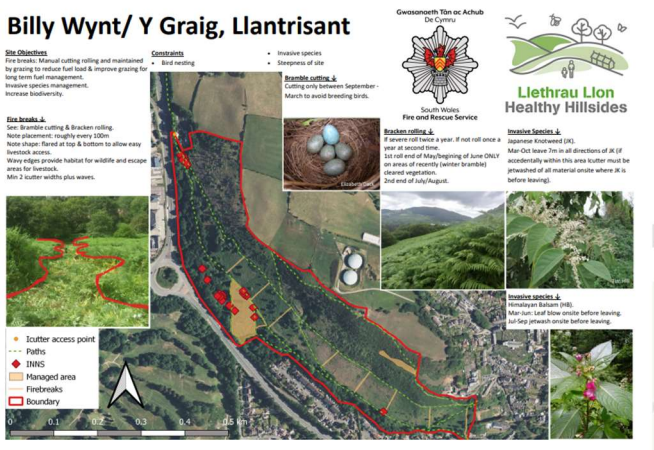
These areas can develop into dominant mono-cultural fire prone vegetation types which are frequently seen as *Molinia*, bracken, bramble, and gorse. These create high fuel loads in areas of volatile wildfire activity increasing risk to the areas surrounding these sites.

When managing wildfire risk within the landscape, an understanding of the land; the current and required management. To work across the landscape and across different landowners and managers assets and risks must be identified:

- Wildfire risks - fuel types, high fuel loads, ignition risks.
- Assets - livestock, crops, infrastructure (fences, gates, water), conservation features.
- Natural fuel breaks - access network (footpaths, farm tracks, byways, roads), watercourses, low fuel habitats.

To reduce risk to assets and manage the possible ignition risks, working with others and planning strategic interventions within the landscape is most effective. This includes working with neighbouring landowners, the Fire and Rescue Service and conservation organisations and others, to ensure that the vegetation is managed appropriately through a variety of mechanisms.

The goal is to manage vegetation, the fuel, to reduce the wildfire risk and build resilience in the landscape for the long-term, to protect identified assets. The objective is to “break up” the fuel, to create compartments of fuel rather than a continuous landscape of fuel. This can be achieved through creating new fuel breaks around the identified assets and maintaining or enhancing the identified natural fuel breaks in the landscape. This can reduce risk instantly.



Long-term solutions for sustainable management are needed for effective wildfire risk reduction in addition to other environmental and socio-economic benefits. Long-term sustainable land management such as the re-introduction of grazing livestock, as appropriate. There are new management tools such as fenceless grazing technologies to control stock movements. Through annual movement programmes stock can be managed across the landscape, reducing infrastructure needs and allowing management to be

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concentrated in specific areas at specific times of the year. This is also ecologically beneficial.

Where grazing is to be introduced, preparation of the land may be required, to ensure sufficient grazing pasture for stock. Initial manual cutting of *Molinia*, bracken bruising or prescribed burning (following FRS advice[22] and the Heather and Grass Burn code[23])*.

Understanding the fuel types and distribution within the landscape allows for fire risk planning and management plans to reduce the risk of wildfire within high-risk areas. Working with neighbouring landowners to manage fuel across the landscape, supporting 5-10 -year management programmes.



Where there are identified antisocial behaviours, working with partners and local groups tackling local anti-social behaviours to reduce the fly tipping, arson and other behaviours which can increase the risk of wildfire within an area. There is no one solution or intervention that can tackle these issues. There are a variety of root causes specific to the area which need to be managed through local site specific and collaborative interventions.

- **Forestry and Woodland Management**

Forests and Woodlands within Wales will become very different in the next 50-100 years under climate predictions. How woodlands and forests across Wales are planned and planted today, will be crucial to the sustainability of that area in the next 40 – 100 years (in line with forest resource plans). Extreme events such as wildfire will have a significant impact on our woodland and forests, and with higher likelihood of wildfires occurring under climate predictions, it means wildfire resilience must be considered in forest planning schemes today.

The presence and history of antisocial behaviours in an area are the primary risk factor. Depending on where the ignition point is, wildfires then travel quickly through high fuel loads on the landscape and most likely impact timber crops from neighbouring unmanaged areas and newly felled or restocked forestry.

[22] https://www.southwales-fire.gov.uk/your-safety-wellbeing/your-community/advice-for-landowners-on-controlled-burns/

[23] https://www.gov.wales/sites/default/files/publications/2018-01/heather-and-grass-burning-code.pdf

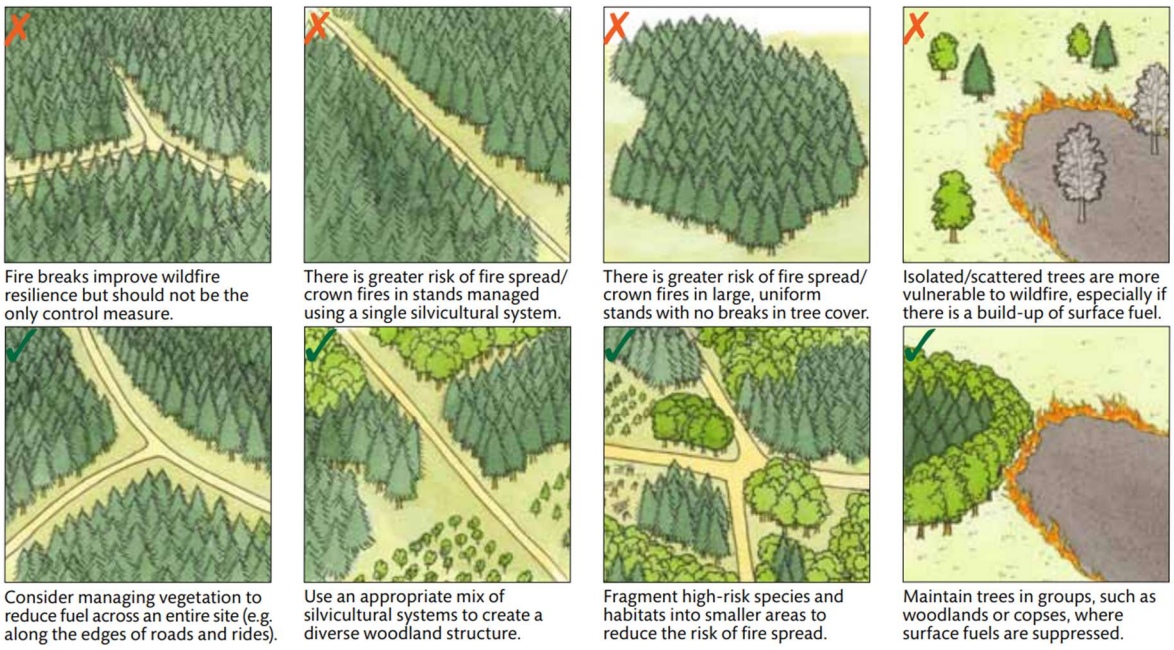
*prescribed burning should be done following Fire and Rescue Service guidance. There are prescribed burning training available from Farming Connect https://businesswales.gov.wales/farmingconnect/skills-and-training/e-learning/using-fire-manage-vegetation

The high fuel loading is mostly due to lack of management or failure to manage risk factors. However, there are species which are more susceptible to wildfire, including conifer-based species. Age classification, undergrowth and surrounding vegetation density are also factors which increase the risk of wildfire within woodlands.

To manage the risk and spread of wildfire within a woodland a variety of planting and management techniques can be used. This should be applicable for all woodland planting schemes, whether on a commercial, conservation or offsetting objective. The Forestry Commission (FC) published a guide to Building Wildfire resilience into Forestry giving an overview of how to undertake a wildfire risk assessment of an area, then implementing a range of opportunities within that forest to reduce its risk. This includes:

- Managing volatile and flammable vegetation types
- Creating fire breaks and fire belts
- Improving the Forest Design
- Building Silvicultural resilience
- Planning for people and their activity within a woodland
- Planning for incident response

The image below, taken from Building Resilience into Forestry[24], shows an example of working practices to consider in woodland planning for wildfire resilience.



When we consider woodlands and forestry within Wales, there is a strong social link within the urban-rural interface, and thus a strong connection with the people of Wales and their woodland landscapes. The main cause of wildfires within Wales is anthropogenic activity, and therefore it is important to consider the way in which people use their local woodlands. This should then be incorporated into the planning, management and long-term vision of

[24] Building wildfire resilience into forest management planning (forestresearch.gov.uk)

the woodland. This is just as important as the physical solutions such as fire breaks and fire belts within the woodlands.

Essential to reducing wildfire risk into forestry plantations and managed woodlands is to build in resilience from planning, planting, through day to day management of the woodland and it's varying recreation, conservation and economic uses and through to harvesting.

Longer term, there are several ways in which we can create a wildfire resilient woodland:

- Creating fire breaks and fire belts which are managed throughout the year – these are required to deliver the Wildfire Resilience Forest Resource Plan local objective and therefore from the planning stage.
- Introducing a diverse species range of trees within a woodland by creating buffer zones (fire belts) or tree groupings to allow the suppression of fire spread, and create a dynamic woodland environment, benefiting biodiversity and climate resilience.
- Include open access tracks and pathways along forested areas that are maintained throughout the year, maintaining a low fuel level to reduce the risk of ignitions and fuel ladder spread.
- Create accessible spaces for emergency access through forest rides, fire breaks and buffer zones that can allow for easier control of a fire during incidents, and reduce the risk of spread within a woodland or between open habitats and woodland.

Fuel management is at the core of wildfire resilience within a woodland environment, and this can be done through several ways:

- Create areas of managed fire belts and fire breaks throughout a woodland planting crop which can vary in size and width. These areas should be managed to control the vegetation amount and height and can be utilised as recreational and operational access tracks.
- Woodlands should be planted with areas of mixed species diversity alongside fire breaks, access tracks, and fire belts, to allow better fuel control and fire risk reduction.
- Within areas of broadleaf or areas of 'defined buffer zones' in a woodland/forest area this can be utilised for woodland pasture to allow cattle and other grazing animals to control fuel loading.
- Management of brash during and post felling and in land preparation for restocking – brash can play an important role in protecting from soil compaction and nutrients, though this needs to be balanced with the fire risk[25].

Managing recreational pressures, incorporating, planning and managing risks where people use woodlands, accounting for both positive and negative behaviours within the woodlands. Woodlands with public access and near communities are an important recreational service and bring positive economic and health and well-being benefits to an area. There are actions to be taken which can reduce the risks of accidental fires and serve to educate, warn and inform communities of behaviours which can increase risk. These actions are seen throughout wildfire prone landscapes across the world and where there is high wildfire risk, particularly associated with recreation and antisocial behaviours this should be incorporated into recreation management.

- Signage – consideration of a wildfire risk rating e.g. Australia Fire Danger Rating System[26].
- Signage – warnings and information boards present within the area through key periods in high recreation areas – this is used inconsistently throughout the UK[27] and more consistently in places like USA e.g. Smokey Zones[28].
- Restrictions in areas and periods of high fire danger – this is used throughout Europe, Australia and Canada. E.g. France have passed legislation to ban smoking in woodlands to reduce wildfire incidents. [29]
- Updating and promoting the Countryside code to better address the challenges of climate change and how behaviours need to adapt to climate change risk such as wildfire – in all our stakeholder discussions the relevance of the countryside Code has been consistently raised.
- Provision of safe BBQing or campfire spaces, supporting positive and safe recreational use of the countryside – this is common practice in many wildfire prone

[25] Building wildfire resilience into forest management planning (forestresearch.gov.uk)
[26] AFDRS – Australian Fire Danger Rating System
[27] Example: North Pennines Wildfire Warning Poster
[28] https://smokeyzone.com/pages/fire-danger-signs
[29] France smoking ban: Lawmakers vote to ban smoking in woodlands to curb risk of blazes | Euronews

countries, mitigating for activities it is difficult to manage, but also supporting recreational use of outdoor amenities.

Incorporating the mitigation measures identified above can build wildfire resilience, restore biodiversity and build community benefits. This is particularly beneficial in woodland areas near communities.

- **Rural-Urban Interface**

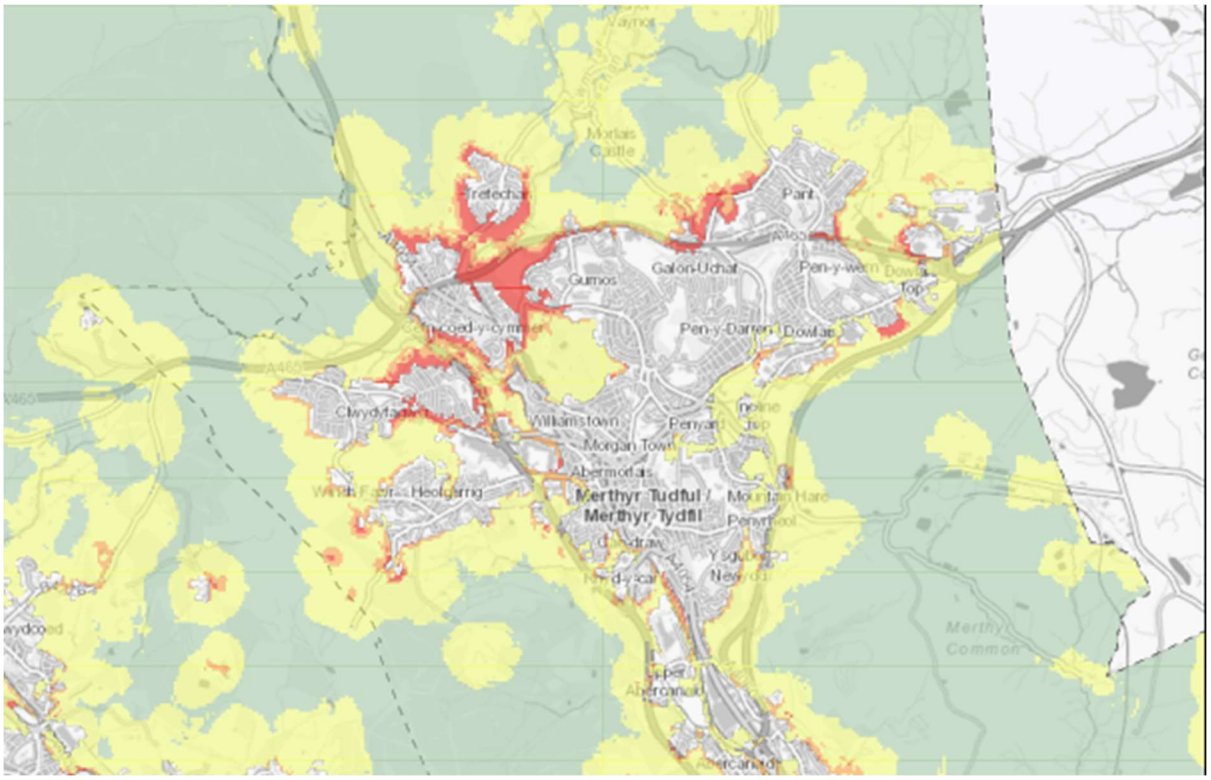
At the rural-urban interface there will be communities and properties where there is a higher wildfire risk. This is largely due to the combination of high fuel loads; typically open habitats or forestry in the surrounding landscape, a history of wildfire; and antisocial behaviours. The challenges are complex and difficult to tackle. However, there are actions which communities can take to make their space safer and more resilient to wildfires.

Individuals or communities can assess the risk around their properties, through simple assessments, looking at vegetation on neighbouring land and the additional fuels around their boundaries and property from their own actions or neighbours. Communities can take action to reduce their wildfire risk, by adopting wildfire wise behaviours and have a greater awareness of their personal and community risk.

Where there is public service ownership or management of land, wildfire risk should be considered by the appropriate public service. Property in private ownership should also be aware of and mitigate those risks. Development planning, social housing refurbishment and public services like waste collection should be wildfire aware and adapt to the pressures and challenges of high-risk communities.

To guide public services and communities we are developing a wildfire fire risk map. The aim of the mapping work is to create a wildfire risk map for the Healthy Hillsides project area to identify areas of higher risk based upon past incident data and habitat data.

The aim of the map is to identifying areas where risk may be greater, triggering a wildfire risk assessments and application of mitigation interventions. It is the aim that this map will allow public services to prioritise assessment and intervention, but also be a guide to others to mitigate their own risks.



Map 1 – Areas of increased wildfire risk – based upon habitat and incident data.

Risk mapping can vary hugely in sophistication. At its most simple, a heat map of past fires shows where ignition risks are likely to be the greatest, and hence where interventions might be best targeted. At its most complex, real-time conditions such as wind direction and fuel moisture levels can be used to model potential fire spread across a well-mapped landscape, identifying areas of greatest exposure or vulnerability.

Due to wildfires mostly being started by arson, fires can start at any place, though most likely close to the urban environment, road or footpath network. Therefore, in this analysis, the model is based off key static risk elements in the landscape, giving a full measure of fire risk without alternative options to specialist simulations. The analysis is shaped by local firefighting knowledge and tactical concerns, such as the risk of fast-spreading hillside fires in areas where properties back directly onto the rural interface.

Where a property or community has a higher fire risk there are simple actions which homeowners, tenants and social housing managers do to reduce their risk to wildfires. We have identified a series of simple interventions which can be done around the home, based on best practice programmes established around the world, where wildfire is a far more realised risk, and from our collaborative discussions with a range of stakeholders and experts.

We have identified actions people can undertake to reduce their personal and community risk:

- Responsible disposal of Behaviour change associated with waste disposal to reduce negative behaviours such as fly tipping and litter.
- Removal and safe storage of waste materials, flammable materials in or around gardens and properties.
- Responsible waste removal, storage of garden materials.
- Use of non flammable materials for boundaries, stone or brick built walls, metal or chain link fences, non flammable composite fencing – to replace plastic or wooden fencing.
- Vegetation management along fence lines within or external to gardens.
- Non flammable infrastructure along adjoining land – garden design and landscaping to create defendable spaces.

There are wider benefits to come from these actions, as identified through stakeholder discussions;

- Building community cohesion through shared events or activity.
- Contributing to being a nicer place to live, improved connection within the community and landscape.
- Social, health and wellbeing benefits, contribution to well-being goals.
- Climate Change adaptation.
- Reduced community risk.
- Reduced firefighter risk

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- **Managed Green Space**

This landscape feature is predominantly focused around areas of open access, recreation and parklands. They are managed for and well used by the public and usually include recreational infrastructure ranging from benches, sculptures, pathways, car parking facilities, toilets, buildings, signage, and others. These areas are often owned or managed by Local Councils, NGO's, and Government organisations such as NRW.

Due to the increased use of those areas by people, it is often an ignition source for wildfires such as campfires, but also have an increased anti-social behaviour presence. This has been raised through stakeholder conversations, with pressures changing from the influence of social media and greater accessibility to the countryside, but behaviours do not support responsible use of the countryside.

When assessing risk from wildfire within these areas, it is important to consider the likelihood and cause of these ignitions within an area, and then mitigate. Assumptions that fires are due to BBQs is not proven and "quick" solutions such as banning items such as BBQs to manage the risk does not reduce fires, but rather reduces use of green spaces.

Building in resilience, value, community ownership and awareness will support appropriate use of green space which is more sustainable. This promotes better use of the green space, further contributing to the Well Being and Future Generations Act objectives and opportunities.

When enabling more people to access and utilise their green spaces, potential use and activities must be assessed and risks managed. Wildfire from activities linked to public use include:

- Ignitions from discarded disposable BBQs and campfires
- Cigarettes/smoking
- Fly Tipping, rubbish and refuse fires
- Anti-Social Behaviours, including arson

In discussion with stakeholders and looking at examples further afield, there are a series of mitigation measures appropriate in green spaces. These measures will act to improve community awareness and promote responsible use, but also make sites more resilient to wildfires caused through ignorant and antisocial behaviours. Importantly these measures also improve the potential of sites, enhancing the natural capital value of the area.

Measures include:

- Education and awareness raising for the public using the sites.
- Developing Safe Zone Areas in woodlands and forestry for recreational activity
- Creating areas of well managed vegetation – particularly around assets and fire safe zones.
- Creating safe zone for using BBQs and campfires with good signage
- Identifiable fire break and fire belt areas around these designated areas
- Well managed pathways which also act as fire breaks.

- **Infrastructure and private assets**

Under climatic predictions our assets and infrastructure across Wales is at a greater risk of being damaged or destroyed due to wildfires. Wales has been developing its tourism opportunities across various landscapes to draw in investments, people, and sustainable future programmes. These have included offering new activities such as outdoor pursuits, hospitality, recreational activities, amongst others to allow Wales to become a destination location. Taking advantage to Wales' abundant natural capital assets. Electricity, renewables and water supply also have remote assets within the landscape.

When considering wildfire risk to infrastructure and other assets within the landscape, the presence and use of the site by people is a key risk. A risk assessment of the asset, the land within an owner/manager's responsibility and the neighbouring land should be undertaken and the risks managed. As in the open country and rural-urban interface sections above, the principles around fuel management both in the landscape and as part of landscaping and infrastructure need to be managed appropriately to reduce fuel loading.

Firstly, a wildfire risk assessment is to be undertaken, identifying key assets, receptors, possible ignition risks and pressures. To reduce risk, working with neighbours to manage hazards across the landscape and seeking advice from the Fire and Rescue Service is important to understand the wildfire risk and inform mitigation measures.

The goal is to manage vegetation, the fuel, to reduce the wildfire risk around the asset and build resilience across the site to minimise impact and reduce vulnerability of an asset or the business associated with it. The objective is to reduce or remove potential fuels around an asset, whether the fuels are natural vegetation, amenity landscaping or infrastructure like fencing which increase fuel loading. Reduction of fuels, safe spaces, non flammable alternative infrastructure are all options to be built into the design and maintenance of any asset within the landscape.

Where there is a customer, public, residents or staff presence on a site, evacuation routes, clear signage is essential for potential people management if an incident were to happen.

Photo: Tower Zipworld, Rhigos Mountain, South Wales – a site within the landscape surrounded by fuel, saved May 2023 through SWFRS tactical burns around the site.

Depending on the setting and scale of the asset there are several options which can build resilience to protect an asset:

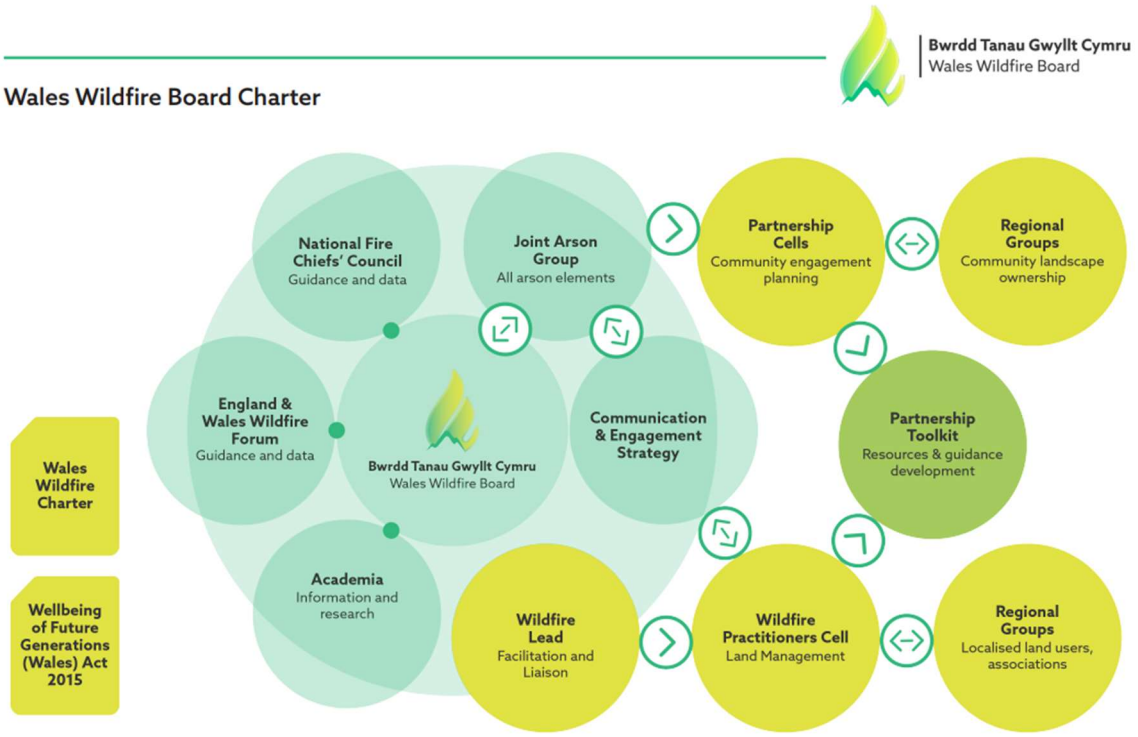
- Fuel breaks around the identified assets and maintaining or enhancing the identified natural fuel breaks in the landscape – fuel breaks are managed throughout the year (being considerate of the risks of ecology, particularly nesting birds).

- Fire belts – strategic areas of less flammable and resistant plant species as part of landscape planting and design or management of deciduous woodland around assets.
- No fuel zones – pathways, roads, walls use of non-flammable infrastructure.
- Evacuation routes, signage for public.
- Consideration of smoke inhalation.

Wales Wide Strategic Wildfire Risk Reduction and Policy

To ensure the long-term management and opportunities around wildfire mitigation within Wales there is a need to think strategically at both policy and guidance level in various sectors of Wales.

The Wales Wildfire Board Charter[30] sets out a strategic view of a collaborative approach to wildfire, bringing together Welsh Government, Emergency Services, Public and Private organisations, landowners, managers and land users. The charter sets out the governance around integrated wildfire management, connecting strategic, practitioner and supporting services.



The charter sets out 3 commitments:

1. Partnership
    - Understand and recognise each other's impacts to develop a range of early interventions.
    - Deliver a one voice approach to wildfire messaging, awareness and education across Wales.

[30] wales-wildfire-board_charter_eng.pdf (mawwfire.gov.uk)

- Have a better understanding of wildfire risk management across Wales.
- Change perceptions and create a wildfire wise Wales.

2. Environmental and Community Resilience
    - Managing the number, scale and severity (and impact) of wildfire incidents.
    - Adapting to nature and climate developments and restoring connections to green space and community.
    - Supporting cleaner air and promoting natural and heritage resources.
    - Protecting our carbon sources in soil and woodlands.

3. Prevention and Protection
    - Adopt and support a landscape management approach to wildfire risk management.
    - Share knowledge and provide training through a Wales wide collaboration network.
    - Create a multi-functional fire risk map and toolkit for preventative land management techniques.
    - Reduce uncontrolled wildfire numbers and severity by sharing resources and implementing prevention measures.

The Healthy Hillsides Project has worked with the MWWFRS in the development of the Wales Wildfire Charter and supports the aims of the charter. The commitments are echoed through the Healthy Hillsides project work, evidence gathering, and lessons learned. It is the hope that the ways of working, and recommendations made through the Healthy hillsides project are built into the Wales Wildfire Charter and provide the detail and actions required to deliver a collaborative and integrated approach to wildfire management.

Shared responsibility and ownership of Wildfire.

Wildfire is a social, cultural, environmental and incident response challenge.

Wildfire is a different challenge in different places:

- **It is a rural-urban interface challenge.**
- **It is a land management challenge.**
- **It is a climate change challenge.**

Wildfire is the symptom or cause of a wider societal challenge. We need to look at the complex interplay between these challenges and a suite of actions and preventative measures that will reduce the risk of wildfire.

As highlighted through our focus group discussions and wider stakeholder discussions throughout the lifetime of the project, wildfire is an issue for many not just the Fire Services. We acknowledge there are opportunities for all key stakeholders and sectors to better

embed working with communities for prevention and reduced wildfire risk. We all have a role to play in this challenge.

There are key sectors which require a targeted approach to build in wildfire resilience into Wales wide strategic direction and policy. These are namely the agricultural, forestry and public service sectors.

- **Agricultural Sector**

As the new agri-environmental schemes now approach their launch in 2025 onwards, it is pertinent to think of where climate change resilience can be embedded into the agricultural sector to allow for landscape scale opportunities to be developed.

As highlighted previously, the agricultural sector provides a wide range of opportunities when addressing wildfire risk reduction within a landscape, as it provides invaluable fuel management. The use of both mechanised management and then sustainable long-term management via rotational grazing would allow for wildfire risk to reduce within key hotspot areas of Wales. It is important that the role of grazing and land management throughout the landscape is valued and appropriately supported to ensure economic viability and is recognised for its role in protecting and enhancing ecosystem services and building climate resilience.

Through the Healthy Hillsides Project we have worked collaboratively with a variety of stakeholders exploring the challenges and opportunities and have trialled delivering grazing on both private and public land to reduce fuel load, whilst enhancing biodiversity. There are challenges and there is a need for collaboration across the public sector, private land managers and the public to achieve integrated land management.

We have undertaken an assessment of grazing opportunities and taken learning from wildfire/fuel management grazing projects around the world, making a series of recommendations to better support and facilitate landscape management through grazing for the multiple benefits to biodiversity, risk reduction and restoration of ecosystem services.

From these examples, there are several key recommendations and requirements to better support land management practices within key landscapes of Wales:

Need	Action Required	Responsible Owner
To create a training programme for land managers within Wales, for wildfire resilience (planning, prevention, incidents, recovery).	• Identify training needs within the land management sector including agriculture and forestry to better understand the requirements of the training within Wales • Identify key target audiences and best ways of creating training programmes either virtually or face-to-face • Create specific training programmes for both mitigation management, use of fire as a management tool, long term planning and opportunities, and others as required.	Wales Wildfire Board. Aligns to Commitment 3 Wales Wildfire Charter.
To create a training programme in liaison with the Fire and Rescue Services in Wales to develop an accredited prescribed burning course and guidance to be approved by Welsh Government as part of the Heather and Grassland Burning Code.	• Work with key representatives from the Fire and Rescue Service across Wales, the Wales Wildfire Board and Welsh Government to create a training programme that can be accredited under the Heather and Grassland Burning Code regulations.	Wales Wildfire Board. Welsh Government Nature and Forestry Policy Department. Aligns to Commitment 3 Wales Wildfire Charter.
To scope and understand how wildfire resilience and management of landscapes can be fed into the new 'Collaboration' and 'Optional' Layers of the SFS.	• Create key case study examples for wildfire partnership and collaboration across landscapes in Wales to develop a sustainable model for land management in Wales that can be funded via agri-environmental schemes	Welsh Government NRW
To better understand the financial costs of wildfire within a landscape to support funding mechanisms for land managers in Wales to mitigate against this risk.	• Create an assessment of wildfire costs to Wales economy and Natural Capitol to date. • Understand the impact of wildfire and the mitigation measures required to be preventative and the effect is on agricultural productivity and natural capital. • Understand long term costs of wildfire mitigation measures that can be implemented within Wales, and better understand how these can be funded in the future • Assess the costs of wildfire incident response and damage to the Wales landscape to date	Welsh Government and Wales Wildfire Board

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- **Forestry Sector – Public and Private Estates**

The Welsh Government Woodland Estate (WGWE) is currently managed by NRW as the body responsible for the public forestry and land in Wales. The estate is managed to produce timber for the market, create areas of recreational and public access, and provides a host of habitats for biodiversity and nature.

Additionally, Wales has a substantial amount of privately owned forestry which has an aim of creating sustainable timber for the marketplace to ensure that we have a long-term production of timber within the UK. These are predominantly managed by forestry consultants and companies and adhere to UK Forestry Standards[31] and other accreditations.

Under climate predictions, the forestry sector within Wales is under pressure due to the impact of increased rainfall, seasonality differences, invasive species and tree health impacts, extreme weather events (drought, flooding and windblow) and wildfire.

Predominantly the way in which timber has been produced for the past 100 years was to create quick growing crop species that could be utilised for the industrial requirements of the UK businesses such as coal mining, steel production and others. Adapting to the economy and products required, forestry is also required to provide public good. This allows for nature and climate emergency mitigation to be better designed and planned into woodlands for a future Wales.

There are several climate pressures on the WGWE, wildfire is of concern particularly within the South Wales area as here there has been a significant impact of wildfire due to anti-social behaviour pressures, particularly associated with deprived communities. As climate change predictions increase the risk of more severe wildfires, adapting woodland design and management to account for, the ecosystem services of woodlands, the communities of Wales as well as the economic value of timber production.

As discussed within this report there are a suite of options and management techniques developed through the Forestry Research Wildfire Resilience Report[32] which provides guidance on creating an adaptable, resilient and sustainable forestry of the future. The principles of this report along with local demonstrations and experience should be incorporated into NRW operational guidance for both internal and external audiences. This should also form the basis of wildfire prevention woodland management training.

With a changing climate wildfire will become a greater risk throughout Wales, therefore it is important to consider increased risk of wildfire now. We have similar vegetation types and fuel volatility within our landscape as Southern European Countries with a climate currently allowing for good rainfall and seasonality to suppress high wildfire risk. However, with Climate Change predictions the forecast for Wales is that there will be extreme droughts, lower rainfall, akin to mid and southern European countries.

[31] The UK Forestry Standard 2017 - Forest Research

[32] Building wildfire resilience into forest management planning (forestresearch.gov.uk)

We should therefore consider wildfire risk and extreme weather conditions when creating forests of the future. This can be embedded through a variety of ways which can be seen as recommendations below:

Need	Action	Responsible Owner
Identify and prioritise all at high wildfire risk woodland areas across Wales.	• Develop a wildfire risk map for all of Wales that incorporates the risk of wildfire for woodlands in Wales for both the private and public estate. • Identify key 'at risk' areas across Wales and implement further mitigation measures as required. • Include local objectives for all these woodlands through the Forest Resource Plans – e.g. Lower Rhondda FRP[33] which has a wildfire objective: *Reduce the risk of wildfires by planning and delivering appropriate fire control measures during and after operations, such as creating and managing fire breaks around restock areas and working with SWFRS to plan and implement measures on the estate.*	Wales Wildfire Board. Aligns with commitment 3. Welsh Government NRW.
Create template Wildfire Risk Assessments that can be implemented into all woodlands in Wales	• Develop a multi-agency approach to wildfire risk assessments that can be developed with key sector representatives from forestry and fire service, as well as insurance agencies. • Launch template risk assessment and guidance notes via the Wales Wildfire Board website to host key information and supporting mechanisms to foresters within Wales. • Ensure that wildfire resilience assessments are initiated through all planting schemes including Woodland Creation, National Forest, and Sustainable Farming Scheme.	Wales Wildfire Board
Identify wildfire resilient species mixes for forestry planting to be incorporated into forest designs for both the public and private	• Develop key case study examples for forestry with wildfire resilience • Apply guidance such as the Forest Research Document on forestry and wildfire resilience.	NRW

[33] Natural Resources Wales / Lower Rhondda Forest Resource Plan

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European Agricultural Fund for Rural Development: Europe Investing in Rural Areas
Llywodraeth Cymru Welsh Government

estate, where wildfire is an identified risk.	• Develop training programmes to support foresters to better understand wildfire resilient woodland schemes. • Work with UKFS and other accreditation organisations to develop guidance and supporting documentation for woodland owners and managers in Wales.	
Provide training and guidance for public and private land-owners within Wales to better understand wildfire risk and how to mitigate.	• Work with industry representatives to create a suite of training programmes and demonstration sites. • Assess the current understanding of wildfire resilience knowledge within Wales and report key findings to support training schemes. • Create a one stop area for wildfire resilience information through key organisation websites such as Confor[34] or the Wales Wildfire Board[35]. • Create a training programme for new woodland creation schemes to ensure wildfire resilience is a key component of criteria in woodland plans and schemes – this includes new forestry planting schemes through the agricultural- environment schemes • Assess training programmes each year to ensure they comply with European developments, best practice and UK forestry standards.	Wales Wildfire Board

[34] Confor: Sustainable Forestry (confor.org.uk)
[35] wales-wildfire-board_charter_eng.pdf (mawwfire.gov.uk)

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Llywodraeth Cymru Welsh Government

- **Public Land – Local authorities, publicly managed space.**

Recommendations focussed on publicly owned and managed land and property is discussed in more detail in the Community Engagement Wildfire Wise report. Though it was felt that the discussion of preventative action by local authorities and other public land managers was an important sector to include in the prevention strategy.

Despite the significant numbers of wildfire incidents in Wales, with hotspot areas like Rhondda Cynon Taff and the wider South Wales Valleys there is a need for Local Governments, Welsh Government and Risk Assessments to acknowledge the wildfire risk to communities from health impacts to risk to life and property.

Where wildfire is a persistent challenge and there is evidence to demonstrate a higher risk – rural-urban interface, poor land management/high fuel load, high frequency and severity of wildfire incidents this needs to be considered in strategic planning, locally and regionally. This is a planning consideration in many countries across the globe and has been highlighted through the Landscape Fire Governance Framework. In adapting to climate change where wildfire is more prevalent in the landscape, for sustainable development individual and spatial planning must build in wildfire resilience.

Wildfire is a symptom of wider issues, this has been a repeated description about deliberate wildfire, particularly in the South Wales Valleys. It was highlighted in a number of community discussions the need for a bigger picture and ensure where there are persistent wildfire incidents that this be considered in wider service management. There is a need to work across functions within Local Authorities or any community service as the seemingly unconnected issues can increase risks in wildfire hotspots.

Findings from our trials working with communities and through our stakeholder focus workshops identified a need to train and inform community service providers and community leaders. Through this embedding wildfire, and wider climate resilience for communities can be made more sustainable and place appropriate.

There are great examples around the world, where wildfire is a more established pressure and there has been community impacts from past wildfire incidents. Schemes such as Firewise USA[36] or FireSmart[37] in Canada have developed guidance, training and an approach for communities to deliver to build wildfire resilience on the community level. Having looked at examples from around the world and having looked at ways of working trialling different approaches in the South Wales Valleys, a series of recommendations through lessons learned have been identified for communities to build resilience.

Given the socio-economic demographic of most of the worst affected communities, government funding to build proactive and preventative measures linked to other infrastructure and actions such as fly tipping is required to develop, train and deliver

[36] NFPA - Firewise USA®
[37] FireSmart Canada

community wildfire resilience, the approach we have recommended in our Wildfire Wise; A Community Approach.

The suite of preventative measures on the ground can also deliver multiple benefits. Therefore, in planning and delivering wildfire prevention as part of the day-to-day management and design of sustainable communities, opportunities to improve access, waste management, nature recovery, health and fitness should be incorporated. This should be done working collaboratively with the community and key stakeholders.

As the recognised responsible authority for fire, people look to the Fire and Rescue Services (FRS) and through the Healthy Hillsides project a key role for the FRS has been highlighted as community prevention. There is precedence of preventative measures being embedded into the FRS, seeing culture change and a shift towards prevention in the strategic model of the FRS. Building in external property advice into community visits is essential alongside community ownership added risk to wildfire from behaviours around waste management and property management. We have found that communities do respond to and automatically expect fire messaging to come from the FRS. External property/wildfire advice for communities should be on a risk basis and could be prioritised through the newly developed Wildfire Risk map.

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European Agricultural Fund for Rural Development: Europe Investing in Rural Areas
Llywodraeth Cymru Welsh Government

Need	Action	Responsible Owner
Inclusion of Wildfire community resilience in climate adaptation plans, policy, strategic planning and local planning.	• Data and spatial plans to identify wildfire hotspots to direct and prioritise wildfire resilience policy and implementation through spatial and local planning. • National guidance on the consideration of wildfire as a climate change impact identified in Wales in spatial planning. • Appropriate planning guidance should be developed to guide planning authorities and developers in building wildfire resilience into future development in wildfire hotspots. • Local policy adopted on maintenance and retrofitting community infrastructure to ensure long term wildfire resilience in wildfire hot spots. • Inclusion of wildfire mitigation and grounds maintenance through planning permissions and upgrading of infrastructure in priority places will ensure communities are better prepared for wildfire in the long-term. • Any community initiatives or projects in wildfire hotspots should build in community wildfire resilience on the ground and through education and awareness raising.	Welsh Government Local Authorities Public Service Bodies Wales Wildfire Board
Community service provisions should build in wildfire awareness in wildfire hotspots.	• Wildfire mitigation can be built into wider benefits such as access management, green spaces, community buildings and social housing. • Risk assessments undertaken within communities to highlight key mitigation measures to reduce risks. • Waste education and good waste management in wildfire hotspots. Wildfires are often associated with waste fires and then the increased risk to properties where waste is stored close to properties.	Local Authorities Public Service Bodies Wales Wildfire Board
Design training and awareness programmes for key community stakeholders.	• Data and spatial plans to identify wildfire hotspots to direct and prioritise wildfire resilience training and education – similar to flood risk Communities at Risk Registers. • National guidance and training programme designed for community based support services/organisations: housing associations, developers, schools,	Welsh Government Local Authorities Wales Wildfire Board

	third sector organisations, local authorities to understand and manage wildfire risk through simple mitigation measures. • A long term funded and resourced central programme to be rolled out to prioritised communities throughout Wales. Based on the train the trainer/ peer to peer mentoring to embed training, awareness and knowledge within communities by trusted and familiar community leaders.	
In high-risk areas and for best practice, all FRS to include external property check lists to home safety visits.	• Data and spatial plans to identify wildfire hotspots to direct and prioritise proactive and strategic engagement with communities around wildfire mitigation. Similar to flood risk Communities at Risk Registers. • Building on the existing community safety advice checklist for internal fire risk – inclusion of risks outside the home, in the garden, outbuildings and neighbouring land.	Fire and Rescue Services Wales Wildfire Board
Land in public ownership or receiving public money for management is assessed for wildfire risk and risk is mitigated.	• Ensuring activities for public services – recreational, public good/ecosystem services are consistent with the need for wildfire risk management – ensuring competing priorities are managed appropriately whilst not increasing wildfire risk, particularly in the Rural-urban interface. • Land is managed sustainably to reduce wildfire risk, and build wider climate, nature and ecological resilience. • Any wider risk management such as carbon sequestration, tree planting, tip safety, land reclamation, nature conservation and flood management balances risk management with wildfire resilience.	Public land owners/managers: Local authorities, NRW, MoD, Coal Authority etc..

Conclusions and Recommendations

Prevention is key to sustainable management of wildfires. Planning and implementing prevention on the ground, supported by policy, governance and guidance is the greatest tool in the box for tackling wildfires. Prevention will reduce the socio-economic, health and environmental impacts across the landscape and in our communities. Prevention will also take the strain off our public services in the event of an incident making our fire service safer and more efficient at tackling wildfires.

By preventing wildfires we protect our habitats, biodiversity and carbon sinks, we maintain air quality and protect communities. An integrated approach to wildfire resilience across the landscape is reliant upon good land management, but this must be valued and recognised for the role in maintaining a resilient landscape.

Through the Healthy Hillsides project, in discussion with stakeholders, undertaking demonstration projects on the ground and undertaking literature and evidence reviews we have made a series of recommendations to direct and influence a sustainable approach to wildfire prevention.

Recommendation 1: Inclusion and integration of wildfire resilience into sustainable land management practices and policies, forestry planning and creation, climate adaptation strategies and other relevant policies and guidance in various sectors across Wales.

Actions Required:

- Identify high risk wildfire areas in Wales through a landscape scale analysis of vegetation fuel loading, historical data, at risk communities, key infrastructure/assets, and others as required.
- Include high risk fire zones as part of spatial planning: Local development plans, well-being plans, area statements, forest resource plans, AONB plans, National Park Management plans, designated site management plans.
- Create wildfire risk plans for high-risk sites, under an agreed and consistent methodology.
- Create local partnership groups that can create preventative and mitigation measures within high-risk areas.
- Incorporate increased awareness and education as part of partnership groups to support emergency response.
- Identify mechanisms of fuel management within high-risk areas that can be delivered and funded through wider schemes such as the Sustainable Farming Scheme and landscape projects such as Urban Heath Partnership in Dorset[38].
- Identify funding opportunities for management and engagement within high wildfire risk areas of Wales to reduce the severity of wildfires and adapt to climate change.

[38] Urban Heaths Partnership (dorsetheaths.org.uk)

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European Agricultural Fund for Rural Development: Europe Investing in Rural Areas
Llywodraeth Cymru Welsh Government

Responsible Owners – Wales Wildfire Board, Welsh Government Sustainable Farming Scheme Department, NRW, Welsh Government Nature and Policy Department.

Recommendation 2: Creation of long-term funding mechanisms for integrated wildfire resilience programmes across various sectors within Wales.

Actions Required:

- Understand the scale of funding required.
- Incorporate wildfire resilience into wider landscape scale projects and programmes as an essential aspect of climate resilience across the landscape.
- Dedicated funding through climate resilience and adaptation all Welsh Government funding streams.
- Incorporated into spatial planning and as appropriate development planning as a mitigated environmental and climate change risk – this would in particular apply to renewable developments within the landscape, developments within rural and urban fringe areas of high wildfire risk.

Responsible Owners: NRW, Welsh Government, Wales Wildfire Board

Recommendation 3: Create a Wales accredited training programme and associated guidance documents to ensure consistent capabilities across relevant sectors in wildfire awareness, prevention, and response across Wales.

Actions Required:

- Assess the level of understanding and awareness of wildfire within different sectors of Wales.
- Develop tailored training programmes and materials for different sectors - in particular Agriculture, forestry and Public Authorities.
- Target and deliver tailored training and education to specific sectors – to build capabilities and awareness across the landscape.
- Identify priority areas for community and public education.
- Work with insurance companies in the private sector to understand level of training and mitigation required to support policies.
- Work with key representatives from Welsh Government to better understand the requirements of training to utilise safe working practices for wildfire mitigation including mechanised management and the use of prescribed burning – supporting adherence and use of Heather and Grassland Burning Code.

Responsible Owners: Wales Wildfire Board, Welsh Government

Recommendation 4: Identify or recruit strategic leads of key wildfire practitioners and policy makers within Wales across multi agencies to ensure long-term coordination, management and development of wildfire resilience within Wales.

Actions Required:

- Create a coordination role in Wales to support cross sector wildfire resilience.
- Key organisations to have strategic and practitioner leads on wildfire to support strategic development of wildfire resilience, support incident response and integration across organisations and sectors.
- These key strategic leads will be required to work together across multi agencies to create landscape scale mitigation and preventative measures, as well as investigations and restorative plans post wildfire incidents.
- Develop key guidance and supporting documentation to standardise wildfire mitigation and response across all of Wales.
- Work with the Wales Wildfire Board and others to ensure wildfire mitigation and response is consistent across Wales, and is fed into policy and guidance across different agencies.

Responsible Owners: Wales Wildfire Board, Fire and Rescue Services, NRW, Welsh Government and others.

Recommendation 5: Develop, share and implement evidence driven measures and ways of working to support strategic direction and delivery on the ground.

Actions Required:

- Work with research centres across UK and wider to improve the understanding and management of wildfire.
- Undertake an assessment of wildfire risk and vegetation volatility across Wales to better understand the risk of severe wildfires under climate change predictions.
- Research and assess the current cost and impact of wildfires within Wales
- Research and assess the cost of mitigation measures of various techniques and suitability to assess against incident response and cost.
- Work across agencies to develop case studies and examples of best practice land management techniques.