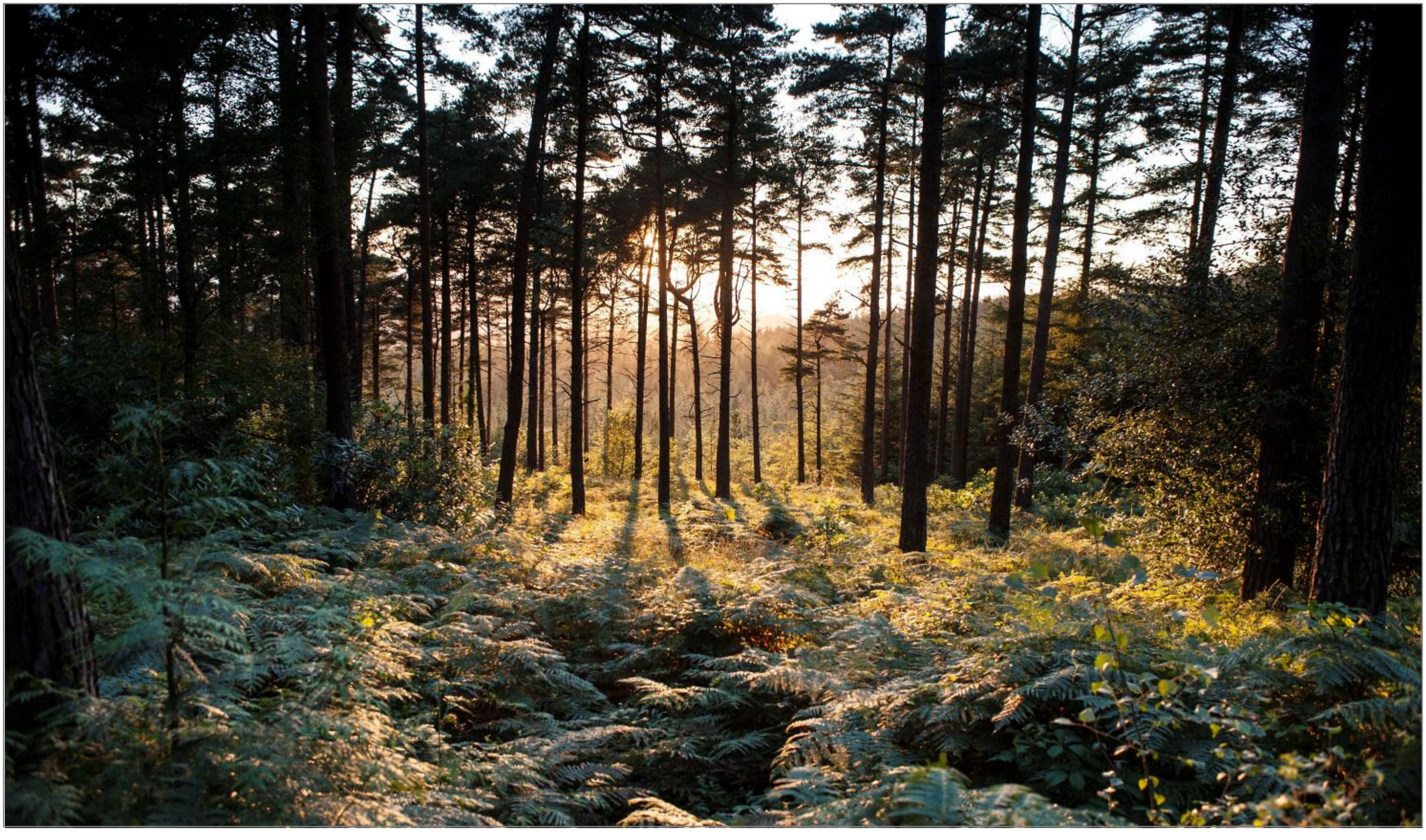
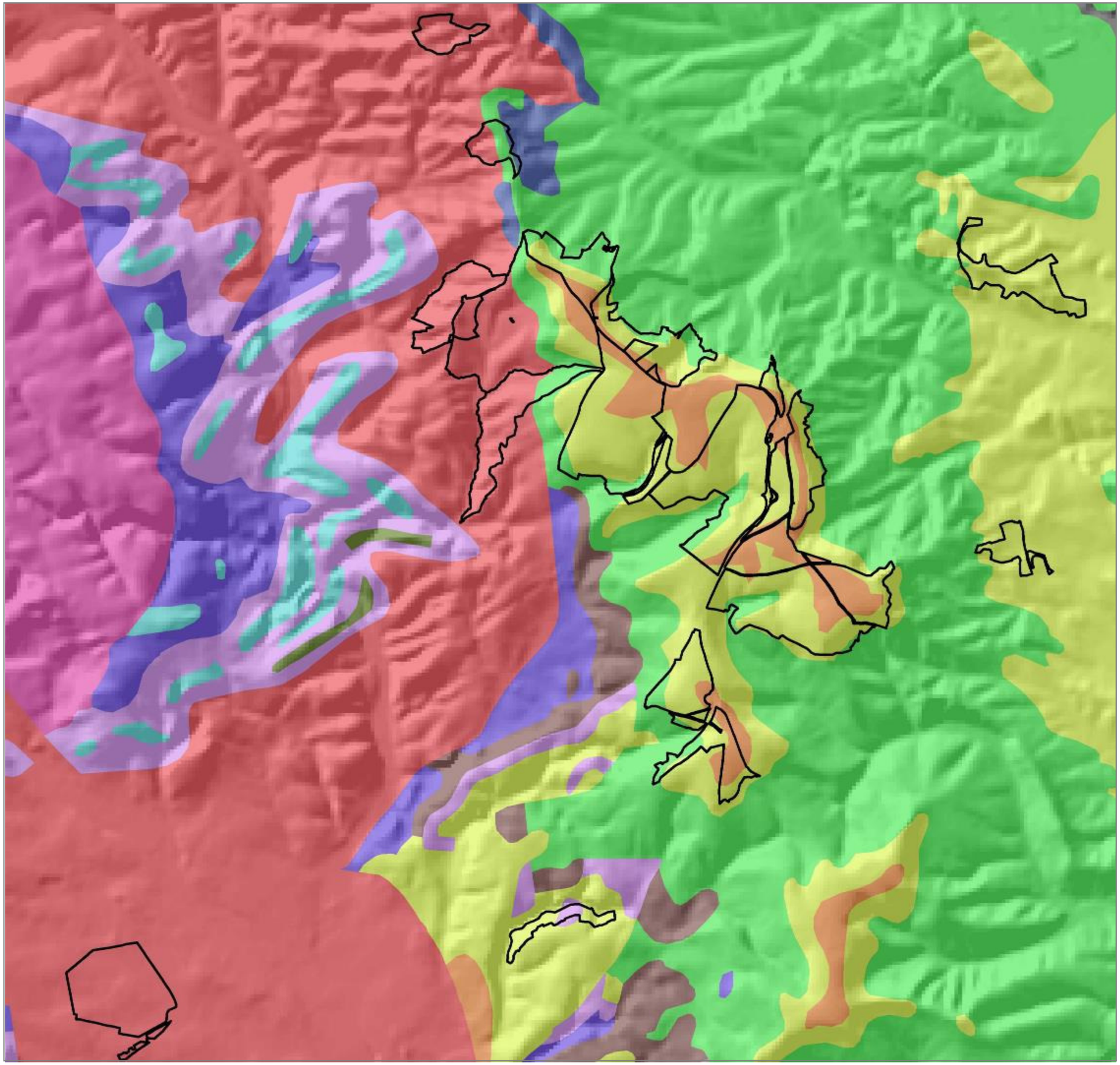
APPENDICES



APPENDIX 1: Physical environment

Geology

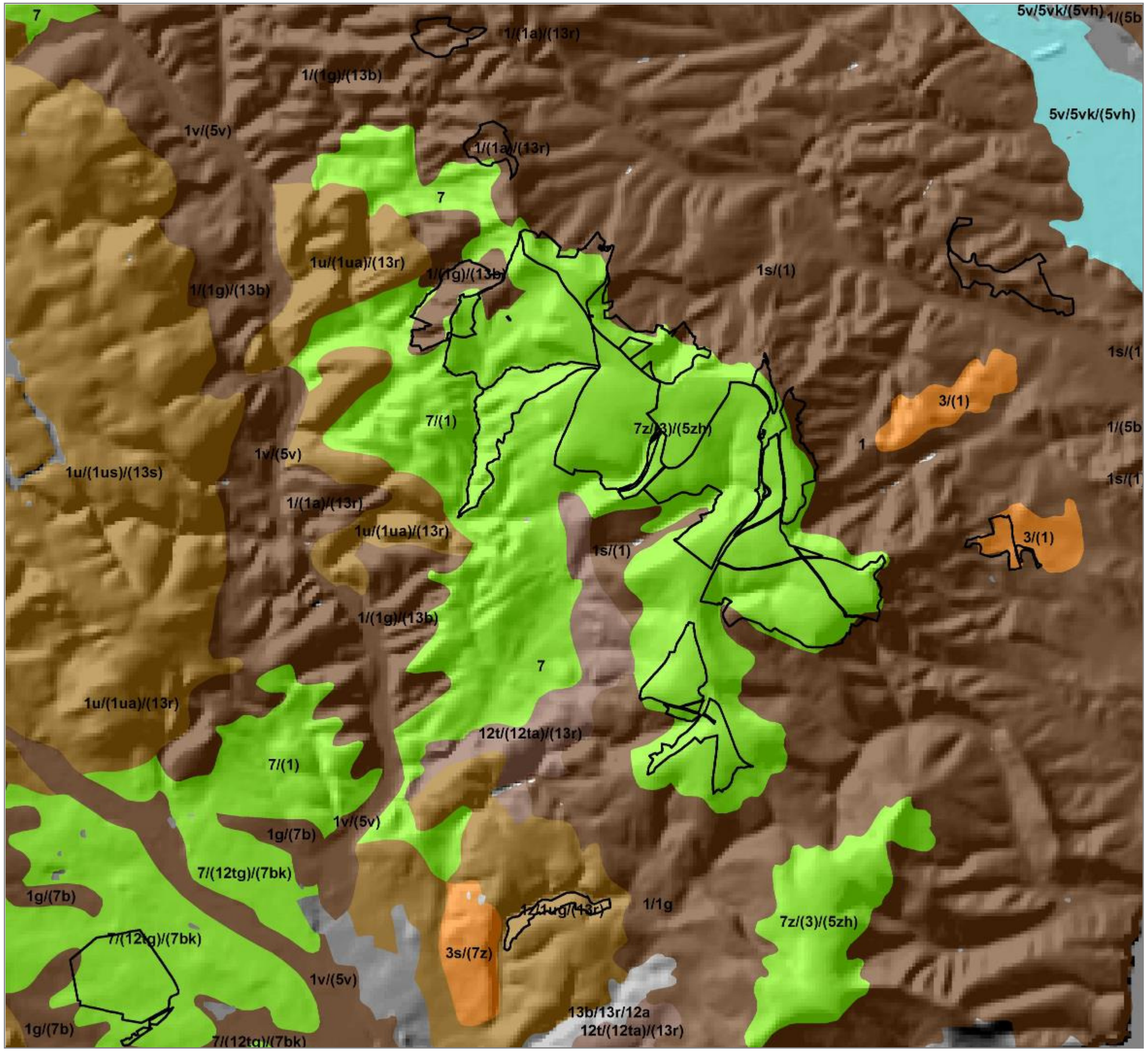


Legend

- BASALT, LAVA
- BRECCIA
- CONGLOMERATE
- DOLERITE (SYNONYMOUS WITH MICROGABBRO)
- GRANITIC-ROCK
- LAVA (UNDIFFERENTIATED) and TUFF
- LIMESTONE
- SANDSTONE (UNDIFFERENTIATED)
- SILICICLASTIC ARGILLACEOUS-ROCK
- SILICICLASTIC ARGILLACEOUS-ROCK and CHERT
- SILICICLASTIC ARGILLACEOUS-ROCK and SANDSTONE

0 0.375 0.75 1.5 2.25 3 Miles

Soils



Legend

- 1 [Typical brown earth]
- 12t [Argillic brown earth]
- 1u [Upland brown earth]
- 1z [Podzolic brown earth]
- 3 [Typical podzol]
- 5 [Typical ground-water gley]
- 7 [Typical surface-water gley]
- 7z [Podzolic surface-water gley]
- 13b [Brown ranker]

0 0.375 0.75 1.5 2.25 3 Miles

Landform Analysis

The landscape analysis is used to assess the landform patterns and demonstrates how it is in keeping with the surrounding landscape character.

One's eye is naturally dawn up the valleys and down the ridges. These principles will be used to design the shape of future coupes. Ensuring that the shape and size of felling and restocking areas do not detract from the natural appearance of the forest and its contribution to the landscape character.

Lines of upward force
(valleys and hollows)

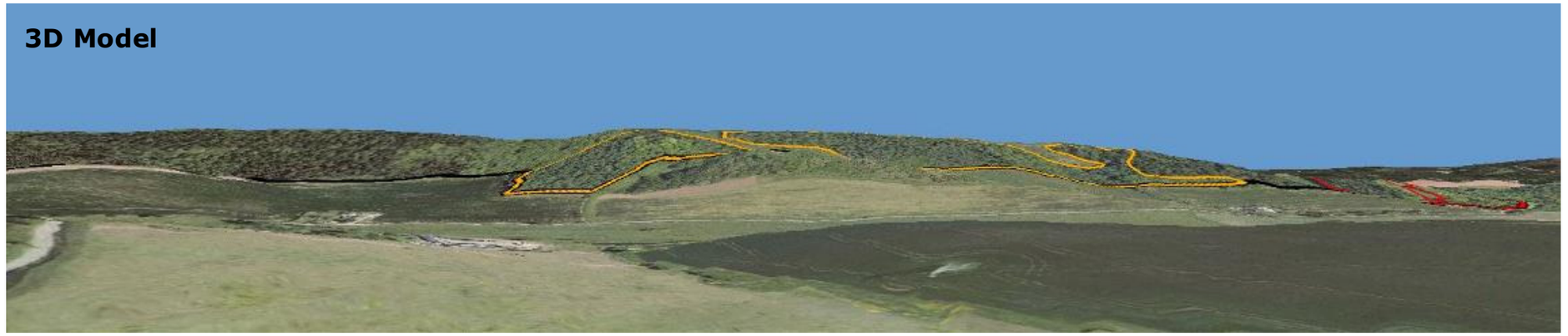
Lines of downward force
(ridges and plateaus)

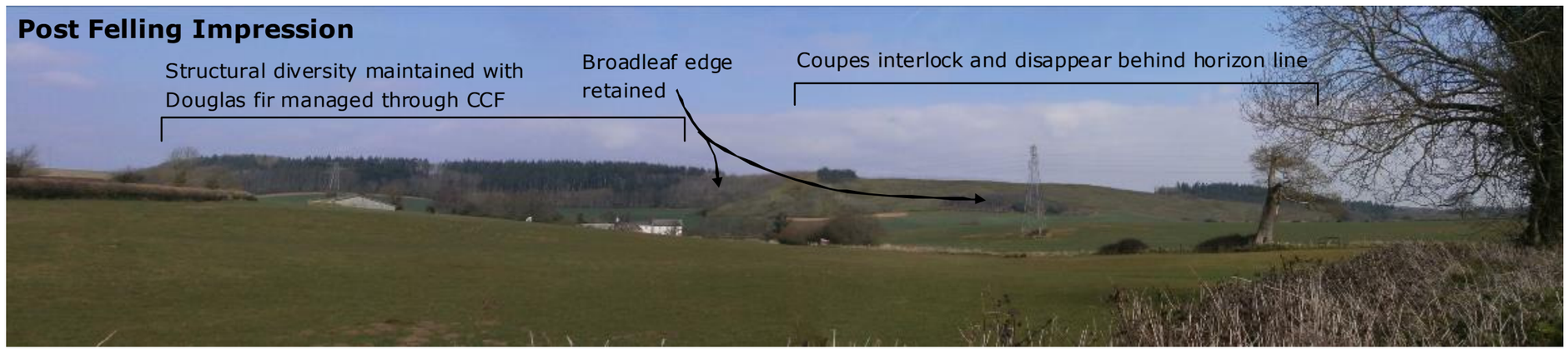
0 0.375 0.75 1.5 2.25 3 Miles

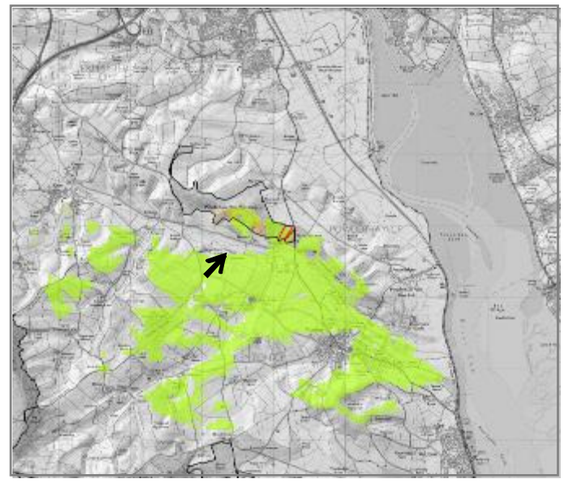
Landscape Analysis

Coupe 81773 - Powderham South

Viewpoint 1



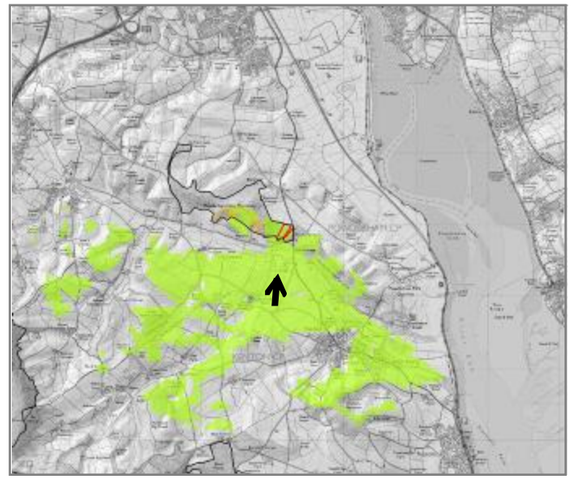


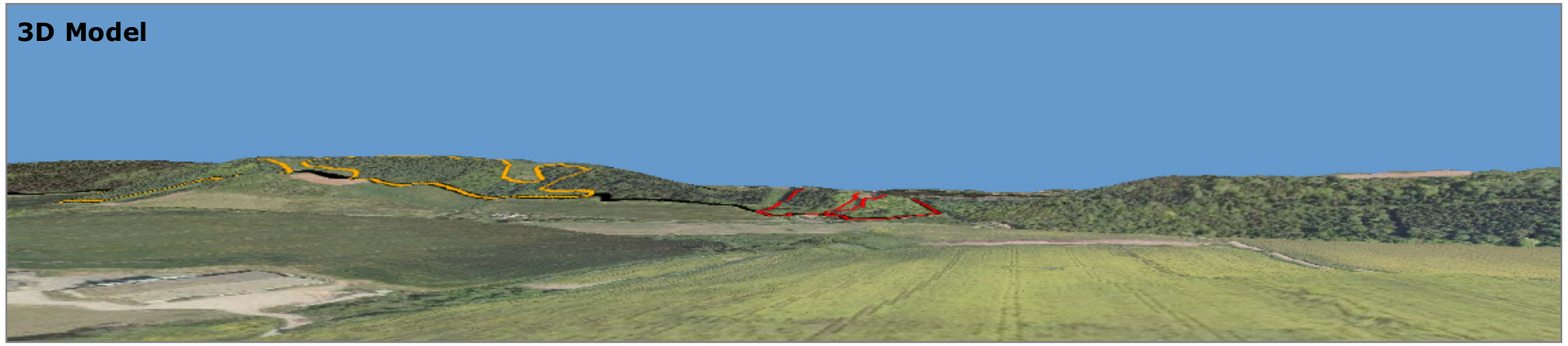


0 0.25 0.5 1 1.5 2 Miles

Coupe 81683 & 81773 - Powderham South

Viewpoint 2



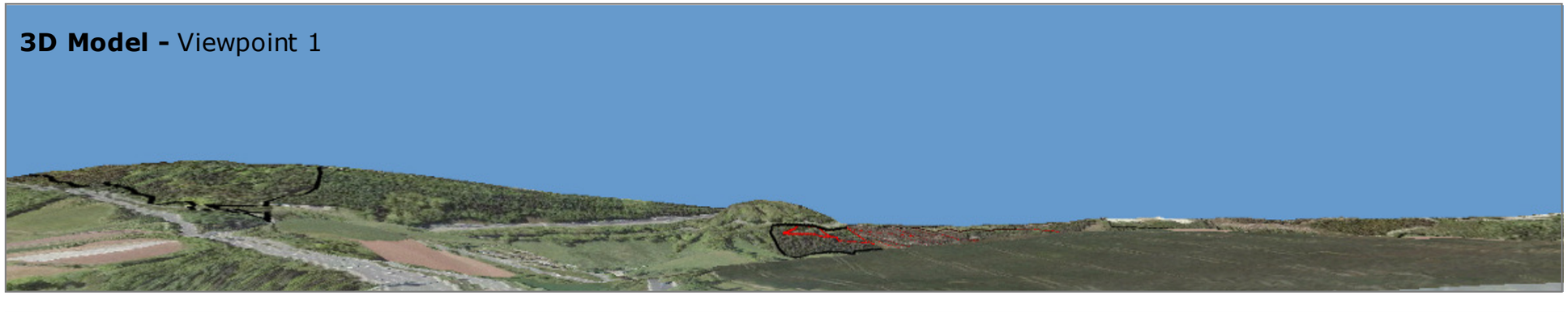


0 0.25 0.5 1 1.5 2 Miles

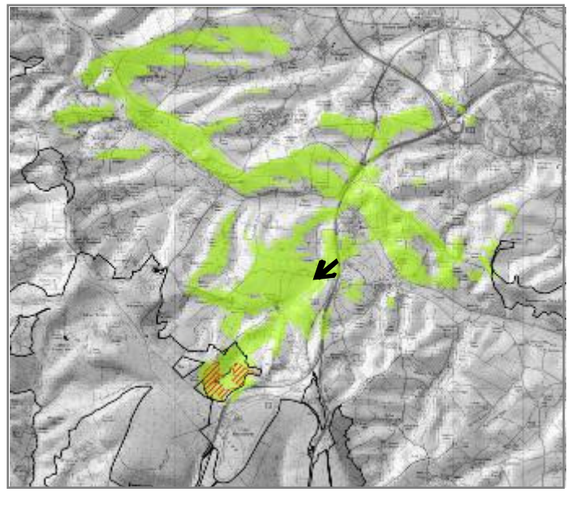
Summer 2016 - Viewpoint 1

Impact of felling will be from a long distance and will not be significant, given the high wooded landscape

3D Model - Viewpoint 1

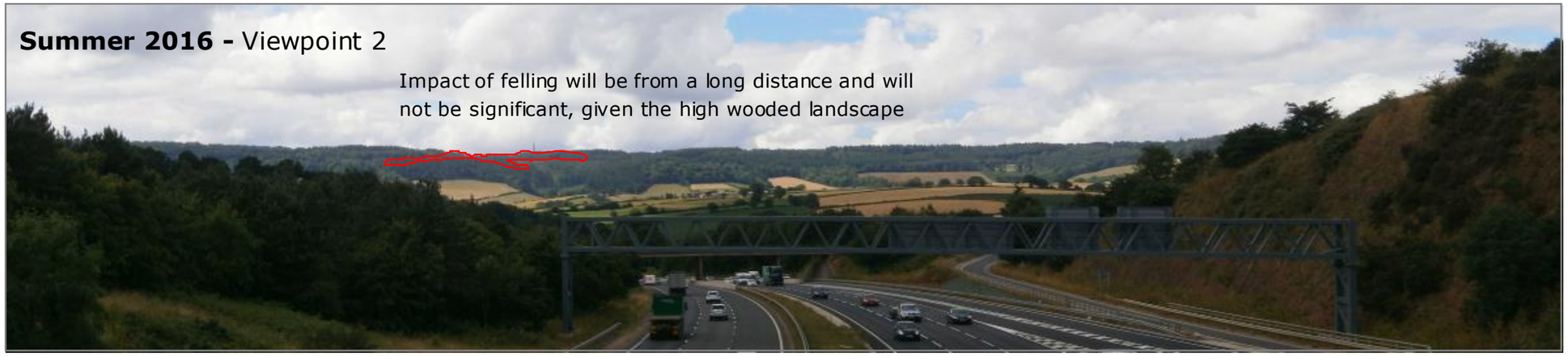


Coupe 81659 & 81839 - Freers
Viewpoint 1



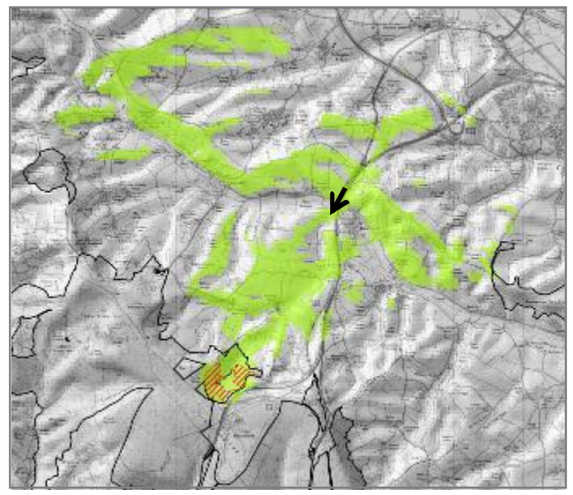
Summer 2016 - Viewpoint 2

Impact of felling will be from a long distance and will not be significant, given the high wooded landscape



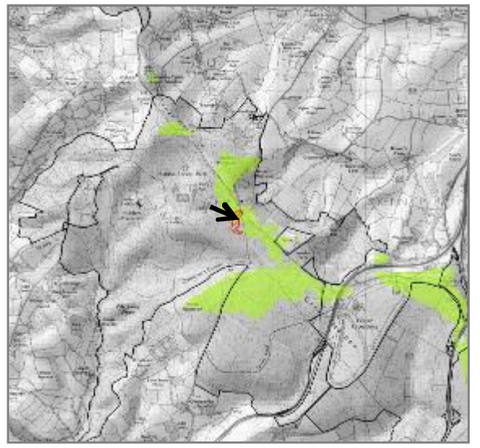
3D Model - Viewpoint 2

Coupe 81659 & 81839 - Freers
Viewpoint 2

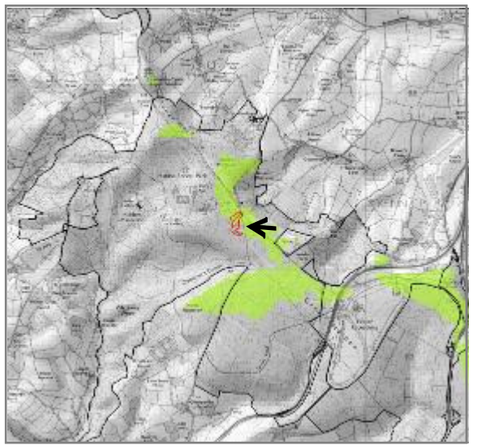


0 0.25 0.5 1 1.5 2 Miles

Coupe 81915 — Bullers Hill
Viewpoint 1



Coupe 81915 — Bullers Hill
Viewpoint 2



0 0.25 0.5 1 1.5 2 Miles

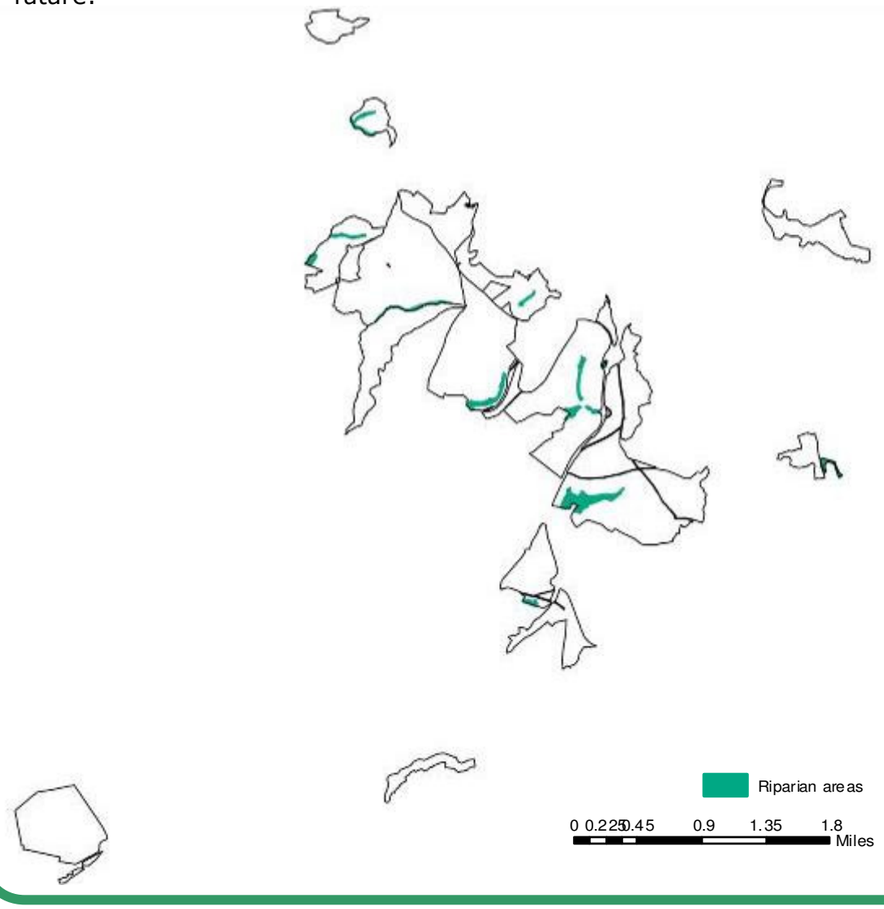
Water & Riparian Management

Riparian Management

All watercourses and riverine areas will be management sensitively to protect and enhance water and soil quality in line with best practice. The 'riparian zones' (39ha) identified will be developed to create and maintain areas of up to 50% continuous forest cover through gradual regeneration or enrichment with site appropriate tree species, such as *Alnus, Salix* and *Ulmus* spp. A gradual change to this type of wet woodland habitat will create a environment of dappled shade with good light penetration and aeration as well as buffer the riverine systems from forestry operations.

Clearfells within the area have been designed and phased to minimise surface water runoff and soil erosion ensuring the riverine systems and SSSI are protected and improved into the future. All felling and restocking operations will work within the guidelines set out in UKFS, Forests and Water with the aim of developing further riparian areas at the time of intervention through heavier thinning of conifer and stimulating native species regeneration.

The Haldon Plan area forests are a component of flood alleviation for the Teign and Exe estuary and the wider South Devon Catchment through soil stabilisation and surface runoff, retaining forest cover and a move towards continuous cover systems together with maintained drains and water storage will ensure this continues to slow down peak flows into the future.

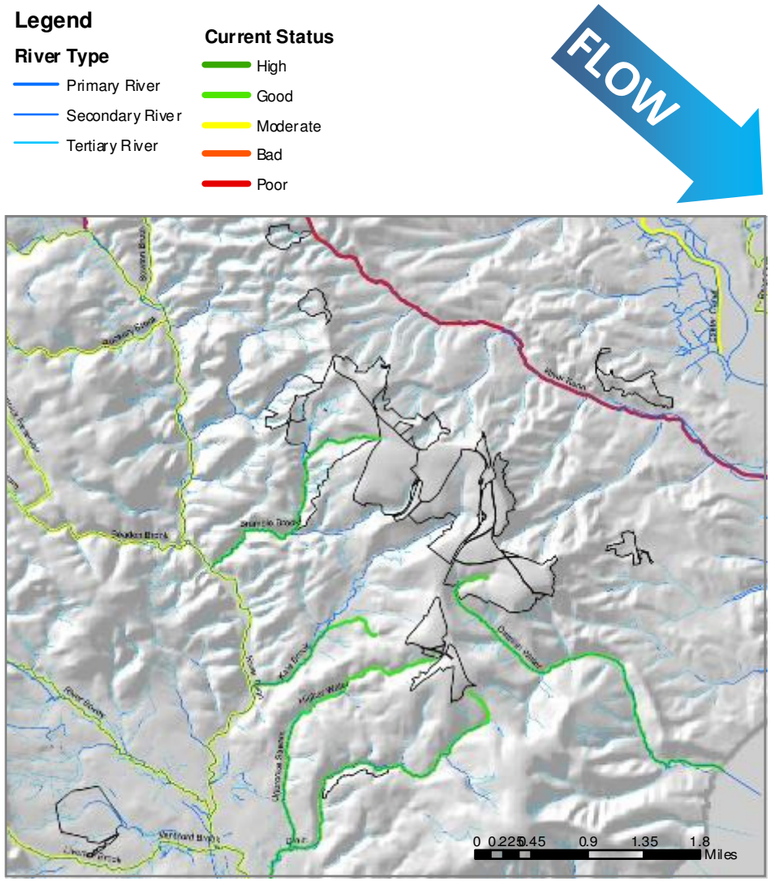


South West Catchment District

Just over 3 million people live in the South West River Basin District. The economy is dominated by the service sector, and each year millions of visitors to the district make a vital contribution to the economy. However, the resulting seasonal fluctuations in population bring challenges for protecting the water environment, especially in coastal areas.

The district has a huge network of internationally, nationally and locally recognised wildlife sites, from the uplands of Dartmoor and Exmoor and outstanding rivers such as the Camel and Hampshire Avon, to the fantastic estuaries and coastline. There are two national parks, and the Jurassic Coast in Devon and Dorset is the only natural world heritage site in England.

The farming and land management sector has a big role in looking after and improving the quality of the rural environment. Agriculture accounts for approximately three quarters of the land area in the South West River Basin District.



South Devon Basin

The South Devon Basin covers the catchments of the Rivers Teign, Dart, Erme and Avon, which flow west and south from Haldon into the estuaries and sea. The area is environmentally rich, containing several important environmental sites and a very high quality river system.

The South Devon Basin covers an areas of some 1,500 square kilometres (580 square miles). The main physical characteristics of the catchments are steeply sloping watercourses rising in the Dartmoor National Park, that then flow into wider, more permeable valleys in the lower reaches. Annual rainfall ranges from more than 2,300mm (90in) in upland areas to less than 1,000mm (39in) on the coast. The England and Wales average is 920mm (36in).

There are 113 river water bodies in the catchment, with a combined length of almost 700 km, and 10 lakes. Currently, 43 per cent of surface waters (199 km or 29 per cent of river length and 5 of the lakes) achieve good or better ecological status/potential. 49 per cent of surface waters assessed for biology are at good or high biological status now.

East Devon Basin

A small proportion of the Plan area (Powderham, Black Forest and Dawlish Waterworks) have slopes and watercourses which feed into the East Devon basin. This catchment is characterised by diverse habitats ranging from the moorland of Exmoor National Park at the headwaters of the River Exe, to the Exe Estuary at Exmouth, the gateway to the Jurassic Coast World Heritage Site.

Critical Load Area

The Plan area sits entirely within a high impact critical load area. As a result felling will be phased and co-ordinated with consideration given to minimising residues, whole tree harvesting, stump removal and short rotation forestry.

Wildfire Management Plan

Wildfire Risk

Fire Risk

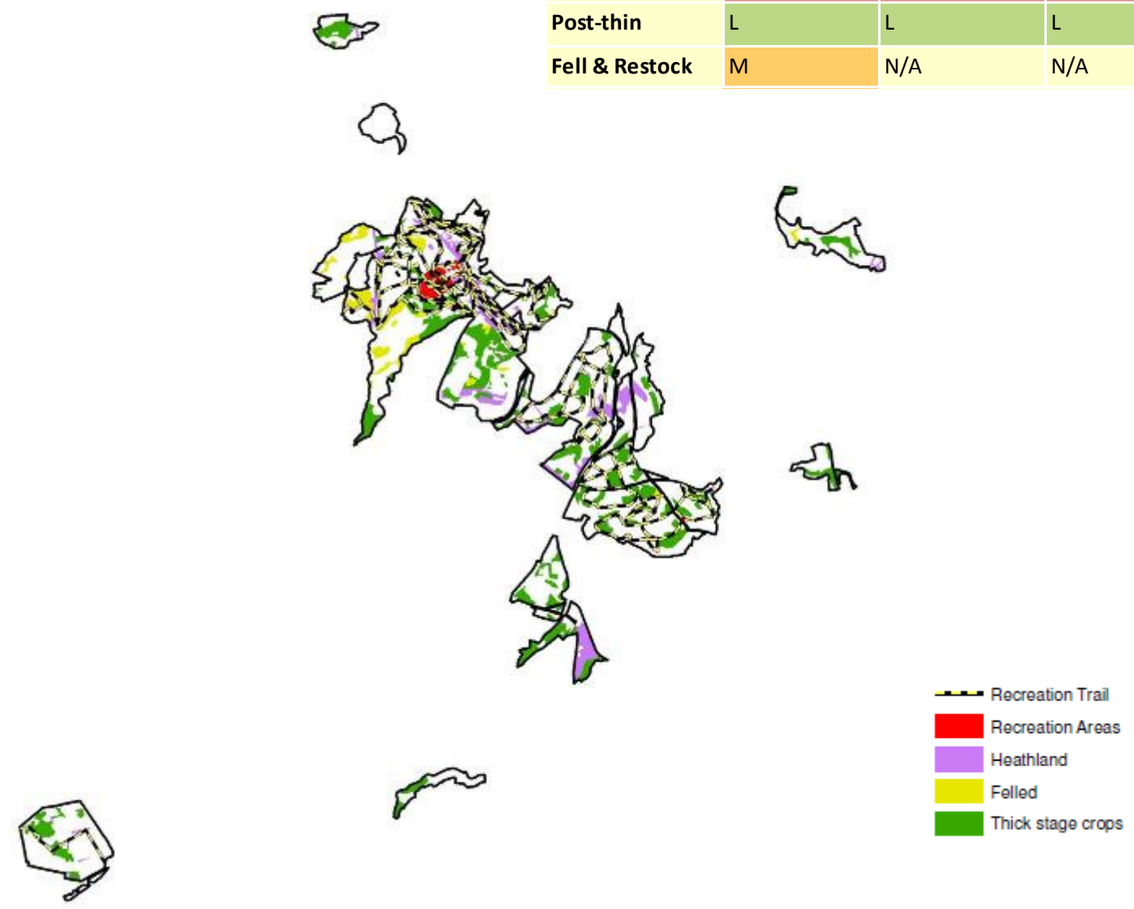
Wildfires are relatively rare however their impacts can be disproportionately large and costly to society and their frequency are predicted to increase due to increased land pressure and climate change. Young coniferous woodland of pine, spruce or fir are at particularly high-risk from wildfire as are dwarf shrub heath, gorse, bracken and grasses. This makes the Haldon Plan area at specific risk due to both the nature of the tree crops, the planned management in future decades and the significant amount of heath grassland which surrounds it.

The vast majority of wildfires are caused by people, accidentally or deliberately. The risk of this is increased by periods of dry hot weather. The nature of the site, its topography, land use and vegetation type as well as tree health and wind all determine the ferocity and extent of a fire.

The Plan area does experience periods of high visitor numbers, particularly around the main hub area. Therefore sites close to car parks and popular trails are at greatest risk of experiencing the initiation of a fire event. The fact that the majority of the Plan area is moderately sloped to the south also creates a higher risk factor given the propensity for prolonged pre-heating of the forests.

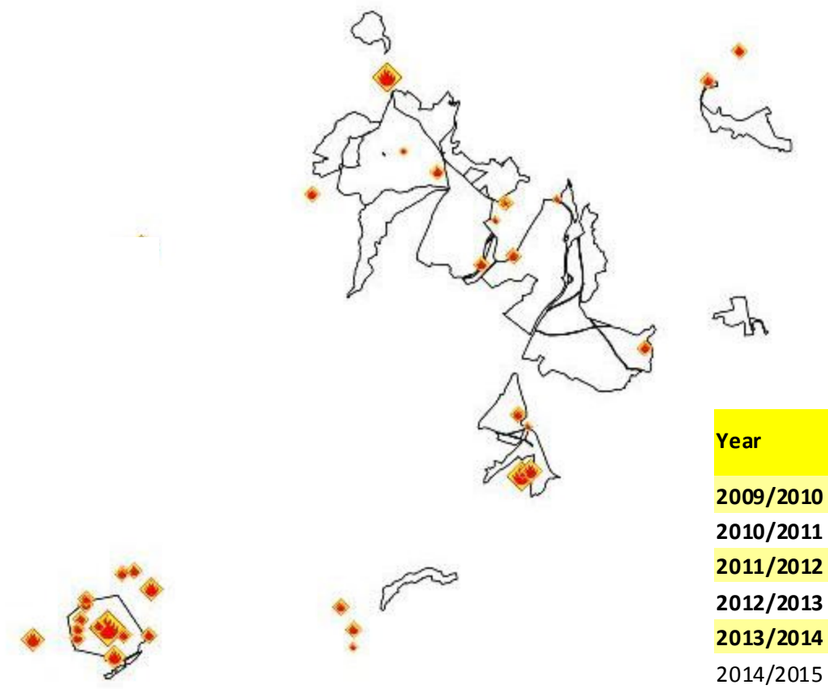
Fire Risk Mapping

Stage	Likelihood of	Likelihood of	Likelihood of
New Planting	M	N/A	N/A
Pre-thin	H	H	H
Post-thin	L	L	L
Fell & Restock	M	N/A	N/A



Recent Reported Fires - within 1km of Plan area

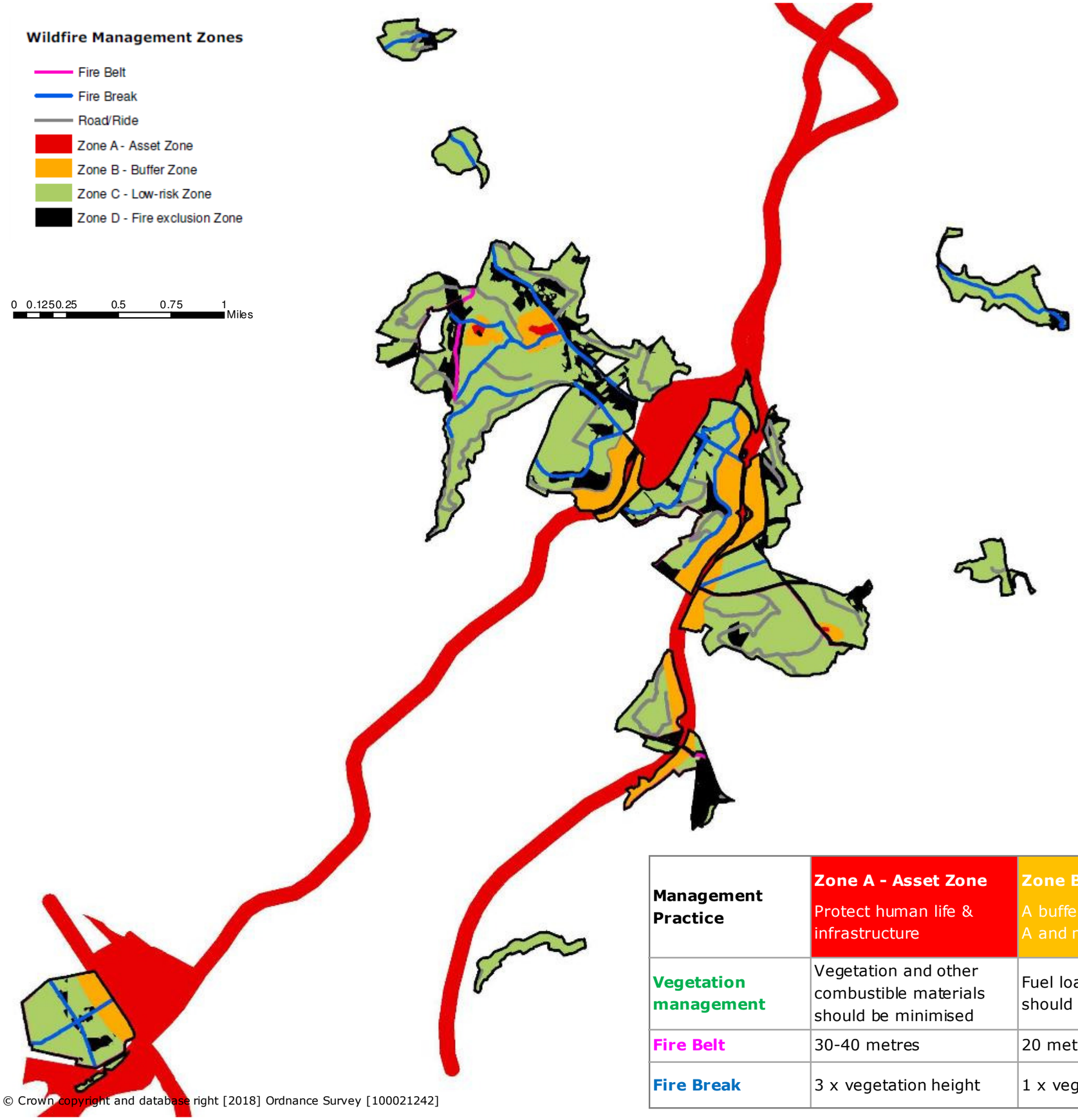
(Source: Fire and Rescue Service Incident Reporting System)



Year	Number of Fires	Total Duration (hrs)
2009/2010	1	5.3
2010/2011	7	14.0
2011/2012	9	30.2
2012/2013	1	1.8
2013/2014	18	26.8
2014/2015	2	1.8

Wildfire Risk Assessment

Hazard	Source	Initial Risk			Steps to manage risk	Revised Risk		
		L	S	Risk		L	S	Risk
Fire initiation from public	Barbeques and camp fires Cigarettes Arson	4	3	2 = Low	Education through signage Fire breaks along popular routes	3	3	1.5 = Low
Fire initiation from infrastructure	Utility powerlines Café and office appliances Public highways	2	4	10 = Moderate	Fire breaks and belts around assets and infrastructure	1	4	5 = Low
Fire initiation from vehicles	Public and staff vehicles Harvesting machinery	2	3	1 = Low	Fire breaks along main routes Fire fighting equipment with vehicle	2	2	0.1 = Low
Fire spread from neighbouring property	Controlled burning Residential & commercial property	3	3	1.5 = Low	Education and liaison with neighbours Belts along boundary	2	2	0.1 = Low
Fire spread from onsite fuel loads	Stored petroleum fuels and chemicals Grassland and Scrub Young forest crops	4	4	16 = High	Fire breaks and belts around areas of high asset importance and fuel load. Suitable storage of fuel	2	3	1 = Low
Loss of control of managed heathland burn	Controlled burning Grassland and Scrub	2	3	1 = Low	Liaison with fire service Appropriate training and risk management	2	2	0.1 = Low



Wildfire Management Plan

Wildfire Mitigation and Adaptation

Mitigation and adaptation due to wildfire risk can be achieved by managing vegetation and fuels, creating fire breaks and belts, improving forest design and silvicultural diversity and the management and education of people. The key principles outlined follow the FC Practice Guide (2014).

Vegetation will be managed as part of standard forest operations and maintenance. Fire breaks have been identified and located at critical locations such as at the bottom of slopes and in conjunction with other fire resistance liner features, such as roads, rides and rivers. Fire belts already exist in places and predominantly consist of fire retardant broadleaves. The criteria for location and extent of these is much the same for fire breaks and they offer an alternative form of wildfire mitigation

Clearance of windthrow and deadwood in high risk areas as well as remaining wood residues and products will contribute to lowering the fuel load factor and minimising the risk of ladder fires. We will work with local the Fire and Rescue Service when considering controlled burning in order to manage risk. Uncontrolled fires will be dealt with in line with the West District Emergency Incidents Management Plan.

Education as well as provision of practical information are the key factor to wildfire mitigation, this will be focused around areas of highest recreational footfall. Vegetation management around key recreation sites, notably the main hub and Mamhead car park and along popular trails will lower the fuel load factor and thus the risk of fire ignition.

Management Practice	**Zone A - Asset Zone** Protect human life & infrastructure	**Zone B - Buffer Zone** A buffer areas around Zone A and major roads	**Zone C - Low-risk** Low to medium risk area for normal management	**Zone D -Fire excl. Zone** Protect habitats
Vegetation management	Vegetation and other combustible materials should be minimised	Fuel loading and deadwood should be reduced	Conventional vegetation management practices	
Fire Belt	30-40 metres	20 metres	20 metres	20 metres
Fire Break	3 x vegetation height	1 x vegetation height	1 x vegetation height	3 x vegetation