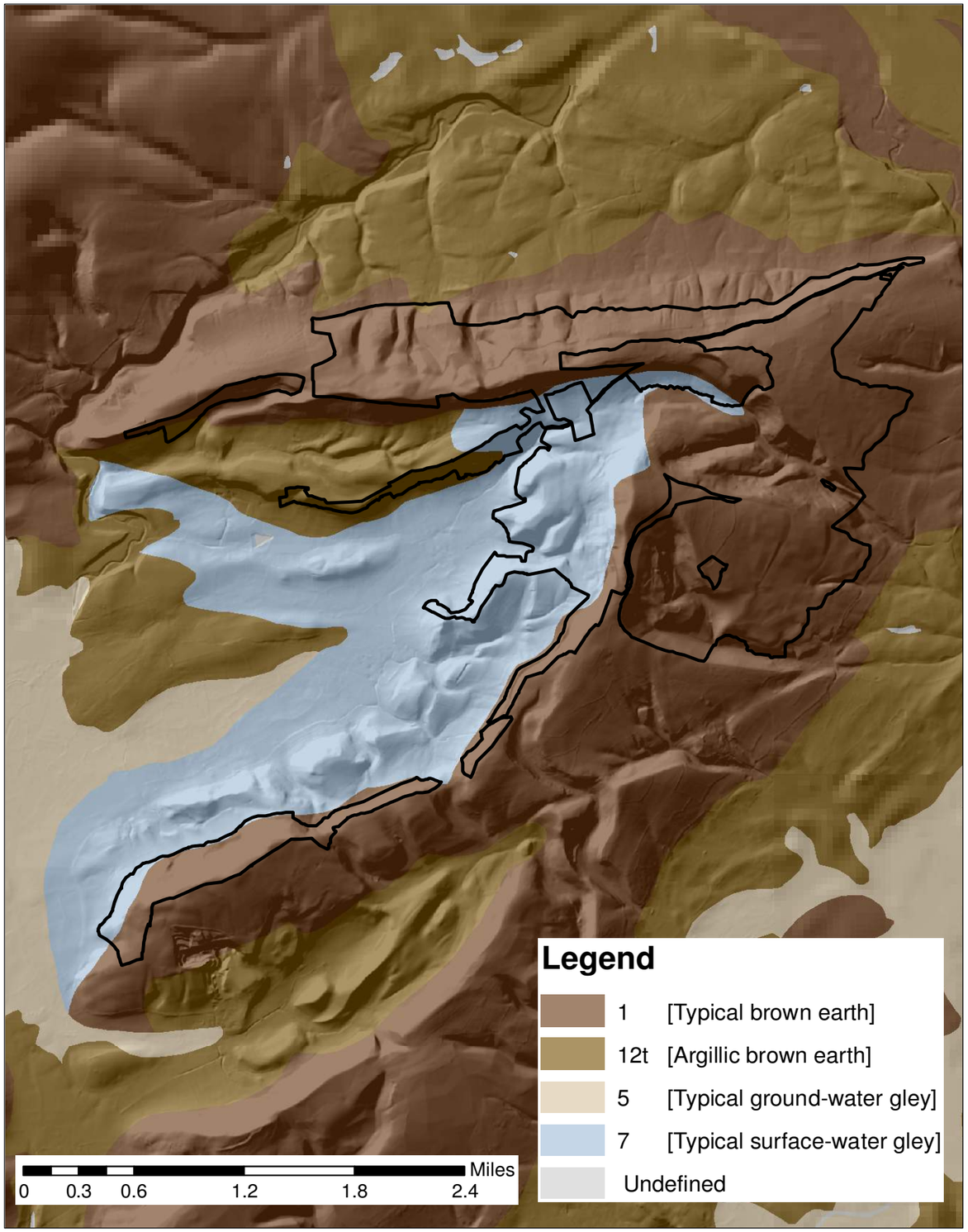
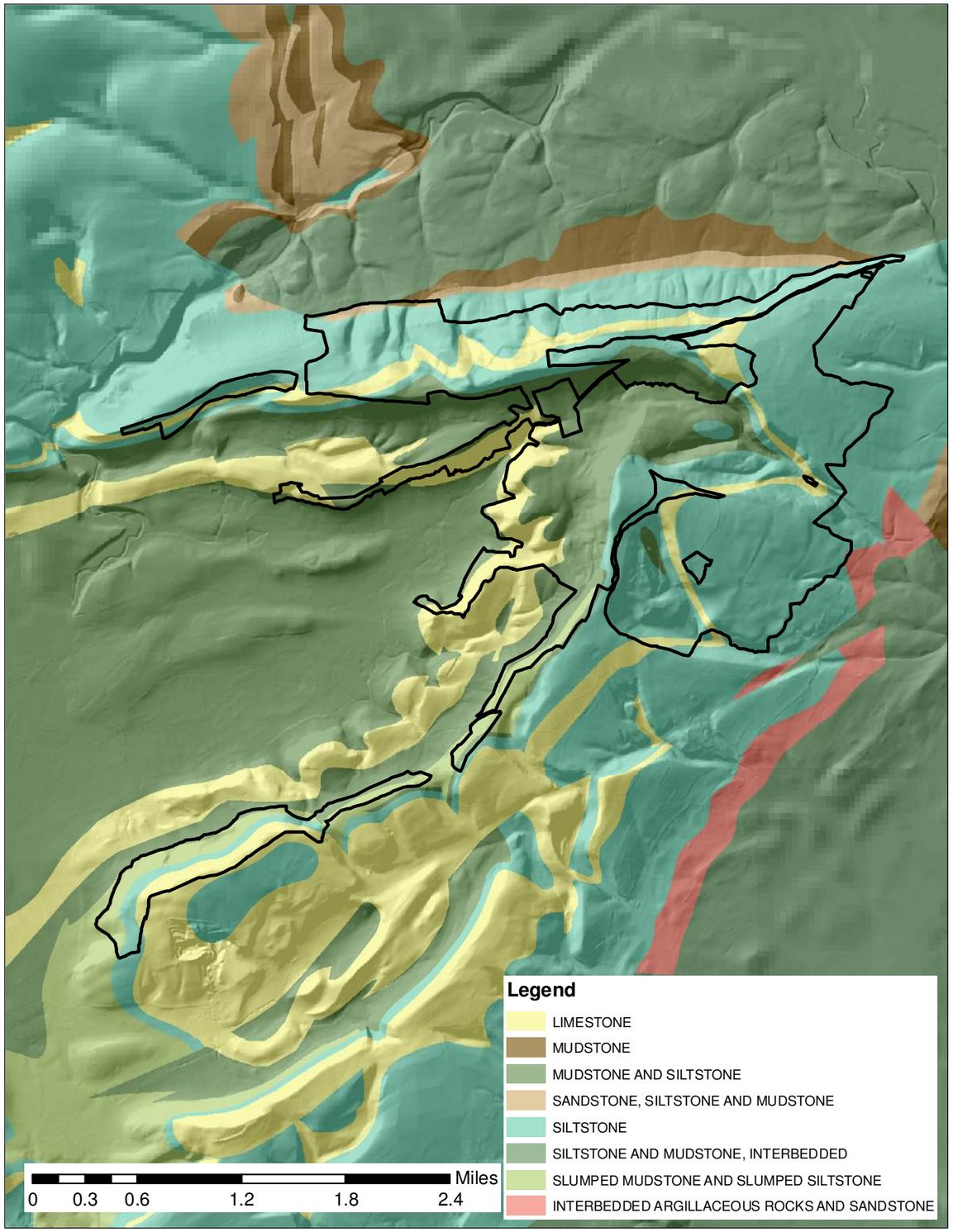
Soils



Geology



Landform Analysis

The Mortimer Forest Plan area sits raised in an lowland but hilly landscape at between 150 – 375 metres above sea level, with a predominantly north-westerly aspect.

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.

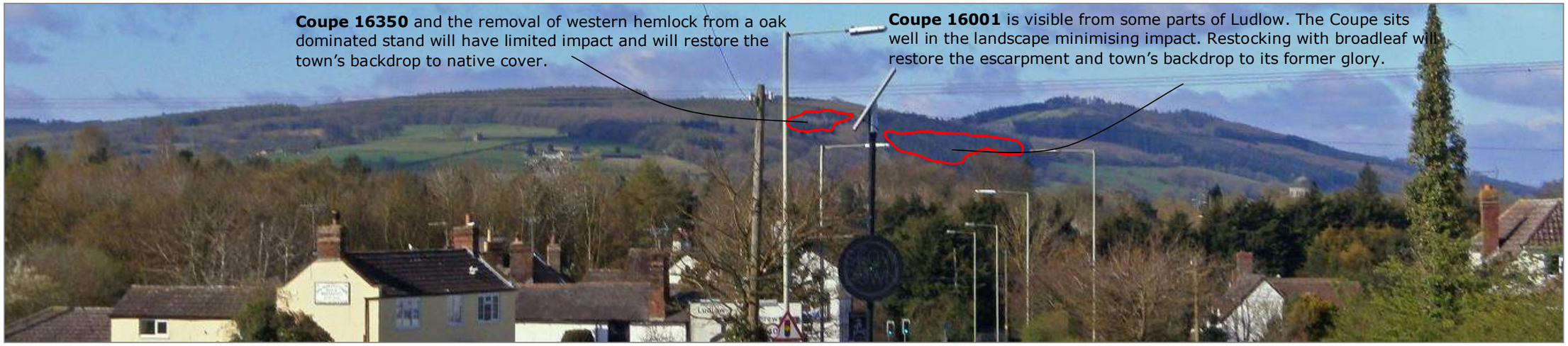
Lines of upward force

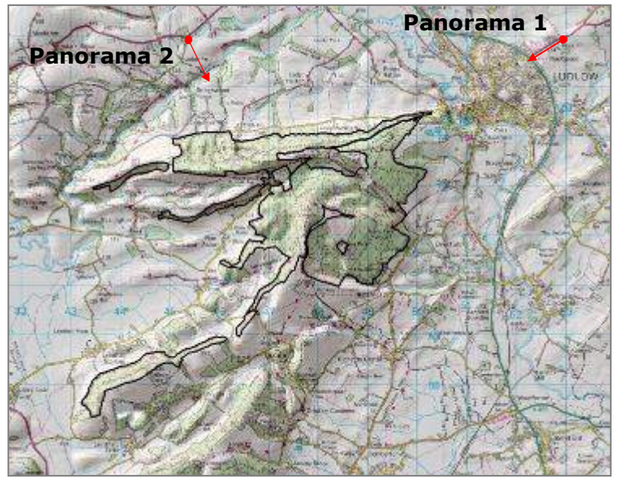
Lines of downward force

0 1 2 4 6 8 Miles

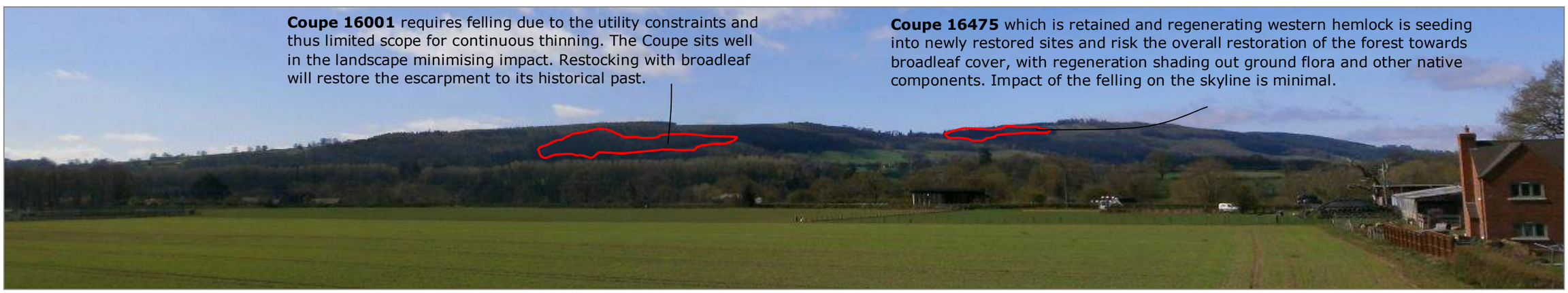
Landscape Analysis

Panorama 1



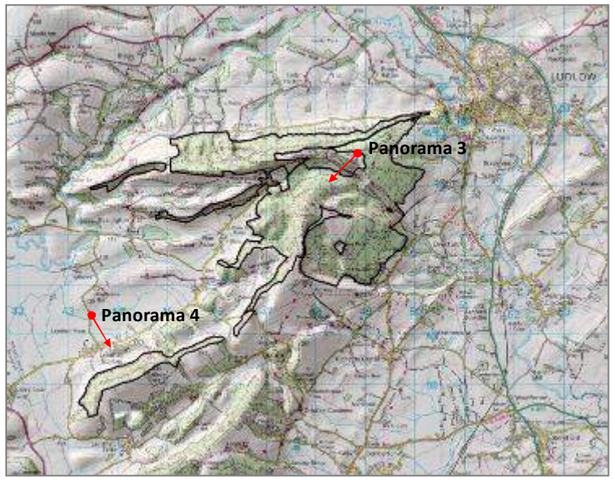


Panorama 2

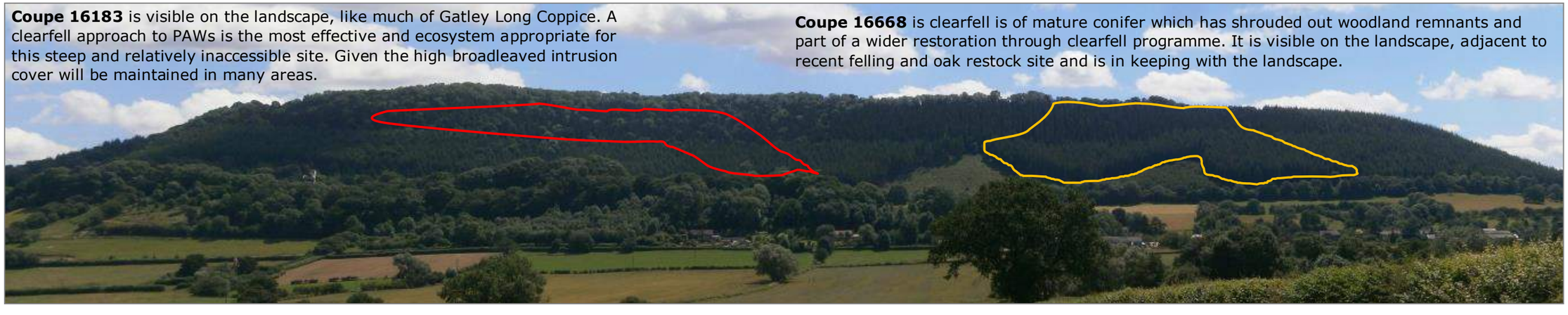


Landscape Analysis

Panorama 3



Panorama 4



Water & Riparian Management

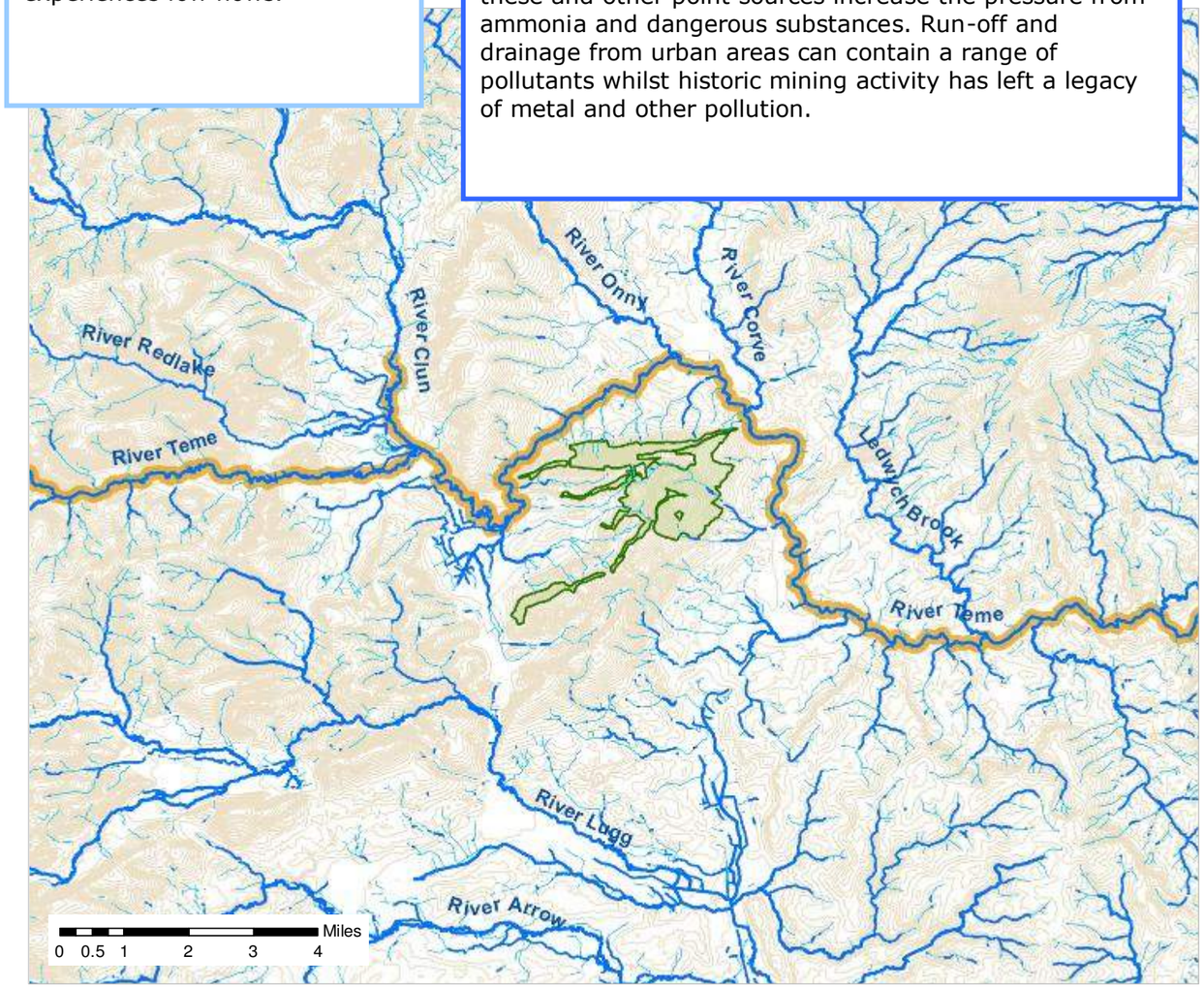
River Teme Catchment (River Basin Management Plan, Environment Agency, 2009)

Brown trout and migratory Atlantic salmon are found throughout the majority of the Teme catchment and its tributaries provide extensive spawning grounds for both species. The presence of obstacles such as weirs limits the distribution of salmon within the catchment. Water quality in the lower reaches of the catchment is affected by diffuse pollution, mainly by nutrients and sediment. Whilst there is adequate supply of surface water in the catchment during the winter months, in the summer the Teme often experiences low flows.

flow

River Severn Basin (River Basin Management Plan, Environment Agency, 2009)

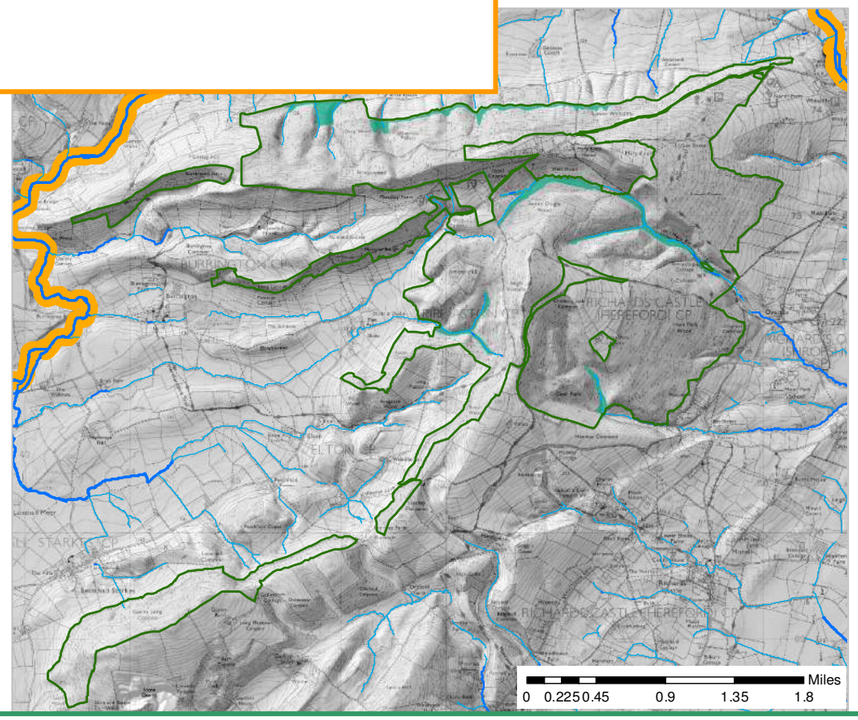
The Severn River Basin is home to over 5.3 million people and covers an area of 21,590km2, with about one third of the district in Wales. The river basin district contains important habitat and wildlife areas, including 28 Special Areas of Conservation and five Special Protection Areas. Rural land management is a source of diffuse pollution from nutrients, sediments and pesticides. Sewage treatment works and other intermittent discharges from the sewerage network also increase nutrient levels whilst these and other point sources increase the pressure from ammonia and dangerous substances. Run-off and drainage from urban areas can contain a range of pollutants whilst historic mining activity has left a legacy of metal and other pollution.



River Teme SSSI (SSSI Notification, Natural England, 1996)

The River Teme is of special interest as a representative, near-natural and biologically-rich river type associated with sandstone and mudstones. These attributes and the high water quality, support significant river plant, fish and invertebrate communities and otter populations.

The majority of the SSSI is currently in 'Unfavourable, no change' condition, due to poor water quality as a result of inappropriate hard structures, invasive freshwater species and water pollution. The maintenance of good water and sediment quality are essential to maintaining a healthy river system. River management should minimise pollution both from point and diffuse sources, and will include discharges of domestic and industrial effluent, run-off from agriculture, forestry and urban land, and accidental pollution from industry and agriculture. Riparian areas and the wider catchment need to be managed sensitively to avoid excessive run-off of soil particles and nutrients into the river.



Riparian Management

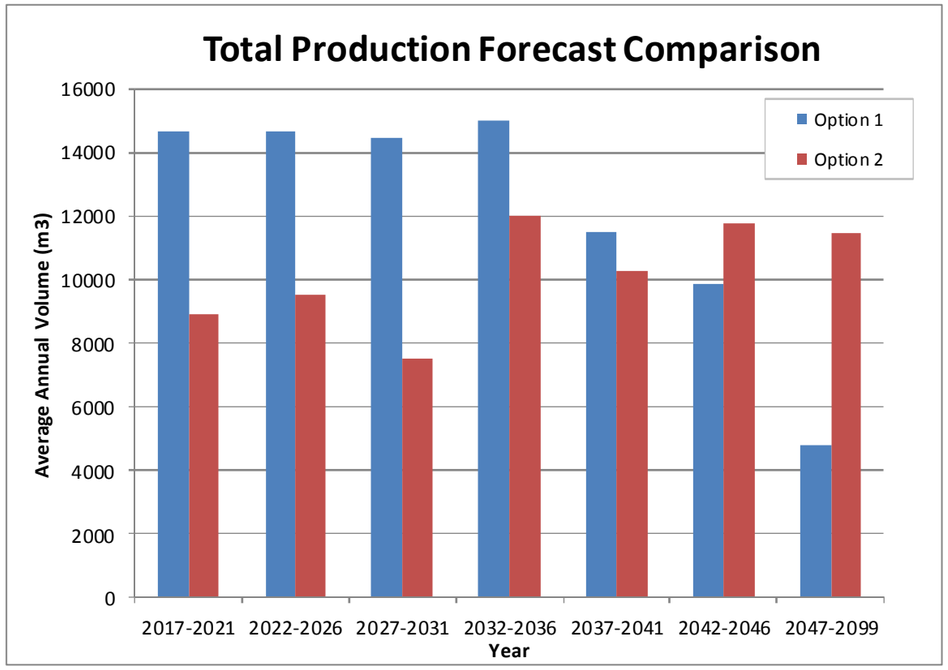
The riparian zones identified will be developed over time to create areas of 50% continuous forest cover through gradual conifer removal and enrichment with site appropriate native tree species, such as *Alnus, Salix* and *Ulmus* spp. A gradual change to this type of wetland habitat will create a environment of dappled shade with good light penetration and aeration as well as buffer the riverine systems from forestry operations.

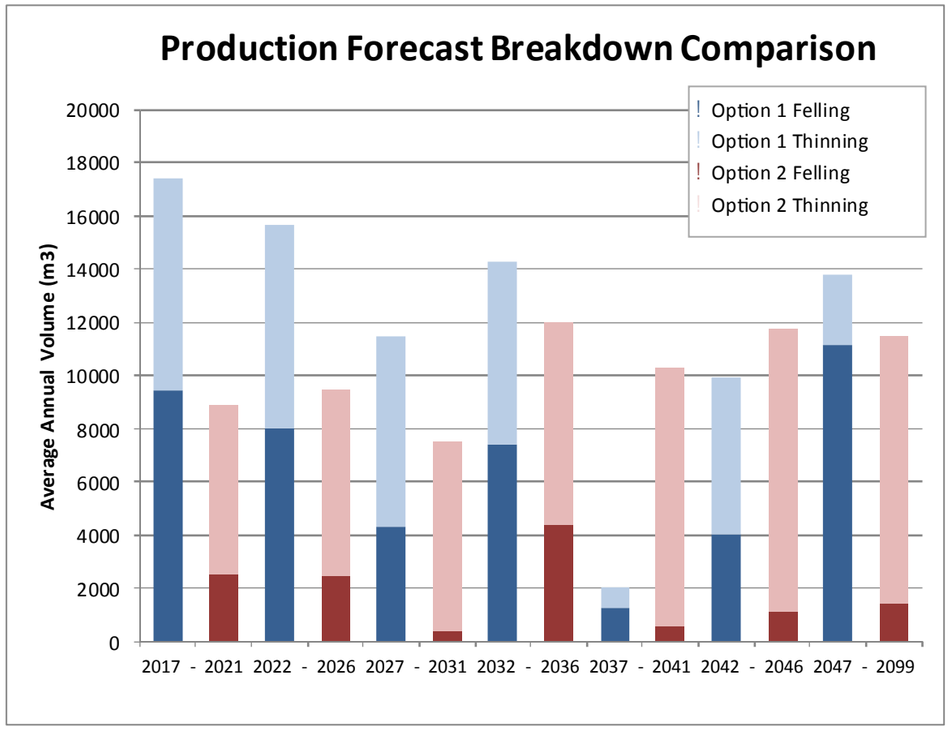
Clearfells within the Plan area have been designed and phased to minimise surface water runoff and soil erosion ensuring the riverine systems and SSSI are protected and improved into the future. All operations will look to work within the guidelines set out in UKFS, Forests and Water.

Mortimer Forest Plan area provides excellent flood alleviation for the River Teme and the wider Severn River Basin 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.

Option Testing

Option 1 – Current Forest Plan	Option 2 – Proposed Forest Plan
The continued production of sustainable and marketable woodland products.	
The production of timber is somewhat reliant on volume resulting from clearfelling. This felling programme is experiences some periods significant of peaks and troughs. This combines together to make a less sustainable production model for woodland products.	The felling and thinning programme is balanced across the decades which stabilises the sustainability of timber production. This is achieved by resequencing coupes and increasing the amount of thinning volume by switching suitable coupes to CCF.
To conserve, maintain and enhance cultural and heritage assets	
The proposals make little acknowledgement of the heritage assets but in reality plans would have minimal impact on features.	The Plan acknowledges the cultural significance of the Forest and a clear and measurable set of proposals have ensured the perpetuity of these valuable features.
The provision and maintenance of recreation facilities.	
Management proposals see a steady flow of clear felling with coupes adjacent to recreational facilities.	Selection systems will replace some clear felling in key areas to ensure a higher quality of user experience.
To protect and restore areas of ancient woodland in line with 'Keepers of Time'.	
Minimal acknowledgement is made of the need or process to restore ancient woodland. Any significant restoration would be achieved through clear felling and restocking.	A clear strategy for PAWS restoration through a mixture of clear felling, group felling and thinning together with native species replanting will ensure a proactive restoration of ancient woodland will occur over time.
Protect and enhance woodland and open habitats and their associated species.	
Restructuring is mainly reliant on the use of clear felling with restocking consisting use of one or two species, thus retaining fairly monocultured single-aged stands.	The diversification of age and species structures through targeted felling and restocking together with a proactive programme of maintaining permanent and transient open space ensures an enhanced and diverse range of habitats is realised.
To deliver well-designed proposals that comply with landscape design principles in keeping with the local landscape character.	
A reliance on clearfell particularly on visible edges, such as Bringewood with little allowance for integrated management systems and retentions to minimise felling impact.	The Plan makes acknowledgement and provision for the forests contribution to the local landscape character. Coupes are designed in a way to enhance the local character both from a short and long-distance, Steps have been taken to reduce the amount of clearfelling as well as using corridors to improve internal landscape views.





Utilities

Legend

- Powerline Overhead
- Powerline Underground
- water_pipeline

Roads

- Class B
- Class C
- Unclassified
- n — Dams

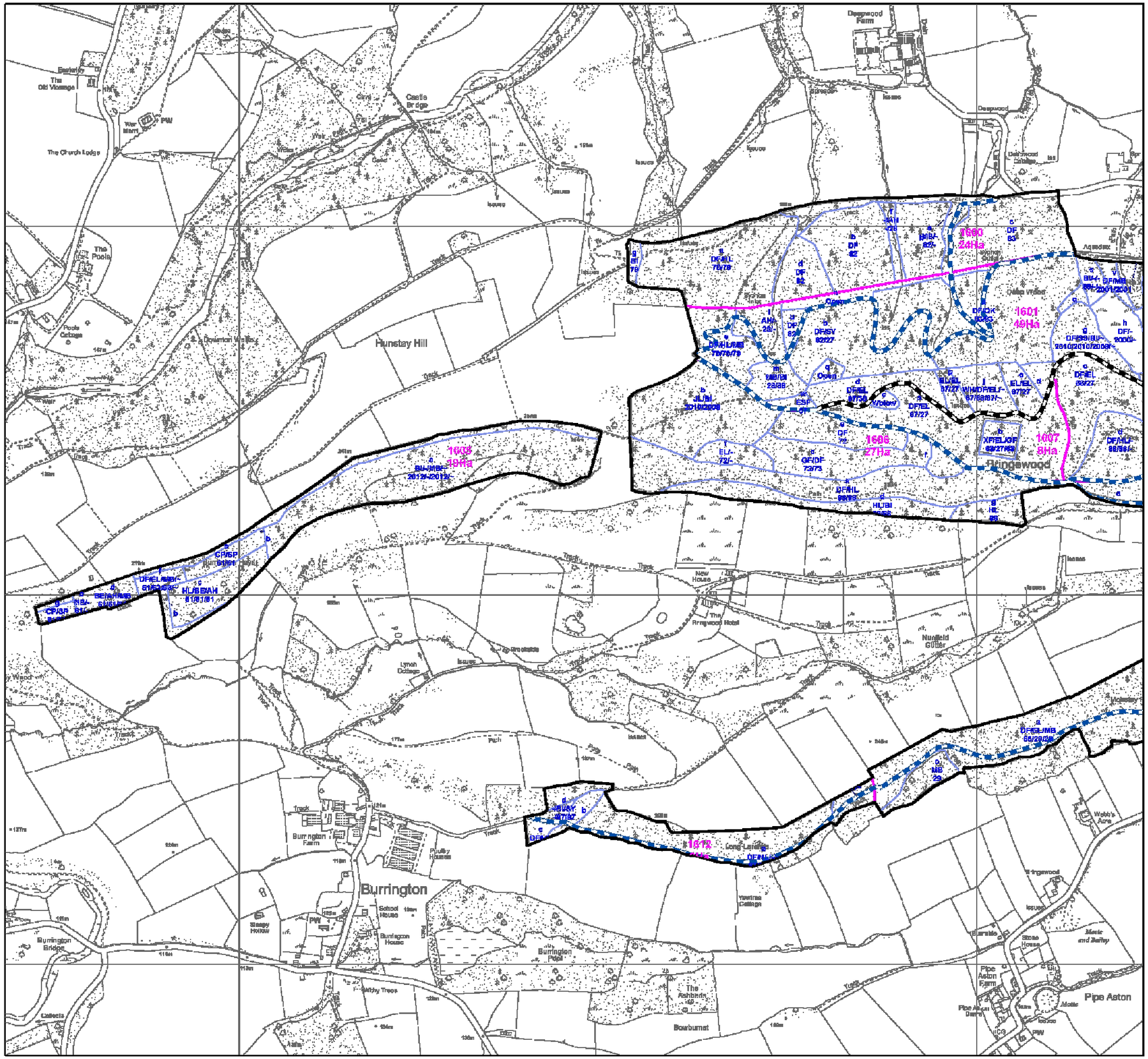
0 0.275 0.55 1.1 1.65 2.2 Miles

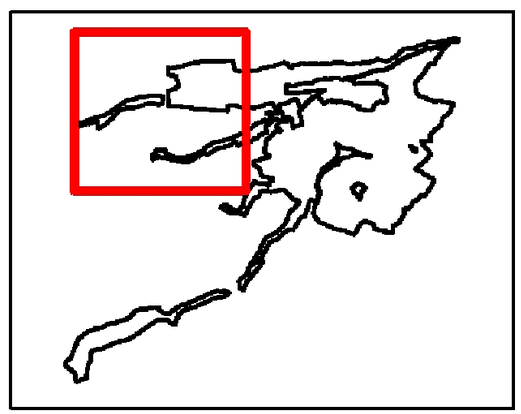
Fell 2019 - 2021
Fell 2022 - 2026
Fell 2027 - 2028
Group Selection

Coupe Prescriptions

Coupe	Area	Existing Crop	Rationale/Prescription	Restock	Area	Restock Proportion	Rationale/Prescription
16350	1.3 ha	p.56 WH	Mature western hemlock continues to pose a risk to the restoration of the forest towards broadleaf cover, with regeneration shading out ground flora and other native components, particularly mature oak within the stand which is to be retained. Operation should be similar to a heavy thinning.	**16350a**	1.3 ha	80% Native broadleaf 20% Open	Replanting should only be required to enrich the exiting mature oak component intrusion within the stand. This is most likely in towards the east of the stand which is more heavily coniferised. Consider enriching in with wych elm, cherry and wild service.
16475	2.8 ha	p.54 WH p.2001 WH	Retained and regenerating western hemlock is seeding into newly restored sites and risk the overall restoration of the forest towards broadleaf cover, with regeneration shading out ground flora and other native components.	**16475a**	2.8 ha	80% Native broadleaf 20% Open	Replanting on this exposed site will be required. Site is relatively poor and well drained, north facing and cool. Consider planting all of the site with Pedunculate oak, elm, cherry and/or wild service.
16183	9.3 ha	p. 64 NS	Clearfell approach to PAWs is the most effective and ecosystem appropriate for this steep and relatively inaccessible site. Clearfell is of mature conifer which has shrouded out woodland remnants and part of a wider restoration through clearfell. Option to heavily thin p.80s crop within coupe if felt appropriate.	**16183a**	9.3 ha	80% Native broadleaf 20% Open	Restocking should be achieved through a mixture of cluster planting and natural regeneration. Banks of seeding broadleaves to the south should provide good local source from which to build. Consider planting oak in clusters with hazel to replicate coppice with standards.
16001	8.4 ha	p.55 DF	Crop is mature and situated below major utility pipeline. Continued thinning for gradual restoration threatens the integrity of the pipeline and therefore crop will be removed in single operation.	**16001a**	8.4 ha	80% Native broadleaf 20% Open	Replanting should only be required to enrich the exiting mature oak component intrusion within the stand. This is most likely in towards the east of the stand which is more heavily coniferised. Consider enriching in with wych elm, cherry and wild service.
16083	9.3 ha	p.61 WH p.61 GF p.62 NS p.62 DF	Crop has now reach economic maturity and further thinning will yield little result. Mature seeding conifers pose a risk to the remnant features, with regeneration shading out ground flora and other native components and continued thinning to CCF too complex given the site conditions.	**16083a**	6.3 ha	90% Evergreen conifer 10% Open	Site yields good quality timber and should be restocked accordingly with this objective in mind. Flushed poor to rich soils mean consider planting Douglas fir, Omarika spruce or Noble fir
				16083b	3.0 ha	80% Native broadleaf 20% Open	Replanting on this exposed site will be required. Site is relatively poor and well drained and south facing. Consider planting all of the site with Pedunculate oak, elm, cherry and/or wild service.
16668	8.3 ha	p.64 NS	Clearfell approach to PAWs is the most effective and ecosystem appropriate for this steep and relatively inaccessible site. Clearfell is of mature conifer which has shrouded out woodland remnants and part of a wider restoration through clearfell programme. Option to heavily thin p.80s crop within coupe if felt appropriate.	**16668a**	8.3 ha	80% Native broadleaf 20% Open	Restocking should be achieved through a mixture of cluster planting and natural regeneration. Banks of seeding broadleaves to the south should provide good local source from which to build. Consider planting oak in clusters with hazel to replicate coppice with standards.
16836	4.9 ha	p.52 JL p.52 DF	Crop has now reach economic maturity and further thinning will yield little result. Given much is larch on secondary woodland, this is precautionary attempt to minimise the impact of *Phythophthora ramorum* infection. Coupe is part of wider ongoing clearfelling programme.	**16836a**	4.2ha	90% Evergreen conifer 10% Open	Site yields good quality timber and should be restocked accordingly with this objective in mind. Flushed poor to rich soils mean consider planting Douglas fir, Omarika spruce or Coast redwood
				16836b	0.7 ha	80% Native broadleaf 20% Open	Replanting on this exposed site will be required. Site is relatively poor and well drained. Consider planting all of the site with Pedunculate oak, elm, cherry and/or hazel.
16713	6.3 ha	p.50 JL	Group fellings totalling 1.5 ha within Plan period (up to 0.25ha per 2ha per 5 years) used to diversify stand structure and accelerate native woodland cover restoration. Group fells should start furthest from car park and trails to minimise impact.	**16713a**	6.3 ha	80% Native broadleaf 20% Open	Minimal replanting should be required given the sites propensity to naturally regenerate oak and hazel. Consider enriching in clusters with Pedunculate oak, elm, cherry and wild service.
16747	15.4 ha	p.59 JL p.49 JL p.49 LC	Group fellings totalling 3.5 ha within Plan period (up to 0.25ha per 2ha per 5 years) used to diversify stand structure and accelerate native woodland cover restoration. Group fells should start furthest from car park and trails to minimise impact.	**16747a**	15.4 ha	80% Native broadleaf 20% Open	Minimal replanting should be required given the sites propensity to naturally regenerate oak and hazel. Consider enriching in clusters with Pedunculate oak, elm, cherry and wild service.

Stock Data - 2018





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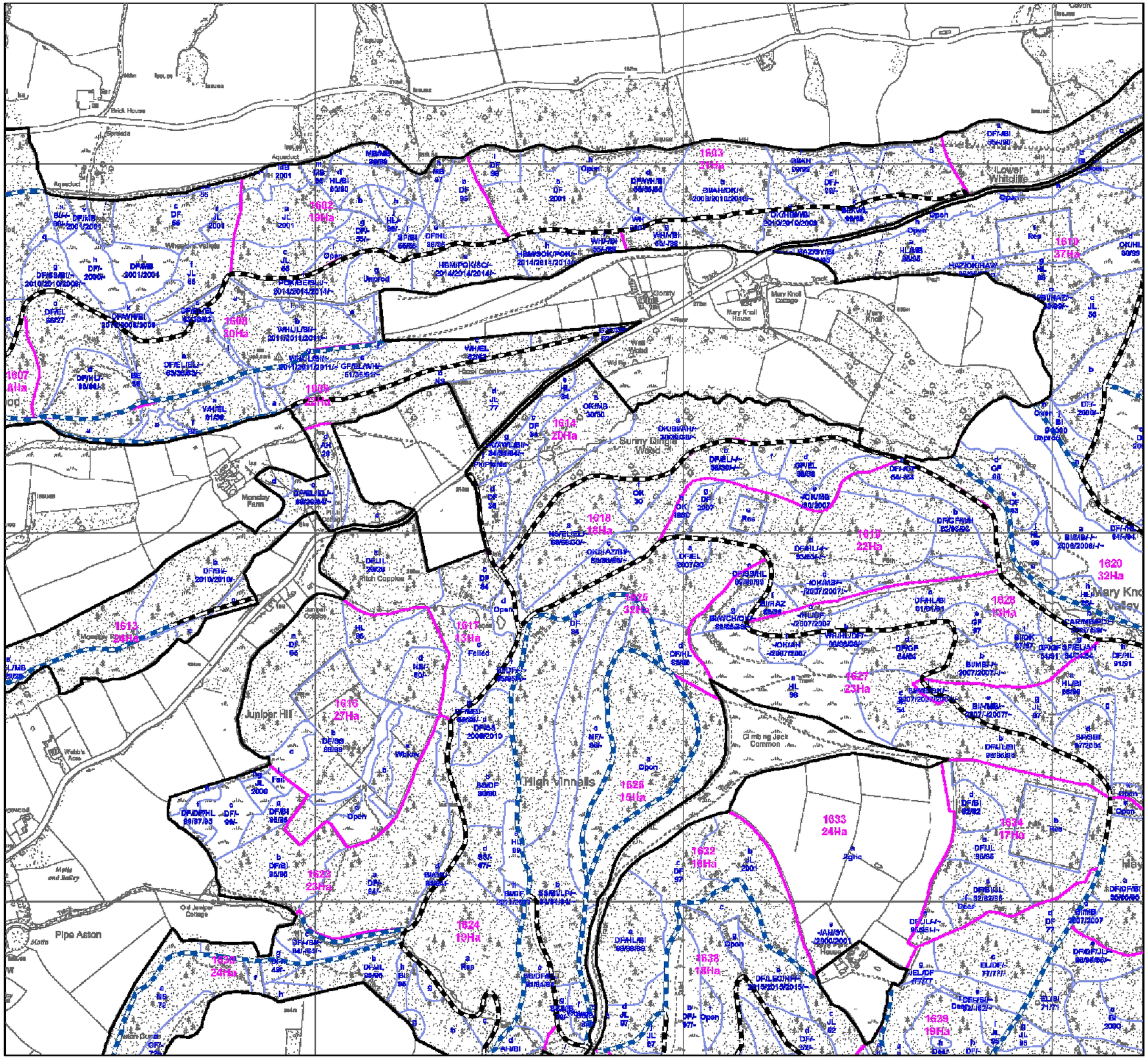

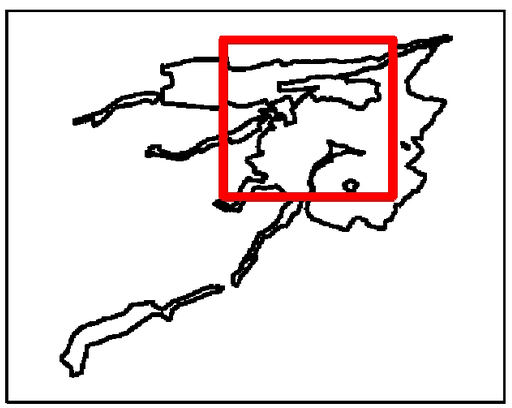

0 0.1 0.2 0.4 0.6 0.8 Miles

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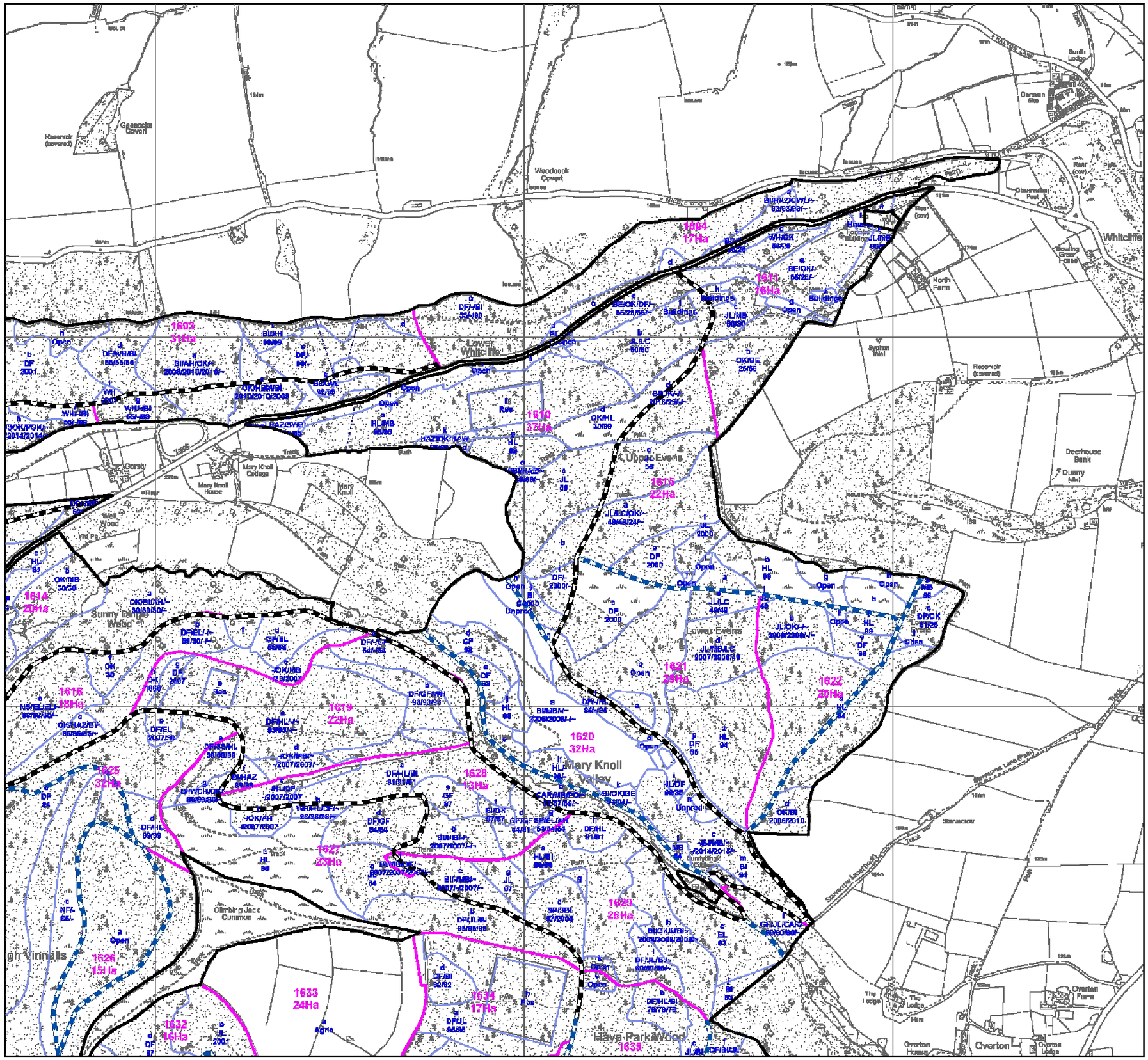

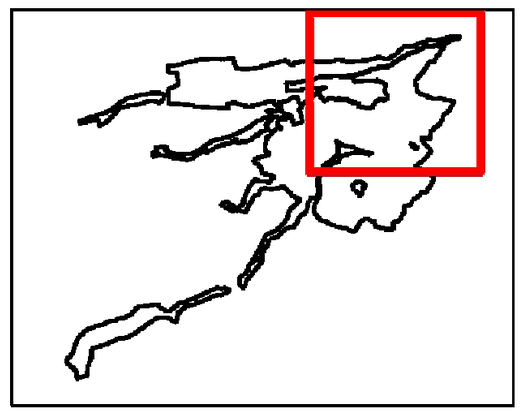

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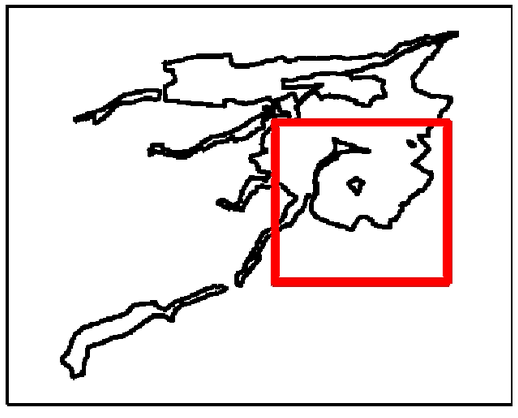

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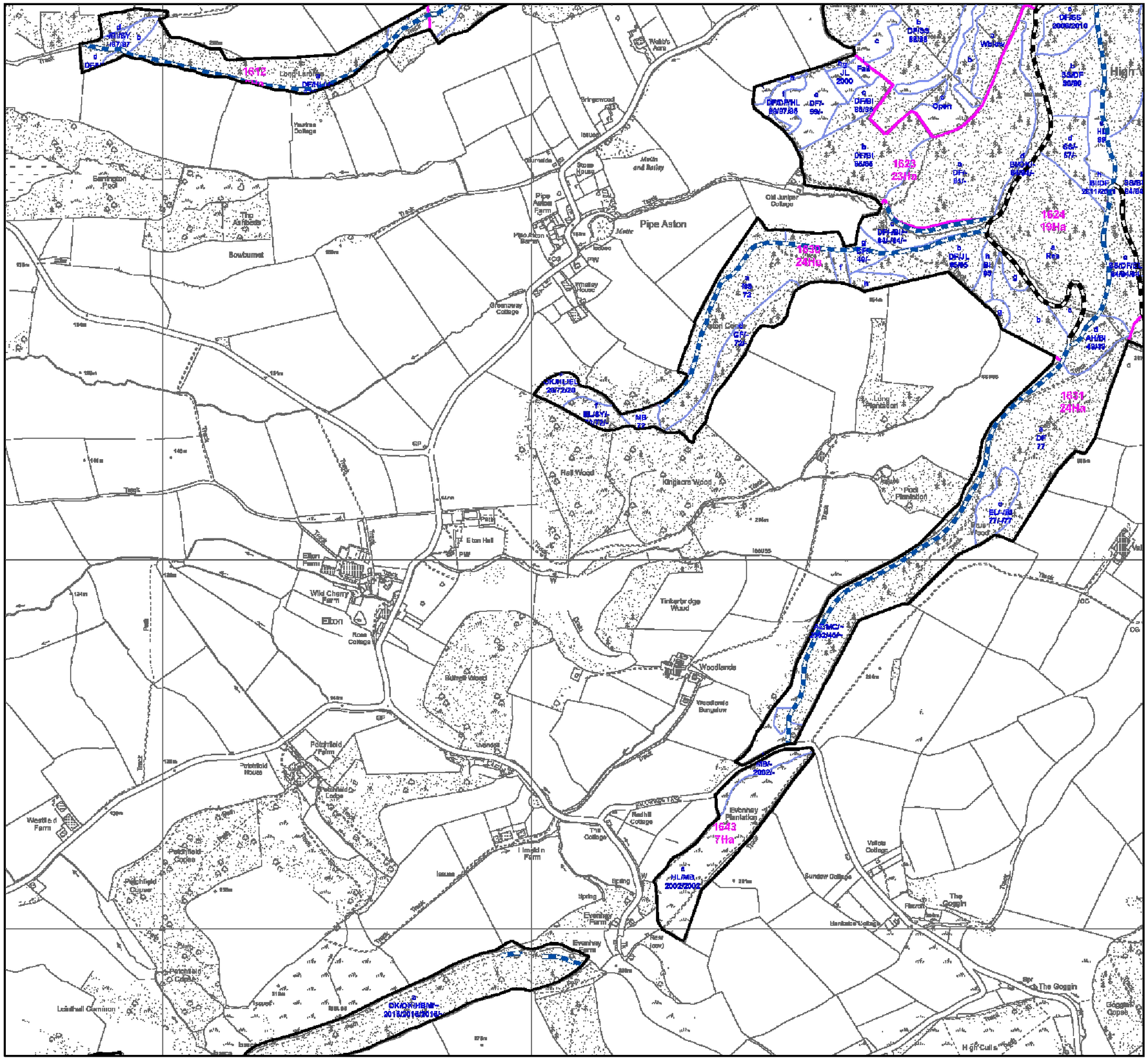

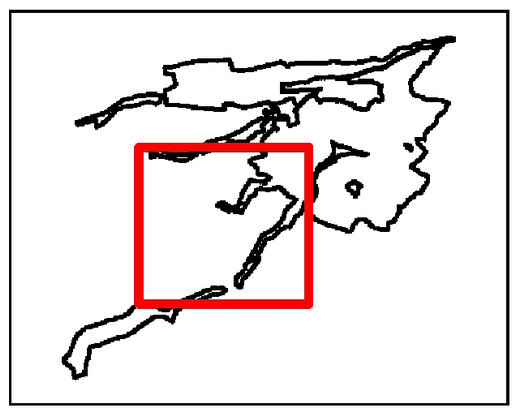

0 0.1 0.2 0.4 0.6 0.8 Miles

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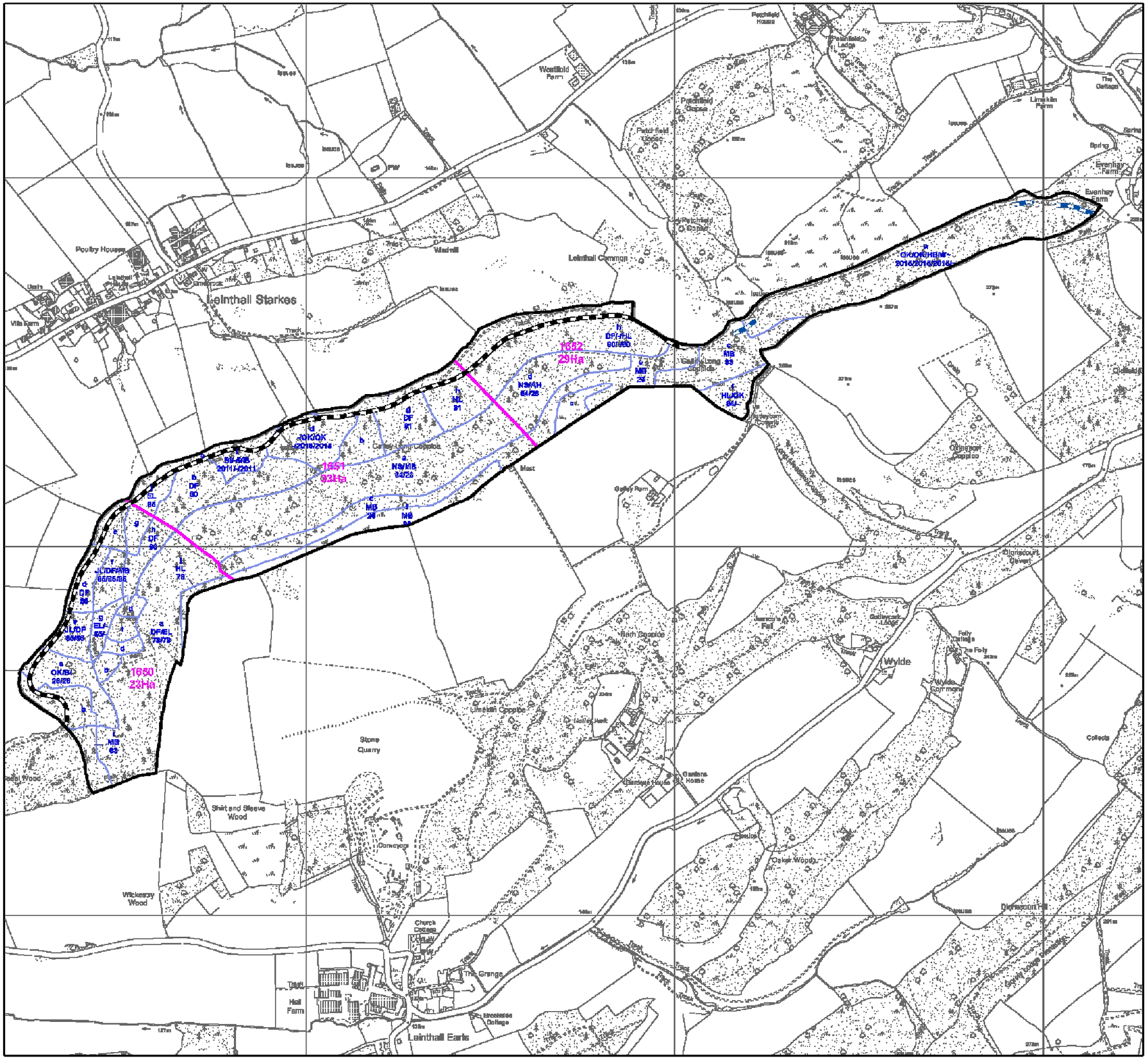
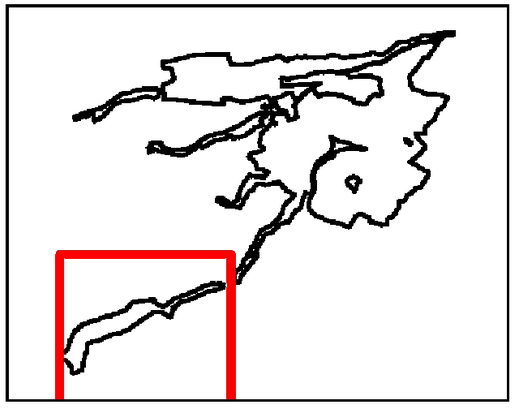
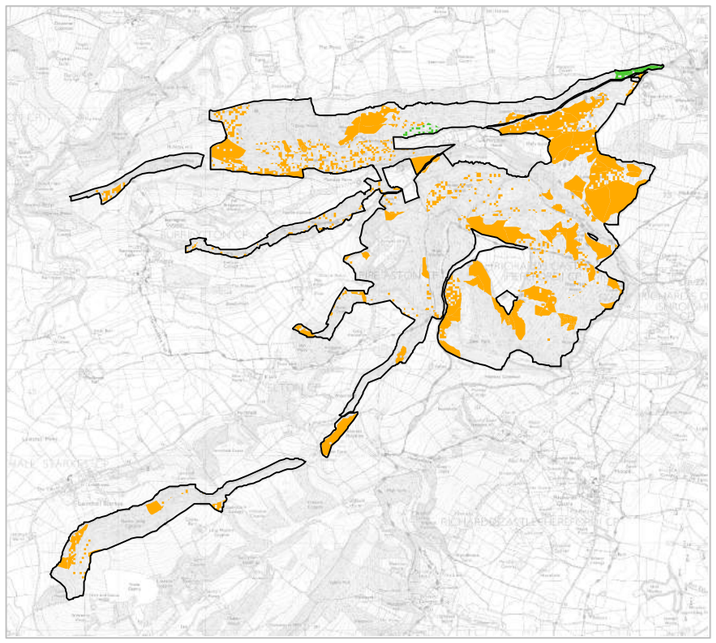
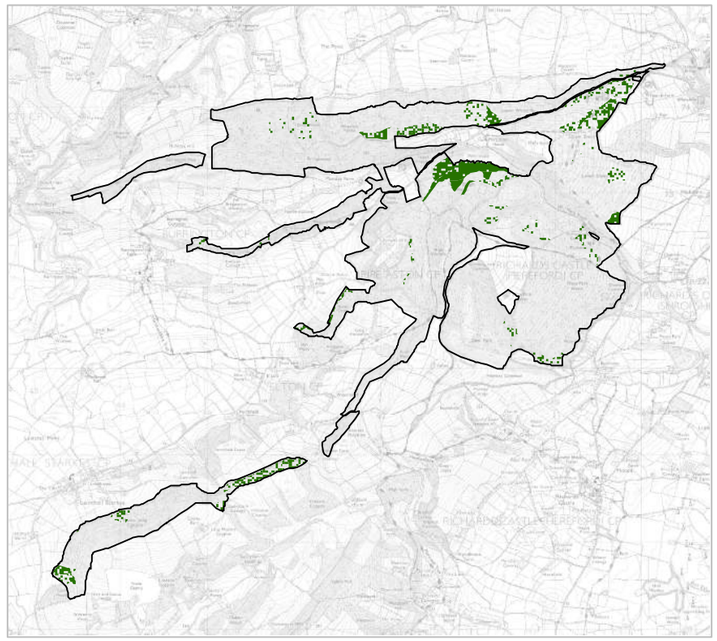




Pests & Diseases

Name: *Phytophthora ramorum* (PR)
First appearance: 2009
Attacks: Larches
P. ramorum was first found in the UK in 2002 and until 2009 in the woodland environment had largely been associated with rhododendron species acting as a host from which spores are produced. In August 2009 P. ramorum was found on a small number of dead and dying Japanese Larch in South West England, causing particular concern since some affected trees were not close to infected rhododendron and showing a significant change in the dynamics of the disease than experienced previously. Following this testing in Devon and west Somerset confirmed the presence of PR in mature Japanese larch as well as species in its under-storey, including sweet chestnut, beech, birch, oak, Douglas fir and Western hemlock. On some sites there is little or no rhododendron present. It is now known that Japanese larch can produce very high quantities of disease-carrying spores when actively growing in spring and summer, at much higher levels than those produced by rhododendron. These can be spread significant distances in moist air. PR is a notifiable disease dealt with by felling the infected area under a statutory plant health notice (SPHN) issued through FERA and the Forestry Commission.





Name: Oak 'dieback' or 'decline'
First appearance: unknown
Affects: Oak
Oak 'dieback' or 'decline' is the name used to describe poor health in oak trees and can be split into Chronic decline and Acute decline. Chronic decline is protracted taking effect on the Oak over a number of decades whilst Acute decline is much swifter acting over much shorter periods usually five years or so. Symptoms can be caused by a range of living agents e.g. insect and fungal attack, or non-living factors, e.g. poor soil and drought. Factors causing decline can vary between sites, as can the effects of the factors through time. Oak decline is not new; oak trees in Britain have been affected for the most part of the past century. Both native species of oak are affected, but Pedunculate oak (Quercus robur) more so than Sessile oak (Quercus petraea). Successive exposure to any of these agents on a yearly/ seasonal basis further reduces the health of the tree(s) and predisposes it to other living (Biotic) agents that can often spell the eventual death knell for the tree.

Name: *Chalara fraxinea*
First appearance: currently N/A
Attacks: Ash
Pretty rampant in Europe, showing up in 2012 mainly in East Anglia and along the East coast of England. To date no infection has been found within this part of the West England Forest District and let us hope it stays that way!

Name: Dothistroma Needle Blight (DBN)
First appearance: mid 1990s
Attacks: Pine species
Often referred to as Red Band Needle Blight (RBN) and can reduce growth rates by between 70 and 90%. Effects of RBN are managed through thinning the wood more heavily than you would normally to introduce higher levels of air flow through the remaining crop. However, the Mortimer Plan area contains a relatively small component and therefore its impact has been fairly limited.

Glossary

Term	Abbreviation	Description
Ancient Semi-Natural Woodland	ASNW	An ancient woodland site, where trees and other plant species appear to of established naturally rather than having been planted. Predominantly these sites will contain 80% or over of site native species or species native to the surrounding area.
Alternatives to Clearfell	ATC	Alternative to Clearfell is similar to CCF and refers to management systems where stands are regenerated without clearfelling.
Ancient Woodland Site	AWS	A site that has technically been wooded since 1600AD and is unlikely to have been converted to farmland in the last few centuries.
Continuous Cover Forestry	CCF	Continuous Cover Forestry is an approach to forest management that enables an owner of woodland to manage the woodland without the need for clearfelling. This enables tree cover to be maintained, usually with one or more levels and can be applied to both conifer or broadleaf stands. With Conifer it is possible to regenerate the crop a lot faster than in broadleaf crops, where the canopy is generally removed a lot slower and over a much longer time span. A decision to use CCF must be driven by management objectives and will have long-term vision often aimed at creating a more diverse forest, both structurally and in terms of species composition. There are no standard prescriptions meaning CCF is very flexible in ensuring opportunities can be taken advantage of as they arise. This development of a more diverse forest is a sensible way to reduce the risks posed by future changes in the climate and biotic threats.
Clearfell	C/F or CF	To cut and remove all trees from a certain area of woodland.
Crop		A stand of trees. Often associated with stands completely or partially managed for its timber. Just as farmers manage crops so does forestry the only difference is a farmers' rotation is shorter and often realised in 1 year. Trees are a much longer term crop with rotations varying from 6 years to 400 years. (also see definition for rotation)
Enrichment planting		Planting different species within areas of regen that helps diversify the range of species in a wood and in doing so can make it more resilient to future climate change and future threats from disease. Enrichment may be desirable in areas where success of regeneration is uneven, patchy or where a regen crop is limited by the number of species present.
Group felling / group planting		This is where small areas of woodland are felled hence the name "group felling" and then either allowed to develop through the use of nat-regen or in this case planted hence "group planting". These techniques can help to develop structure* within a wood over a given length of time and is often used in conjunction with continuous cover. *Either in terms of age or number of tree species present, since shelter and shade are provided by the remaining upper storey one can consider a larger number of tree species when deciding what to plant.
Hectare	Ha	Unit of area equating to 2.47 acres.
Native (and honorary native)		The trees making up the woodland are part of England's natural, or naturalised flora. Determined by whether the trees colonised Britain without assistance from humans since the last ice age (or in the case of 'honorary natives' were brought here by people but have naturalised in historic times); and whether they would naturally be found in this part of England.
Natural Regeneration	Regen or nat-regen	Trees growing on a site as a result of natural seed fall, and can be used as a management process and can allow cleared areas of woodland to germinate, grow and develop naturally. This process can happen anywhere and woods can be managed to encourage nat-regen although there is no guarantee of success. In these instances, or if nat-regen is unlikely for a variety of reasons, one can use enrichment planting or group planting to achieve the same affect. The process usually relies on an overstorey of "parent trees" being present or on parent trees being close by to provide the seed. These parent trees will usually of been thinned and managed with natural regeneration in mind. Existing areas of nat-regen are then usually developed through carefully thinning the surrounding woodland over a number of years, to give more light and space to ensure the young trees can establish themselves into larger trees eventually allowing them to be incorporated ('recruited') into the main crop for the next rotation at some point in the future. Usually done in small groups or in strips this system can allow a varied woodland structure to develop over time. Protection from competing plant species and mammal browsing might be required in the early stages by fencing or using tree shelters.

Rotation		Generally a commercial term used to describe the length of time an area of trees is growing for, from the time of planting to the time of felling. For broadleaves a rotation is generally a lot longer than that of conifer species* and can broadly speaking be anywhere between 80 years to 3-400 years, as opposed to conifer crops whose rotation is generally shorter but can vary from 20-25 years to 120 years plus. *The exception being that of coppice where rotation length can vary from 5 or 6 years up to 30 years plus depending on management objectives. "First rotation" would refer to an area of wood planted on open ground not previously wooded. And so "second rotation" is one where woodland has been cleared and replanted.
Shelterwood		A management system that is applicable to conifer or broadleaf, where tree canopy is maintained at one or more levels without the need to clear-fell the whole site. Felling can occur, but generally in small "groups" whose size shape and spatial distribution will vary depending on site conditions. The "groups" are then either: allowed to develop and establish by the use of natural regeneration, are planted or are established using a mixture of both techniques. This known as a "group shelterwood system" A variation on this is "Single tree selection". This variation removes individual trees of all size classes more or less uniformly throughout the stand to maintain an uneven-aged stand and achieve other stand structural objectives. While it is easier to apply such a system to a stand that is naturally close to the uneven-aged condition, single tree selection systems can be prescribed for even-aged stands, although numerous preparatory thinning interventions must be made to create a stand structure where the system can truly be applied.
Silviculture		A term coined during late 19th century from the Latin *silva meaning* 'wood' and the French *culture* meaning 'cultivation' and so Silviculture is the art and science of controlling the establishment, growth, composition, and quality of forest vegetation to achieve a full range of forest resource objectives.
Stand		A group or area of trees that are more or less homogeneous with regard to species composition, density, size, and sometimes habitat.
Thin	TH	Selective removal of trees from a wooded area, giving remaining trees more space to grow into larger trees. Thinning is done to: Improve the quality and vigour of remaining trees. Remove trees interfering with mature or veteran broadleaf trees. Give space for tops (or "crowns") of broadleaf trees to develop and potentially act as a future seed source. Give space for natural regeneration to grow and develop with the intention of recruiting these younger naturally grown trees as a part of the future woodland structure. Create gaps for group planting or enrichment. Remove species of tree that may compromise the intended management objective of the woodland e.g.: non-native or invasive species such as Sycamore, Western Hemlock or birch. Improve the economic value of a wood. Help realise opportunities to enhance ecological value. **NOTE:** This list is not in any order of priority and will vary depending on management objectives.
Yield Class	YC	A method of measuring the growth rate or "increment" of a crop of trees by age and height; measured in m3 per Ha per annum. E.g. A crop with a YC of 16 is one that has an annual increment of more than 16m3 but less than 17m3, although generally only even numbers are used when stating YC.

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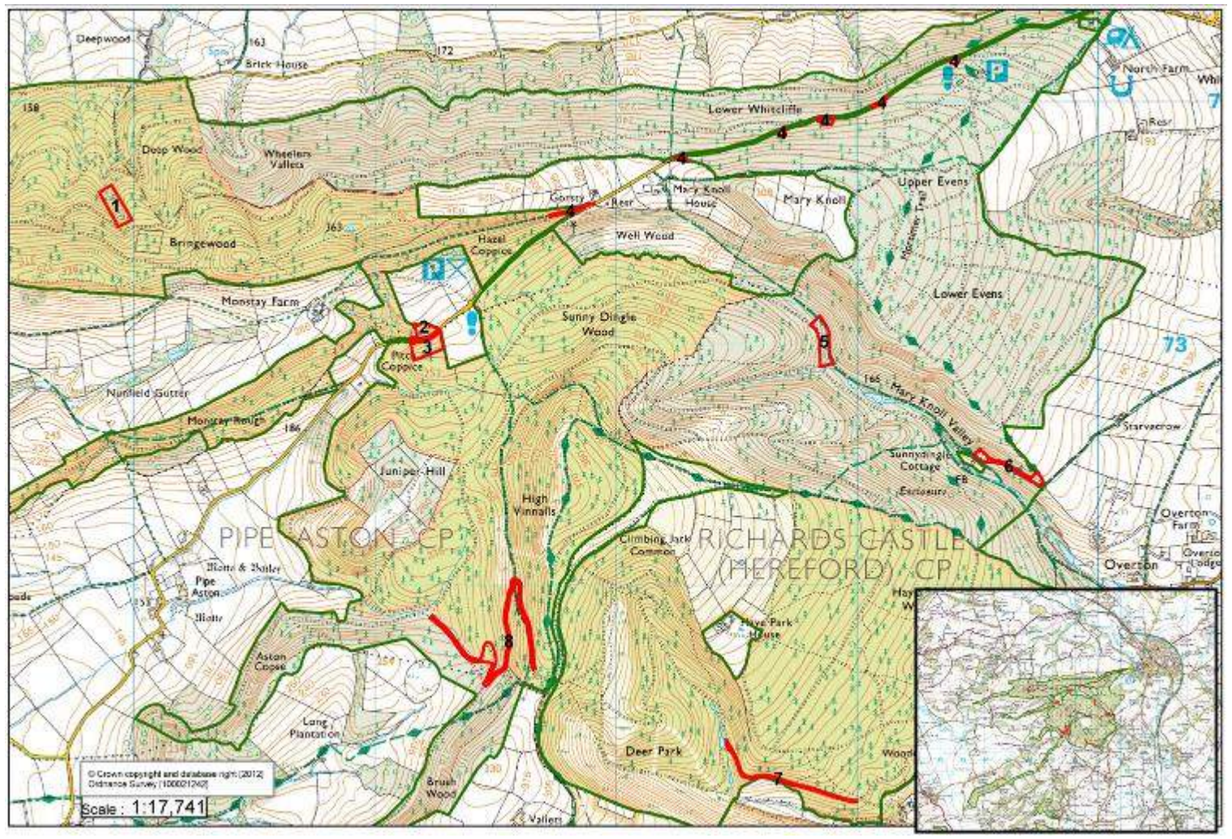
3. List of Potentially Damaging Operations

Ref. No.	Type of Operation
7	Dumping, spreading or discharge of any materials.
12	Changes in tree and/or woodland management including afforestation, planting, clear and selective felling, thinning, coppicing, modification of the stand or underwood, changes in species composition, cessation of management.
13 b	Modification of the structure of watercourses (eg. rivers, streams, springs, ditches, drains), including their banks and beds, as by re-alignment, re-grading and dredging.
14	The changing of water levels and tables and water utilisation, including irrigation, storage and abstraction through boreholes.
20	Extraction of minerals, including topsoil and subsoil.
21	Construction, removal or destruction of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, or the laying, maintenance or removal of pipelines and cables, above or below ground.
22	Storage of materials.
23	Erection of permanent or temporary structures, or the undertaking of engineering works, including drilling.
24	Modification of natural or man-made features, clearance of boulders, large stones, loose rock, scree or spoil and battering, buttressing, grading or seeding rock-faces, outcrops or cuttings.



4. Location

Mortimer Forest SSSI lies within the Mortimer Forest woodland. It comprises 8 units (one unit is made up of four sub-units) as detailed on the map below.

Map 1: Location of Mortimer Forest SSSI

5. Summary Description

Mortimer Forest SSSI is made up of eight sections, consisting of a number of road cuttings, disused quarries and a stream section all of which provide exposures of Silurian aged rocks. These rocks include Wenlock Limestone, Elton Beds, Bringewood Beds, Leintwardine Beds, Whitcliffe Beds and Downton Red Marls.

They cross a succession of layers of rock which slope gently in the direction of Ludlow, exposing progression through time, with the highest and therefore youngest beds nearest Ludlow. They are sedimentary rocks which were deposited in the sea during Silurian Times, about 400 million years ago, and the exposures cover approximately 10 million years of geological time.

Fossils, the remains of once living organisms, are abundant and include many types now extinct. Brachiopods are dominant, but trilobites, corals, crinoids, bryozoa, bivalves, cephlapods, graptolites, worms, fishes and plants are not difficult to find.

The site is of International significance, displaying many type sections and including the standard section for the base of the Ludlow series of the Silurian System.

6. Geological Information

Geologists believe that the rocks of the Ludlow area were first laid down as sediments on the floor of a shallow sea about 420 million years ago. The sea was many thousands of miles away in the southern tropics.

The sea would have been a warm shallow sea covering the continental shelf between the edge of a land mass (now represented by the Charnwood Forest area of the Midlands to the East) and a deep ocean basin (now the thick folded sedimentary rocks of central Wales to the West).

The sediments were originally deposited in more or less horizontal layers on the sea floor. The layers are now dipping at a small but noticeable angle. This is the result of earth movements, as the continental plates have drifted over the earth's crust, buckling the strata into an arched fold or anticline.

The site is exceptionally important for displaying sections through Wenlock and Ludlow Series rocks. The site includes many type sections and has yielded a rich and diverse fossil fauna.

Unit 1- Deep Wood Stream Section (SO459735)

Unit 1 shows key sections in the Ludlow Series Elton Beds, in particular the Middle Elton Beds (Gorstian Stage) with a fauna of graptolites and trilobites. The outcrop here is restricted to the stream bed and a few slabs in the stream bank. This is the type section for the base of the Middle Elton Beds in the Ludlow Series.

Unit 2 Pitch Coppice (SO472731)

The western end of Unit 2 shows Much Wenlock limestone formation, Wenlock Series - alternating bands of hard limestone and softer mudstone and siltstone. The mudstone and siltstone suggest regular influxes of sediment which clog up the filter feeding mechanism of the corals, leading to a lack of fossils at this unit.

The eastern end of Unit 2 shows Topmost Much Wenlock limestone Formation - hard nodular limestone with a few soft partings. The back wall shows "slickensides" - the grooves and ridges found a long a fault like, caused by the two sides of the fault moving past each other.

Unit 3 - Monstay Quarry (SO473730)

Unit 3 lies on the opposite side of the road to unit 2 and shows Much Wenlock Limestone Formation, Wenlock Series and Lower Elton Formation, Ludlow Series. Two quite distinct types are visible here. The Wenlock Limestone of the lower portion was probably dug to feed the limekiln. Within the hard nodular limestone is a conspicuous slot where a soft band of shale has been eroded. About two metres above the slot there is an abrupt change from the nodular Wenlock Liestone to the well bedded fine siltstone of the lower Elton beds. A thin layer of bentonite (Fuller's earth) results from the fall-out of dust from a volcanic explosion

The site is important as it exposes the boundary between the Ludlow Series and the Wenlock Series. Being an international standard section Pitch Coppice is one of Britain's most important geological sites.

Unit 4 – Ludford Lane Quarries (4a SO477735, 4b SO483738, 4c SO487738, 4d SO489739, 4e SO491740, 4f SO493741)

Unit 4 comprises 6 sub-units (a-f) situated along the road. It shows the Upper Elton Formation (with evenly bedded flaggy siltstones, with hard calcareous bands and graptolite fauna), the Lower Bringewood Formations (with olive-coloured calcareous siltstones, limestones concentrated into nodules and shelly macrofauna), Upper Bringewood Formation (noticeably more large limestone nodules giving an irregularly bedded appearance to the rockface and large brachiopods), the Lower Leintwardine formation (regularly bedded calcareous siltstones, with lines of nodules often weathered out to give a honeycombed appearance) and the Lower Whitcliffe Formation (thickly bedded olive siltstones). Extensive paleontological collections were made at these localities by earlier workers.

Unit 5 – Mary Knoll Valley (SO488730)

Mary Knoll Valley is an exposure within a streambed and trackside. It forms a classic stratotype section for the Lower Bringewood Formation and Upper Bringewood Formation boundary. It is the type section for the lower part of the Upper Bringewood Formation, and it contains a diverse well preserved shelly macrofauna.

Unit 6 - Sunnyhill Quarry (SO495724)

Sunnyhill, Mary Knoll Valley is the international stratotype locality for the base of the Ludfordian Stage of the Ludlow Series. The type section of the Lower Leintwardine Formation lies in Sunnyhill Quarry and exposures up to the Lower Whitcliffe Formation along the track to the east-south-east. The boundary between the Upper Bringewood Formation and Lower Leintwardine Formation is exposed in the quarry section. Both formations have a diverse, well preserved shelly macrofauna and a diverse marine microflora.

Unit 7 – Deer Park (SO485712)

Deer Park Road contains the parastratotype sections for the upper part of the Lower Bringewood Formation, Upper Bringewood Formation, Lower Leintwardine Formation and lower part of the Lower Whitcliffe Formation. It has yielded a well preserved, shelly macrofauna and marine microflora.

Unit 8 – Goggin Road (SO473719)

Goggin Road exposes the parastratotypes of the Lower Elton Formation, Middle Elton Formation, Upper Elton Formation and lower part of Lower Bringewood Formation. These are the best exposures in the type area for the Gorstian Stage. A diverse macrofauna occurs in the Lower Elton Formation and the Much Wenlock Limestone Formation, and a graptolite fauna in the Middle and Upper Elton Formations. Marine microfloral elements are well preserved throughout the section.

7. Ownership, Site History and Access

Mortimer Forest SSSI is managed by the Forestry Commission on a part freehold, part leasehold basis.

Mortimer Forest SSSI comprises 8 individual units (unit 4 comprises six sub-units) that are situated throughout the Mortimer Forest block.

Mortimer Forest SSSI is a popular place for recreation with car parks and trails. There is open public pedestrian access to all parts of the SSSI.

8. Important Evaluation Criteria

8.1 Rarity

The rocks and fossils at Mortimer Forest SSSI are of great significance, both to the modern geologist and in the history of geological science. The sites illustrate one of the few places where one can view the gradual evolution of some of the marine animals which have been used to define time divisions of the Silurian period as well as demonstrating the relationship between different animals and the environment in which they lived.

8.2 Intrinsic appeal

Many people visit the Ludlow area to enjoy Mortimer Forest and to study the geology of the area. The geological sites should remain easily accessible by members of the general public and the surrounding woodland should be maintained and enhanced wherever possible.

9. Conservation Objectives and Management Aims

9.1 Conservation Objective

To carry out management agreed with Natural England to maintain the SSSI in favourable condition and to ensure easy access to the sites by the general public.

9.2 Management Aims

To ensure that the geological exposures remain relatively free of regenerating vegetation so that vegetation does not physically damage or erode the exposures and so people can enjoy unhindered access to the sites

To maintain existing fences and danger signs and to prevent access by vehicles and fly-tipping

To encourage open access and study of the geological sites.

10. Factors Influencing Management

10.1 Working Forest

Mortimer Forest SSSI is situated in the Mortimer Forest - a productive forest of mixed broadleaves, larch and Douglas Fir. Many of the geological exposures are surrounded by forestry and some were originally exposed by the creation of forest roads in the past. Care should be taken when working the forest to ensure that no damage is done to the exposures.

10.2 Access and Boundaries

Much of the geological interest is on the periphery of the Ludford Lane and could be at potential risk from fly tipping. Efforts should be made to not make the sites to obvious to passing traffic whilst at the same time encouraging access to those interested in the geology. The "Mortimer Forest Geology Trail" booklet outlines the geological sequence displayed at various exposures within and outwith the SSSI and encourages access for all.

11. Agreed Habitat Management

Regenerating trees and scrub

Wherever possible, small diameter regeneration of broadleaf and coniferous trees should be cut and the stumps treated on a **three-year** rolling programme of management throughout each unit of Mortimer Forest. Those growing on the exposures or affecting access to the exposures should be targeted. Trees should be removed before they become too large and difficult to manage and potentially pose increased likelihood of damage to the geological exposures.

Large, well-established trees

Large trees, when not posing an issue for the geology should remain in-situ, as removing them could cause more damage than leaving them. Small amounts of tree cover can provide shelter and lead to reduced levels of regeneration on the exposures. However, too much shading can lead to damper conditions and the growth of mosses, which although not damaging, can limit the ability to view the exposures. If large trees are thought to be causing damage or are at potential risk of windthrow they should be removed. Felled trees should be cut into lengths and retained nearby to provide habitat piles.

Bramble, bracken and gorse

Bramble, bracken, gorse and other shrubs obscuring the geological exposures or preventing access to the exposures should be managed on a **three-yearly** basis to prevent damage to the underlying geology and ease access.

Infrastructure

All wooden posts marking and preventing vehicular access to the roadside SSSI units should be maintained to reduce the incidences of fly-tipping. Signage indicating the Mortimer Geological Trail should be maintained so that sites are easily identified and visitors can access them easily.

12. Management Prescriptions by SSSI Unit

12.1 Unit 1

The exposures are restricted to the streambed with a few slabs in the stream bank. The unit is fairly difficult to access and is surrounded by European larch planted in 1927 and 1967 shading the site and leading to extensive moss coverage of the exposures.

Management Prescriptions for the period 2019 - 2029		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	Ensure the SSSI is accounted for when planning nearby forestry operations and fell European larch from SSSI area and wider riparian zone to reduce shading, create important habitat and ease access to the SSSI unit.	◆			◆			◆			◆
2	Remove small woody conifer and broadleaf regeneration by cutting and treating the stumps	◆			◆			◆			◆
3	Remove encroaching bracken and bramble when it is obscuring the geological exposures or preventing access	◆			◆			◆			◆

12.2 Unit 2, 3 and 4

Units 2, 3 and 4 lie alongside the busy Ludlford Lane and a few have, in the past, been subject to small amounts of fly-tipping. Efforts must be made to ensure that the exposures remain easy to access but that fly-tipping is kept to a minimum by maintaining wooden posts and not making the units too obvious from the roadside. There are small amounts of regenerating trees on some of the exposures as well as bracken and bramble which should be removed. Larger trees are present at the top of unit 4 e which should also be felled.

Management Prescriptions for the period 2019 - 2029		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	Remove small woody conifer and broadleaf regeneration by cutting and treating the stumps										
2	Fell larger trees growing at the top of the exposure at 4e and treat stumps										
3	Remove encroaching bracken and bramble when it is obscuring the geological exposures or preventing access	◆			◆			◆			◆
	Maintain geological trail posts and good pedestrian access	◆			◆			◆			◆

12.3 Unit 5

The features of interest at this unit are difficult to identify and advice needs to be sought from a geologist before works go ahead. Unit 5 lies in an interesting area of wet woodland and efforts to conserve the geology should not be at the expense of surrounding habitat. Correspondence with Dr Dave Evans in 2001 indicated that the exposures in the streambed and banks and cuttings are overgrown and degraded and would benefit from being cleared and re-exposed.

Management Prescriptions for the period 2019 - 2029		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
2	Remove small woody conifer and broadleaf regeneration by cutting and treating the stumps										
3	Remove encroaching bracken and bramble when it is obscuring the geological exposures or preventing access	◆			◆			◆			◆
		◆			◆			◆			◆

Unit 6

Sunnyhill Quarry is generally well exposed however there is a small amount of regeneration of small woody growth and bramble on the face of the quarry wall and some larger trees that will need to be checked regularly to ensure that they are not having an adverse impact on the geology of the site.

Management Prescriptions for the period 2019 - 2029		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	Remove small woody conifer and broadleaf regeneration by cutting and treating the stumps	◆			◆			◆			◆
2	Remove encroaching bracken and bramble when it is obscuring the geological exposures or preventing access	◆			◆			◆			◆
3	Regularly check trees at top of exposure to ensure they are not having an adverse impact on exposures. If necessary specialist tree surgeons will be required to carry out felling operations				◆			◆			◆

Unit 7 and 8

Deer Park and Goggin Road units are both linear trackside exposures and are subject to some encroachment of gorse.

Management Prescriptions for the period 2019 - 2029		**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	Remove small woody conifer and broadleaf regeneration by cutting and treating the stumps	◆			◆			◆			◆
2	Remove encroaching gorse when it is obscuring the geological exposures or preventing access				◆			◆			◆
3	Flag roadside SSSI units during planning phase of re-grading or forestry operations in the immediate area	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆

13. Record of Management

Operation	Unit number	Signed	Date

14. Bibliography and Further Reading

Jenkinson., Andrew, 2000. The Mortimer Forest Geology Trail

http://www.naturalengland.org.uk/information_for/sssi_owners_and_occupiers/default.aspx