



**Sheffield &
Rotherham**
Wildlife Trust

Reserve Management Plan
Greno Woods
April 2022 - March 2032

**Information regarding sensitive
species has been redacted**

Acknowledgements

Sheffield and Rotherham Wildlife Trust would like to thank the many individuals who have contributed to the formulation of this management plan. In particular we would like to thank the following groups and individuals for their input: Alastair Willison, Andrew Hill and Dave Buttle of the Wharnccliffe Heathland Trust, Ian Wilkinson, Andrew Platts and the Grenoside Conservation Society.

Report by: Chris Doar
Sheffield and Rotherham Wildlife Trust
37 Stafford Road
Sheffield, S2 2SF
0114 263 4335
www.wildsheffield.com

Table of Contents

1.0	INTRODUCTION	7
1.1	Purposes and formulation of the plan	7
1.2	Structure of the plan	9
2.0	Site Description	10
2.1	Location, extent and tenure	10
2.2	Landscape value and context	10
2.3	Site ownership	11
2.4	Designations and policy context	11
2.5	Public Rights of Way	12
2.6	Past ownership and historic management	13
2.7	Adjacent land ownership and use	14
2.8	Services	14
2.9	Rights of access and access infrastructure	14
	Rights of Access	14
	Access Infrastructure	15
2.10	Forestry Infrastructure	16
2.11	Tactical Fire Plan	16
2.12	Site safety, security and maintenance	16
	Site safety	16
	Site security	17
	Litter, cleanliness and vandalism	17
2.13	Funding schemes, income and grants	17
2.14	Environmental Information	18
	Topography	18
	Geology and pedology	18
	Hydrology	18
	Wind	19
2.15	Biodiversity	19
	Biodiversity Action Plans	19
2.16	Habitats	20
	Semi-natural broadleaved woodland	20
	Sweet chestnut coppice	21

	Mixed coniferous/broadleaved woodland	22
	Conifer plantation	22
	Heathland	22
	Neutral grassland	23
2.17	Species	23
	Fungi	23
	Invertebrates	23
	Amphibians and reptiles.....	24
	Birds.....	24
	Mammals.....	25
2.18	Site archaeology	25
2.19	Recreation	26
	Recreational facilities	26
	Recreational usage	26
2.20	Community	27
	Community profile.....	27
	Community services	28
	Communities of interest.....	29
	Community engagement.....	29
2.21	Outdoor learning	30
3.0	Vision and Features	31
3.1	Feature 1. Woodland.....	32
3.2	Feature 2 Ancient Woodland Ground Flora	48
	Table 2. Ancient Woodland Indicator Species*	50
3.3	Feature 3 Open habitats.....	54
3.4	Feature 4 Bird Community	58
3.5	Feature 5 Northern (hairy) wood ant.....	65
3.6	Feature 6 Biodiversity.....	69
3.7	Feature 7 Ecosystem services.....	74
3.8	Feature 8 Recreation and outdoor learning.....	79
4.0	Work Programme.....	88
5.0	Figures	98
	Appendix I: Glossary	115

Appendix II: Woodland compartment map	116
Appendix III: Operational Standards and Techniques	116
Protection and control	117
Minimising wind damage	117
Minimising fire risk	117
Pests and diseases	117
Biosecurity	118
Archaeology	118
Protected species	118
Veteran and Notable Trees	118
Water Management	118
Domestic stock and fencing	119
Use of pesticides and fertilisers	119
Waste disposal and pollution	119
Control of harvesting operations	120
Emergency procedures	120
Road, track and ride maintenance	121
Management of health and safety	121
APPENDIX IV: Operational Standards and Techniques checklist.....	122

List of Figures

- Figure 1. Site location and boundaries.
- Figure 2. Handlands Scheduled Monument
- Figure 3. Public Rights of Way, permissive routes and bike tracks
- Figure 4. Services
- Figure 5. Vehicular access
- Figure 6. Forestry infrastructure
- Figure 7. Tactical fire plan map
- Figure 8. Hydrology
- Figure 9. Wind strength (DAMS)
- Figure 10. Habitat distribution in 2021
- Figure 11. Designated areas and NVC distribution
- Figure 12. Age class distribution
- Figure 13: Coppice coupes
- Figure 14. Distribution of ancient woodland indicator species
- Figure 15. Natural Flood Management proposed works
- Figure 16: Zones of usage
- Figure 17: Visitor infrastructure

1.0 INTRODUCTION

Sheffield and Rotherham Wildlife Trust (SRWT) is part of a national association of 46 local Wildlife Trusts, which work with communities throughout the UK to protect wildlife in town and country. The Trust aims to bring about nature's recovery by protecting and increasing biodiversity, advancing the public engagement with the natural environment and by developing and promoting sustainable land management practices.

Our Vision

Throughout Sheffield & Rotherham, from our streets & neighbourhoods to the wider countryside, there will be an abundance of nature that is protected, cared for and experienced by everyone.

Our Mission

For the benefit of nature and people in Sheffield & Rotherham, working with our members, volunteers, local people, partners and the wider Wildlife Trust family, and by acting locally and thinking globally, we will:

- Turn around the ecological emergency and put nature in recovery by; securing enough land and water that's great for nature, bringing back wildlife and empowering people to take action, care for and respect nature.
- Ensure everyone in Sheffield & Rotherham can experience and enjoy the benefits that nature brings.
- Work with nature to help solve the climate crisis.

Our Outcomes

As result of our work:

- 1) Nature is in recovery and helping solve the climate crisis
More people are taking action for nature
- 2) Everyone can experience and benefit from nature

Greno Woods is the Trust's largest nature reserve.

1.1 Purposes and formulation of this plan

This management plan has been formulated for the following reasons:

- To provide comprehensive and cohesive information about the nature reserve in one document, with reference to other documents where necessary;
- To outline the long-term vision for the reserve and the associated objectives which form the framework of management;
- To outline the rationale for management, giving a clear and comprehensive explanation of why features require management, the form that this management will take and how this will be monitored;
- To provide a key document from which projects are developed and associated funding sought;
- To provide consistency and continuity, so that when changes of staff take place, or changes in ownership or disposal of the land occurs, then management objectives, prescriptions and monitoring are continued.

The work programme is set out within this document. However, the nature of work programmes is such that they vary and are modified due to unanticipated changes or developments such as the availability of funding. Therefore the full annual work programmes are kept and updated electronically at the SRWT offices.

1.2 Structure of the plan

This management plan is divided into sections.

Section 1 gives an overview of the plan

Section 2 provides a detailed description of the reserve.

Section 3 of the plan gives the Trust's **vision** for the reserve: the condition we are aiming to achieve by 2070. It then lists the reserve's **features**: the most valued elements of the site for which it is managed.

For each feature, a number of **attributes** and **factors** is then identified. **Attributes** are measurable qualities of a feature, against which its condition will be monitored in order to judge the effectiveness of management. **Factors** are anything that has the potential to influence or change a feature, or to affect the way in it is managed.

Once the attributes and factors affecting a feature have been identified, each feature is then **evaluated**. During evaluation, the current condition of the feature is compared to that contained in the vision and its performance against the attributes identified discussed. The impact of factors – which can be positive or negative – on the feature, or its management, are likewise evaluated. From this evaluation **management objectives** are then set.

Section 4 comprises the work programme where the management prescriptions for the features are listed.

Section 5 of the plan comprises the **Figures**: maps that accompany the text.

Section 6 of the plan are the **Appendices**, where supporting information is given.

Appendix I contains a glossary of acronyms and technical terms.

Appendix II gives a map showing woodland compartments

Appendix III gives Operational Standards and Techniques

Appendix IV Checklist

2.0 SITE DESCRIPTION

2.1 Location, extent and tenure

Greno Woods is located on Sheffield's northern fringe, straddling the A61. It covers an area of 183 hectares (451 acres) and is centred on OS Grid Reference SK 330 950 (**Figure 1**). The majority of the Trust holding (Greno Wood and Hall Wood) lie to the west of the A61, with Low Hall Wood, Mike's Field and Low Spring Wood to the east.

Approximately 172.6 hectares of the reserve comprises woodland. Of the remainder 7.5 ha comprise heathland which has been enclosed for grazing and 2.3 hectares is neutral grassland known as Mike's Field, which is being managed as wood pasture.

Sheffield and Rotherham Wildlife Trust hold the freehold, mineral and sporting rights to the property.

2.2 Landscape value and context

Greno Woods lies on the fringes of Grenoside and High Green. Together with the adjacent Wharncliffe and Wheata Woods, it forms an attractive matrix of woodland and ancient field systems which abut residential areas to the east and south. Greno Woods form the highest portion of the woodland block, with the north and western sections being visible from the M1 and the residential areas of High Green, Burncross, Chapeltown and Ecclesfield to the east. Driving northwards through the woods on the Woodhead Road or the A61 the woodlands very clearly demark the boundary between city and surrounding countryside.

Greno Woods falls just inside Natural England's Natural Character Assessment (NCA) Profile 38: Nottinghamshire, Derbyshire and Yorkshire Coalfield. However, in landscape character terms, the woodland is more typical of the adjacent NCA Profile 37: Yorkshire Southern Pennine Fringe, as a transitional area lying between the upland Pennine block to the west and the lower-lying arable land to the east.

Greno's topography is typified by moderately steep south and east-facing slopes covered by mature trees. Views over the site and over the adjoining farmland and housing are possible at several points on the upper slopes where clearfell areas have opened up the sightlines previously restricted by tree growth. Due to the density of the tree cover, many visitors find the woods a place of solitude and peaceful contemplation and a place where they can be 'with nature' and away from everyday life.

The woodlands comprise a mixture of mature broadleaved woods and coniferous plantations, interspersed with open areas created by recent clear-fell. The broadleaved woodland is characterised by the presence of many old worked trees, a legacy of the days of coppicing. Many of these have a characteristically 'tortured' or 'medusoid' structure. The ground flora in these areas comprises a blend of species associated with heathland (heather, bilberry and fescue grasses and bracken), or, where soils are deeper, bramble and woodland flowers and provide a rich and varied tapestry of colour and texture through spring and summer. Coniferous areas are characterised by mature conifers evenly spaced and with a dense canopy and a more homogenous ground flora containing few flowers. Open areas typically consist of a patchwork of heather, bracken, bramble and grasses, with numerous young trees.

A network of sandstone forest tracks or ‘rides’ runs through Greno Woods. Some of these are old holloways; routes that have linked adjacent settlements for generations. In much of the woodland these run under the tree canopy and give the visitor a sense of being enclosed by the woodland. More open rides, where a softer grading from high forest to grass/heathland is present, provide a pleasing contrast allowing the visitor to emerge periodically into the open air.

Much of the site is bounded by drystone walls but these are rarely visible from within the woodland.

2.3 Site ownership

The majority of Greno Woods has been owned by Sheffield and Rotherham Wildlife Trust since 2012, with the remaining 26ha being bought from the Esmée Fairburn Foundation in 2013. In 2018 an additional 4.5 hectares of semi-natural ancient woodland at Low Spring Wood were acquired and added to the reserve, and in 2020 a further 2.3 hectares “Mike’s Field” were gifted to the Trust.

Although not solely in SRWT ownership, the woods have been managed by the Trust since 2010 and were purchased with the support of Viridor Environmental Credits, the Heritage Lottery Fund and private subscription.

2.4 Designations and policy context

The reserve (with the exception of Mike’s Field) has been designated for nature conservation at the local level by the Sheffield Local Wildlife Sites Partnership under three Local Wildlife Sites (LWS) (195 Greno Woods; 194 Hall Wood; 196 Low Hall and Low Spring Woods). The entire reserve (with the exception of Mike’s Field) is also designated as Ancient Woodland (Green Lane Spring PAWS). At the time of writing, the Sheffield Local Plan is being re-drafted, but Local Wildlife Sites and Ancient Woodlands (including PAWS) are expected to receive ongoing protection from development and damage under relevant new local policies. Under the current Unitary Development Plan (UDP), LWSs are afforded protection from development by policies GE13 and GE11 (reference is made to Areas of Natural History Interest, but these were renamed as LWS). In addition, the National Planning Policy Framework (NPPF) policy 179a offers some protection for LWS and policy 180c along with Government guidance provides protection for Ancient Woodlands.

The northern part of the woodland is listed as ancient woodland on Natural England’s ancient woodland inventory, with the remainder of the site being listed as plantation on the site of ancient woodland.

A **Scheduled Monument** (SM no. 29822) is present within Greno Woods (**Figure 2**). This area, known as ‘Handlands,’ covers 8 ha and comprises the remains of a Romano-British settlement in the woods. Any works (other than those associated with forestry operations) in this area require the consent of the Secretary of State. ‘Works’ are defined by the Ancient Monuments and Archaeological Areas Act 1979 as: demolishing, destroying, damaging, removing, repairing, altering, adding to, flooding or tipping material onto the monument. Forestry operations will be planned in consultation with English Heritage to ensure minimal ground disturbance and ensure best practise on site.

A **Tree Preservation Order** (TPO) is in force within compartment 19 (see Appendix II for Woodland Compartment map) adjacent to a residential area of Grenoside village. This order still allows trees to be felled if 'under good silvicultural management' and/or part of a Countryside Stewardship scheme approved by the Forestry Commission.

'**Sheffield Green & Open Space Strategy 2010 – 2030**' provides a strategic context with the details of the Trees and Woodland Strategy structured around four themes; People, Places, Environment and Sustainability, and Quality Standards and Resources. The strategy outlines a 20 year plan to meet local people's needs in relation to Sheffield's outdoor spaces, to deliver environmental benefits and to raise the quality of green and open spaces throughout the city.

The '**Outdoor City**' strategy acknowledges the importance of parks, woodlands and the Peak District National Park in the life of the City of Sheffield. Its economic strategy is a statement of the city's ambition and provides a framework to guide the development of recreational facilities as a key part of its economic regeneration. The delivery of this strategy will be overseen by the Sheffield Outdoor Joint Venture which consists of key partners across the city involved in outdoor recreation.

The **Public Rights of Way Improvement Plan** (2007) seeks to facilitate and develop inclusive access to woodlands, riverbanks, waters edge and urban and rural open space and ensure that all public rights of way will be safe and easy to use. It includes the following policies that are relevant to Greno Woods:

Policy 5: To identify areas of primary bridleway need. To resolve route fragmentation and establish bridleway (multi use) routes where possible.

Policy 9. To improve cycling facilities and links between existing routes/trails and further develop the cycling network as part of a sustainable transport policy and within the context of the Cycling Action Plan.

Policy 5. To identify areas of primary bridleway need. To resolve route

Policy 14. In areas designated for nature conservation the impact of access provision will be treated with sensitivity and with due regard to the likely effects on the fauna, flora and any important geology.

Policy 17. To provide confidence building measures and opportunities for wider path use through public education, community liaison and physical improvements.

Policy 24. To extend the network of easy-going trails.

Policy 26. To work with path user groups, landowners and occupiers, parish councils, the National Park Authority, adjacent local authorities and community groups to better focus path provision and reduce conflict.

2.5 Public Rights of Way

A comprehensive network of statutory footpaths and bridleways runs through Greno Woods, with numerous desire lines (non-statutory routes) also present (**Figure 3**). There are

approximately 7.5 km of Definitive Footpath within the reserve, and 4.4 km of Definitive Bridleway.

A section of the Trans-Pennine Trail (TPT) runs through the woods from Greno Gate to Sandy Lane. This was designated and is now maintained by Sheffield City Council.

The Permissive Bridleway along the woods south-eastern boundary is part of a larger route linking into Wheata (SCC) and Wharncliffe (FC) Woodlands.

Horses stabled at Crown Inn farm may access the reserve's bridleway loop from the north through a private arrangement.

2.6 Past ownership and historic management

Archaeological finds and remains show that the land in and surrounding Greno Woods has long been used and modified by human activity. Using information gathered from the historic record, has been used to piece together the life of the woodland from the 15th century to the 1930s (Mel Jones, 2012). This work confirms the existence of Greno Woods for the duration of this period, with its own distinct character and history.

The first evidence of human activity at Greno was the discovery of Mesolithic flint scatter in the woodlands - at this time believed to be wild wood. The presence of the Handlands settlement dating from the Romano-British era and the remains of a fortified medieval hall show that areas of the woodland have been periodically cleared and settled through time, then left to revert back to woodland when these settlements were abandoned.

The historical record confirms that the woodland body has remained largely intact since the 1400s but has undergone substantial management and modification by man, hence its classification as semi natural ancient woodland. Records also show a change in management practise from wood pasture to coppice woodland during the 16th century.

During the medieval period, Greno Woods formed part of the estates of the de Furnival family, passing to John Talbot (later Earl of Shrewsbury) in 1410. Subsequently, the woodland became part of the holdings of the Duke of Norfolk. Much evidence can be found both in the historic record and in on-site archaeology to show that Greno was managed as a coppice woodland with standards during the post-medieval period. The coppice industries of this and other local woodlands were very much tied to the local economy during this period, with charcoal-making (used in the smelting of iron, and later, steel), bark stripping (for tanning leather), basket and clog making all utilising the wood harvested from the coppice.

During the 1800s coppicing declined at Greno and the woodland reverted to high forest, which included areas of beech (*Fagus sylvatica*) plantation.

The Forestry Commission acquired the woodland from the Norfolk Estate some time during the 1900s. The first planting of conifers occurred in the 1960s, under an incentive scheme known as Dedication, following an extensive wildfire (August 1958) which destroyed the majority of the woodland at the southern end of the reserve.

In 1988 Greno Woods passed into private ownership once more and was managed as a commercial woodland by Fountain Forestry up until 2010. During this period the woodlands received almost continual management including thinning, track maintenance, footpath creation and the construction of timber loading areas. A Woodland Grant Scheme

(012004426) was in place between 2004 to 2009, encompassing an Annual Management Grant, Woodland Improvement Grants, Replanting Grants and felling / thinning licences.

Sheffield and Rotherham Wildlife Trust took on responsibility for the majority of the woodland blocks in 2010 (under a management agreement with the Esmée Fairburn Foundation), subsequently purchasing them to manage as one of their nature reserves in 2012/13. Additional purchases / land acquisitions were made in 2017 (Low Spring Wood east), 2020 (Mike's Field) and 2022 (Low Spring Wood west).

2.7 Adjacent land ownership and use

The land surrounding Greno Woods is owned, or tenanted by a variety of private individuals and public bodies (details held at Sheffield and Rotherham Wildlife Trust Headquarters). Of particular note are Prior Royd and Wheata Woods which are owned by Sheffield City Council and Wharnccliffe Woods which are managed by the Forestry Commission.

The Woods are surrounded by farmland, woodland and residential. To the east, the main agricultural activity is horse grazing. Better soils around the northern area allow cereals to be grown. All the surrounding woodlands are mature with those on the western perimeter having Ancient Woodland designation. These woodlands, including Greno Woods, are heavily used by local residents and people across the city for recreational activities and still provide saleable timber.

The responsibility for Greno Woods' boundaries is complex. Responsibility for the fence adjacent to the Woodhead Road boundary lies with the Trust. In general, boundaries adjacent to farmland are the responsibility of the adjacent land owner.

2.8 Services

An aviation fuel pipeline and an oxygen pipeline wayleave runs through the woods (**Figure 4**). Hallwood House has underground utilities running through the woodland to the A61 in cpt 4b north.

2.9 Rights of access and access infrastructure

Rights of Access

The owners of 24 Woodhead Road have the right to access their property via the Trans-Pennine Trail and Greno Gate. This right of access has been extended to the tenant keeping livestock in the fields to the south west.

The owners and tenants of the fields within the south-eastern corner of the woods have a right of access (vehicular) from the A61 across Trust land.

The tenant/owner of the fields to the east of Hall Wood has a right of access to and from these fields from the Woodhead Road.

Horses may access the reserve's bridleway loop from the north through a private arrangement with the Crown Inn farm stables.

Access Infrastructure

The reserve is served by nine vehicular access points from the A61, Greno Gate, Woodhead Road, Springwood Lane and Hallwood Road (**Figure 5**). Six of these serve the main body of the reserve, whilst Low Hall Wood, Low Spring Wood and Mike's Field have one access point each. These access points are protected by locked gates.

A network of access tracks is found in Greno and Hall Woods. These tracks are c2m in diameter and have a gritstone surface, including water bars to assist drainage. Due to the gradient of the slope and the condition of the surfacing some sections of track are suitable only for 4x4 or tracked vehicles, or are motorable only in one direction (uphill to downhill), especially in wet or icy weather.

Once on the track network, turning or passing places are few and far between (**Figure 5**).

Low Hall and Low Spring Wood both contain 1 short section of motorable track. Mike's Field has no tracks but vehicular access is possible via a field gate.

Additional entrances for pedestrians, cyclists or horse-riders exist across the woodland. All official entrance ways are secured by gates, squeezes, A frames, K frames or horse hops to prevent the entrance of unauthorised motorised vehicles, including off-road motorbikes and quad bikes.

A comprehensive boundary survey was carried out as part of the archaeological survey of the woodland in 2013. This shows the woods are bounded by a variety of different structures, including drystone walls, wetstone walls and fencing. In places these structures are found in conjunction with other, often earlier features, such as ditches and banks. The reserve's boundaries are not secure and access can be gained at many points (in addition to official entrances).

Within the site, remnants of walls and banking can be found but the majority of these are historic remains rather than current infrastructure. One exception is the fencing enclosing the reserve's heathland, which comprises a composite fence of sheep netting and a top strand of barbed wire. Two wooden field gates and two stiles allow access into this area. Mike's field is similarly enclosed, with one field gate and a pedestrian gate providing access.

The post and rail fence which runs along the reserve's western boundary (adjacent to the Woodhead Road) is in a has been the subject of much repair over the past 10 year period and is in reasonable condition. This fence attracts much vandalism by motorcyclists and quad bikers wishing to gain access to the reserve. Three new sections of post and rail fencing have been installed along the A61 adjacent to Low Hall Wood to limit access to off road vehicles.

A 2014 survey of access furniture within the woodland recorded the location and description of benches, stiles, gates and way-markers. Rights of Way are clearly marked across the majority of the reserve, although the style of waymarker varies somewhat.

Benches and picnic benches on the reserve are located across the reserve, with the majority being on or adjacent to the Trans-Pennine Trail and bridleway loop in the southern part of the reserve.

Two interpretation boards are present within the woodland. One lies at the crossroads known as 'Spaghetti Junction' and provides information about Greno's wildlife and ecology.

A second is located on the Trans-Pennine Trail adjacent to Sharp's Wood 'Oyl and gives information about the history of the reserve's woodlands.

A map board showing the Rights of Way network and boundaries of Greno, Wharncliffe and Wheata Woods is present adjacent to the main entrance, with a similar map in the Forestry Commission car park.

2.10 Forestry Infrastructure

The reserve has been a working woodland for many decades and consequently contains a number of features to assist in the commercial extraction of timber.

Four stacking areas can accommodate and provide turning for, an articulated logging truck (**Figure 6**). During wet periods there can be conflict with public rights of way (PRoW) which pass through these access points.

The track system, historically used for forwarding timber, is no longer used for this purpose due to RoW designations. Instead, a network of soft extraction routes exist across the woodland and are used and reused as necessary.

A section of stoned extraction route leads to Woodstacks 1, 3 and 4 (**Figure 6**). A stoned crossing point for the fuel pipeline is present in compartment 15d (NB: this point must be reinforced with bog matting before use).

2.11 Tactical Fire Plan

Forest fires are a typical feature of Greno Woods which are, by reasons of topography and vegetation, considered vulnerable to serious fire. A tactical fire plan for the woods is being developed in conjunction with the South Yorkshire Fire Service. Access routes for fire fighting vehicles and the location of fire ponds are shown in **Figure 7**.

2.12 Site safety, security and maintenance

Site safety

A site specific risk assessment has been written for Greno Woods and is reviewed on an annual basis. Further risk assessments are prepared for specific tasks and events at the site as necessary. The Trust also manages the reserve in line with its many detailed policies covering environmental management and Health and Safety. These are amended and updated at regular intervals or to reflect legislative changes.

Greno Woods is regularly patrolled by SRWT staff and volunteers. Any problems are logged on a spreadsheet and addressed as soon as possible. Problems and incidents reported by members of the public are also logged on the spreadsheet and are dealt with as necessary.

Tree inspections for the entire site are carried out every six years, with trees adjacent to the A61, Woodhead and Hallwood Roads assessed every two years. Associated remedial work is undertaken as recommended by the surveyor. At the time of writing, all ash trees adjacent to boundaries with housing, roads or rights of way are checked annually for signs of ash

dieback. Additional tree safety issues picked up during routine patrols are also dealt with, in accordance with the Trust's policy on Tree Management.

Site security

Greno Woods' boundaries are partially marked and secured by drystone walls and fencing. Major access points to the reserve are provided with boulders, gates, squeezes and/or horse hops as appropriate, to allow access by legitimate users of the site whilst excluding egress by cars (other than management vehicles), quad bikes and motorcycles.

Use of the reserve by motor bikes and quad bikes is illegal, and incidents are reported to South Yorkshire Police.

Litter, cleanliness and vandalism

No litter bins or dog waste bins are present on site, rather visitors are encouraged to take their litter/dog waste home for disposal. The installation of litter/dog waste bins has been discounted due to the cost of collections and a desire to keep the reserve as 'wild' as possible.

Fly tipping can be a problem along the periphery of the reserve, both in lay-bys, and adjacent to housing where garden waste is tipped. Waste is cleared quickly when reported. A dedicated patrol team visit the site once every two - four weeks to undertake regular litter picks and report issues of vandalism.

2.13 Funding schemes, income and grants

Grant funding

The entirety of Greno Woods is certified as being of UK Woodland Assurance Standard and is primarily funded through receipt of a Countryside Stewardship grant which brings in annual payments in return for the environmentally sustainable management of the woodland resource. Additional to this income from grants from the Landfill Tax scheme, Lotteries and private institutions are applied for to fund management and improvement works.

Productive land use

Greno Woods' greatest source of income for future years is the coniferous timber crop which has been grown there. This crop, when harvested, is sold for timber and biofuel. Removal of these conifers will generate a regular income stream over the course of this plan as many of the conifer stands are reaching maturity. However, from 2023 onwards no further conifers will be planted at Greno (see also section 3.1).

The reintroduction of sweet chestnut coppice to Greno Woods will, in time, provide another saleable timber product, however this is unlikely to generate more revenue than the costs associated with the management of this area.

Recreational services

Small site hire fees are charged for use of the reserve to various groups for events and uses such as mountain bike coaching. These sums subsidise the upkeep of facilities such as the waterless toilet, or are directed to site maintenance.

2.14 Environmental Information

Topography

Greno Woods lies at a relatively low altitude, ranging between 150m and 300m above ordnance datum. Its topography is typified by moderately steep south and east-facing slopes covered by mature trees.

The woods cover the upper, eastern slope of one of the gently undulating hills that surround Sheffield. The highest point of the woodlands is on the western side at an altitude of 300m where it forms a small hill top (Greno Knoll) on which there is an OS Triangulation Point. From here the ground slopes gently northeast and eastwards to an altitude of 150m at the far eastern end of Low Hall Wood.

Geology and pedology

The Lower Coal Measures Series of the Upper Carboniferous era dominate the area. Rock types range from coal through ganister and fireclay, to sandstones, shales and other clays. The rock strata dip between 5 and 20 degrees to the north-east, becoming progressively younger in this direction.

The massive Grenoside Sandstone dominates the southern half of the woodlands (cpts 6-19). A major geological fault follows the northern edge of compartments 8 and 9 (along the main track) and is possibly responsible for the smooth escarpment edge. Further fault lines occur to the south.

The younger Penistone Flags sandstone, coal seams, shales and clays occur in the remainder of the woodlands to the north-east. Coal seams appear to have outcropped within Compartment 2.

Soils derived from the Grenoside sandstone are mostly thin, well-drained, acidic podzols from which the National Vegetation Classification (NVC) W16 communities are derived. Brown earth soil is derived from the more basic shales and clays associated with the Penistone Flags, especially where stream action has exposed the beds as seen to the east of the A61. These soils are indicative of the NVC W10 vegetation.

Hydrology

Much of the woodland is free-draining, although water does collect to form 'boggy' ground in areas with clay soil deposits. The majority of the site's small watercourses are present in the northern half of the woodland. They arise as springs from beneath the north-easterly dipping Grenoside sandstone and flow in an easterly direction, forming sections of the woodland boundary (**Figure 8**) and ultimately flow into Charlton Brook and the River Don. Some of these watercourses have only a seasonal flow.

Within the Grenoside sandstone areas (cpts 6-19) these springs and temporary streams are invariably associated with the major geological fault lines. Natural springs have long been associated with the history of the area and some have been named such as Harrison Spring and Robin Hood Well.

Springs and streams feed a number of artificial ponds (**Figure 8**). A couple of these were constructed during the 19th century or before (sub cpts 5b and 18b). The pond in 5e, the largest body of water on the reserve, was formed when a seasonal stream was blocked by an adjacent landowner in 2010. The heathland pond was installed in 2013 to provide water to grazing livestock, this pond is fed by a pipeline running from a spring in compartment 8b. Finally, a series of attenuation ponds have been created between 2018 and 2021. These ponds capture and store run-off at times of high rainfall and form part of the reserve's contribution towards Natural Flood Management (see also 3.7).

Wind

The central western area, on the highest ground, is exposed to westerly and north westerly gales. This can be seen in **Figure 9** where the 'windiness' range is described using DAMS (Detailed Aspect Method of Scoring).

Wind damage

The Forestry Commission ForestGALES programme was run on the woodlands to predict at what age (and therefore which calendar year) the sub-compartments within the highest Detailed Aspect Method of Scoring (DAMS) range attained Wind Damage Risk Status (WDRS) 6, as described below :-

WDRS	RETURN PERIOD *
1	>100 years
2	100-50 years
3	50-33 years
4	33-20 years
5	20-10 years
6	<10 years

* The return period is the *average* interval between gales that will damage the crop, taking into consideration its growth rate.

The programme showed that most of the crops within the DAMS range of 15-18 have already attained a value of WDRS 6, indicating that they are most likely to suffer gale damage within the next 10 years. Vertical tree growth will further increase the likelihood of damage. In addition, the existence of wet flushes throughout the woodland increases the WDRS score and many such areas already exhibit localised windthrow (e.g. in the east of Cpt 12). Unfortunately, most of these high risk crops need to be felled later than optimal due to their sheltering effect upon the woodlands to the east. As shown in Plan 9.8, there is generally a westerly progression of clear-felling so as to prevent the windthrow of adjacent crops.

Lodgepole Pine (*Pinus contorta*) attains WDRS 6 within the lower DAMS ranges of 13-18 due to the wind breakage of the stem rather than blowing over.

Japanese Larch (*Larix kaempferi*) and Corsican Pine (*Pinus nigra*) within the DAMS range of 11-14 do not appear to be at risk within the lifespan of the crops, except in the few areas of predominantly wet ground conditions.

2.15 Biodiversity

Biodiversity Action Plans

Greno Woods is a site of considerable importance for wildlife due to its size, location and species composition. Its position as part of a larger woodland complex (700 hectares including Wheata and Wharncliffe Woods) allows it to support a wide variety of animal and plant life.

The Natural England priority habitats – deciduous woodland and heathland – are both present on the reserve.

A number of National Local Biodiversity Action Plan habitats and species have been recorded on site (Table 1). It should be noted that, due to a paucity of site specific data, the true number of BAP species present on site is likely to be considerably higher.

Table 1. National and Local Biodiversity Action Plan priority habitats and species.

Habitats	Species of principle importance
Lowland mixed deciduous woodland Upland oak wood Heathland	White Letter Hairstreak, Dusky Brocade, Shining Guest Ant, Tree Pipit, Lesser Spotted Woodpecker, Tree Sparrow, Bullfinch, Dunnock, Cuckoo, House Sparrow, Wood Warbler, Spotted Flycatcher, Nightjar, Song Thrush, Hedgehog

The distribution of UK Biodiversity Action Plan Priority Habitats is given in **Figure 9**.

Additional species of conservation interest

Ancient woodland ground flora: bluebell (*Hyaconthoides non-scripta*), sanicle (*Sanicula europaea*), wood sorrel (*Oxalis acetosella*), wood anemone (*Anemone nemorosa*), woodsage (*Teucrium scorodonia*), dog's mercury (*Mercurialis perennis*), wood melick (*Melica uniflora*), wood millet (*Milium effusum*), yellow archangel (*Lamium galeobdolon*), common cow wheat (*Melampyrum pratense*), opposite leaved golden saxifrage (*Chrysosplenium oppositifolium*), ramsons (*Allium ursinum*), cuckoo pint (*Arum maculatum*) and honeysuckle (*Lonicera periclymenum*).

- Northern wood ant
- Woodcock
- *Redacted*

2.16 Habitats

Greno Woods support a number of different vegetative communities; chief amongst which is woodland. This woodland is a mixture of semi-natural broadleaved woodland, and plantation (both broadleaf and conifer) on the site of an ancient woodland (PAWS). Areas of conifer plantation are extensive, and have been managed as a commercial forestry enterprise. This history of forestry has resulted in a canopy where the dominant species varies from compartment to compartment, though the compartments themselves tend to have a very homogenous canopy, especially in coniferised areas.

The habitat types present on site comprise native broadleaved woodland, both ancient semi natural and secondary (91 hectares, 50% of total reserve area), mixed woodland (19 hectares; 10%), conifer plantation (64 hectares; 35%), dwarf-shrub dominated heathland. (7.6 hectares; 4%) and neutral grassland (2.3 ha; 1%) (**Figure 10**). Each of these habitats is described below.

Semi-natural broadleaved woodland

Semi-natural broadleaved woodland makes up the majority habitat type on the reserve. This habitat is somewhat variable across the reserve and includes areas of semi-natural ancient woodland (typified by a canopy including oak trees over 50 years of age), areas where the canopy is dominated by beech and areas of new planting typified by seedling English oak (*Quercus robur*) or sessile oak (*Q. petraea*), silver birch (*Betula pedula*) and rowan (*Sorbus aucuparia*) that have replaced areas previously coniferised. An area of sweet chestnut coppice is described separately below.

The semi-natural broadleaved woodland at Greno is distributed across the north and western parts of the site. The species composition of this broadleaved woodland is characteristically varied. Many areas are

heavily modified by the historic planting of species such as sycamore (*Acer pseudoplatanus*), beech and sweet chestnut (*Castanea sativa*), which dominate the canopy in places. The oak itself is variable in form, and includes many fine examples of old worked trees, some of which have been 'singled' and allowed to grow on to the canopy, as well as standard trees.

The understory is generally well-developed, with bramble (*Rubus fruticosus* spp) and holly (*Ilex aquifolium*) hags present throughout the woodland. Sweet chestnut is frequent, whilst hazel, goat willow and rowan are present but occasional. In non-beech areas, the ground flora is dominated by creeping soft-grass (*Holcus mollis*) or wavy hair-grass (*Deschampsia flexuosa*) with abundant bracken (*Pteridium aquilinum*) in more open areas. Bluebell is locally abundant, and a variety of ancient woodland indicator species including common cow wheat, honeysuckle (*Lonicera periclymenum*), wood sorrel, wood anemone, ramsons, wood melick and dog's mercury have been recorded, being concentrated in relic areas of ancient semi-natural woodland (ASNW).

Part of the reserve's woodland are listed as Areas of Semi-Natural Ancient Woodland (17 ha) with the remainder being Plantation on an Ancient Woodland Site (PAWS 162.4 ha; **Figure 11**). Other woodland areas on the northern and western periphery of the reserve strongly resemble ASNW in canopy age and species composition (especially with respect to ground flora) and may resemble relic areas of ASNW too small to have been included in the national inventory.

When ground flora rather than canopy is analysed, the majority of the reserve falls within the upland oak W14 NVC community, with some areas to the east (including the areas of broadleaf reversion) characteristic of W10 lowland oak woodland (**Figure 11**). Beech-dominated area displays characteristics of NVC W14 and has developed well, partly by virtue of the exposure of more basic shales, in cpts 2 and 18.

The age of broadleaf woodland on the reserve is very varied (**Figure 12**). The areas of ASNW are mature, with canopies dominated by trees over 70 years in age, whilst in areas of PAWS restoration the woodland is still largely young and, often, comprised almost entirely of sapling trees. Mature woodland dominates the north and east of the reserve, with areas of younger planting to the west.

A system of Continuous Cover Forestry (CCF) has been carried out within the ASNW areas for at least the last 30 years, whereby the majority of the upper canopy has remained intact in accordance CCF management. Crown thinning was carried out in all areas of semi-natural broadleaved woodland between 2004 and 2015 to create gaps for natural regeneration. This included 36 hectares of PAWS restoration area, amounting to some 20% of the woodland. Non-native and non-locally native species, such as sycamore, beech, conifer and sweet chestnut, were targeted for removal, with oak and other native species being retained. However, the non-native species component was too high to be removed in one operation. A small amount of oak (*Quercus* sp.) were felled by singling during this period, to produce better quality final crop stems. Oak stems of average timber quality are only present within the NVC W10 and W14 areas.

The small clear-fell area of cpt 2a has been planted with disease resistant English elm (*Ulmus procera* var.). clones in early 2018. This area is regularly managed to allow the clones a chance to develop (see also 3.1).

Sweet chestnut coppice

A 3.9 ha area of abandoned sweet chestnut coppice is present in cpt 17 (**Figure 10**). Whilst historically supporting a varied ground flora including many woodland flowers (*J.Ranson, pers comms.*), the density of growth reached by this area has resulted in a sweet chestnut monoculture with a sparse or absent ground flora.

The Trust began reintroducing a management regime of coppicing with standards to this area, in 2013, to which end it has been nominally divided into 10 compartments or coupes of approximately 0.26ha (**Figure 13**). The sweet chestnut within these areas is being coppiced in rotation, with oak/birch retained as standards. The stored coppice arisings have been sold as firewood or used to make fencing materials.

Mixed coniferous/broadleaved woodland

A number of areas of mixed coniferous/deciduous woodland are found on the reserve. For the purposes of this plan, woodland is considered “mixed” if it contains both coniferous and broadleaved species in the canopy at a ratio of 1:3 or 3:1. A small number of these areas (cpts 5c, 16d) contain mature broadleaves and Japanese larch, with the larch now ready to be harvested. However, the majority of mixed woodland areas comprise young Scot’s Pine (*Pinus sylvestris*) growing alongside silver birch (cpts 8a,9a,10d and 12b). In these areas the trees are less than 10 years old.

Conifer plantation

Conifer plantation is the second most common woodland type in Greno Woods, covering an area of 64 ha (36%) in 2021 (down from 90 hectares in 2015). The majority of these plantation areas (cpts 8,9,10,11,12,13, 15) were planted during the early 1960s following a forest fire, so the majority of the trees are currently within 10 years of reaching commercial maturity. Additional areas in Hall and Low Hall Woods were planted with Japanese larch during the early 2000s.

Corsican pine (YC14) and Japanese larch, (YC16) are dominant on the higher and lower ground respectively, but stands of lodgepole pine and Douglas fir (*Pseudotsuga menziesii*) are also present. The lodgepole pine appears to be the *Pinus contorta* ‘latifolia’ provenance, and exhibits much better stem form than commonly seen in other plantations where *Pinus contorta* ‘contorta’ has been planted. Typically these conifers have been managed as single species, even-aged stands but an area of mixed corsican pine/larch is present in compartment 15.

As typical in commercial forestry, the areas of conifer have little understory and an impoverished ground flora dominated by bracken (*Pteridium aquilinum*) and bramble in some places, and wavy hair-grass (*Deschampsia flexuosa*) and bilberry (*Vaccinium myrtillus*) in others.

Both Corsican pine and Japanese Larch have responded well to renewed thinning following a seven year lapse between 1996 and 2003. However, when factors such as biodiversity value, climate change predictions and the prevalence and spread of fungal disease are considered, Scot’s pine was thought to offer clear advantages over the above species. In consequence, between 2013 and 2021 a number of felled coniferous areas were replanted with Scot’s Pine. These areas currently harbour heath-like vegetation – heather (*Calluna vulgaris*), bilberry, bracken, fine-leaved grasses interspersed with young trees.

Heathland

7.6ha of heathland is present on the reserve (**Figure 10**). This heathland is co-dominated by heather and bilberry, with bracken and fine-leaved grasses. Oak (*Quercus* sp.) and silver birch saplings are frequent across the eastern section of the heath but less common to the west. Gorse, broom, raspberry and bramble are also present in small amounts along the southern edge.

This area of heathland was formed by forest fires – one in 1958 and a second during the 1970s then began the succession back to broadleaved woodland during the 1980s and 90s as increasingly large numbers of birch and sweet chestnut seedlings took root. A first attempt at scrub clearance occurred between 2004 and 2006, and bracken was controlled during the same period. Subsequently, management of the

heathland ceased again until 2011. At this time the heathland was enclosed by stock fencing and scrub and bracken control began again and continue to the present day. Conservation grazing, by cattle, was introduced in 2013.

Currently, the heathland is a stronghold for northern hairy wood ant (*Formica lugubris*), a Greno speciality. Nightjar (*Caprimulgus europaeus*) were also recorded on the heath in summer 2021.

Neutral grassland

An area of neutral grassland known as “Mike’s Field” was gifted to the Trust in 2020 and now forms the north-eastern corner of the reserve. Mike’s Field comprises of secondary, species-rich neutral grassland, over-planted with specimen trees, with some mature and semi-mature trees on its boundaries. A hedgerow is also present along its northern boundary with Springwood Lane. Hall Wood Dike forms the southern boundary to the field. A small orchard is present along the eastern boundary.

The principle habitat present on this site is the grassland, which dominates all but the peripheries of the field. Following reseeding several years ago, the sward contains a good variety of native grasses, including crested dog’s-tail (*Cynosaurus cristatus*), Yorkshire Fog (*Holcus lanatus*) and sweet vernal grass (*Anthoxanthum odoratum*) and wildflowers such as yarrow (*Achillea millefolium*), black knapweed (*Centaurea nigra*), bird’s-foot trefoil (*Lotus corniculatus*) and yellow rattle (*Rhinanthus minor*).

This area is lightly grazed by cattle between the end of August and November each year.

2.17 Species

Fungi

No systematic study of the reserve’s fungal communities has been carried out, however considerable fungal data has been gathered since the reserve has been in the ownership of SRWT, with the majority of records coming from the 2016 survey of the south-eastern part of Greno Woods.

Surveys have shown that the mycota of Greno Wood is relatively sparse, with the communities also being somewhat unusual in their makeup. A number of common national and local species including the stump puffball (*Lycoperdon pyriforme*), shaggy polypore (*Inonotus hispidus*) and Coral Spot (*Nectria cinnabarina*) were absent from the area surveyed, however a number of locally unusual species were identified. Mushrooms and toadstools were observed to fruit over a short period and not in great amounts, and jelly fungi was also only found in small quantities. Crust fungi (colonisers of dead wood that often pioneer the decay process) were found to be numerous albeit small in size. Sulphur tuft (*Hypholoma fasciculare*), were common on stumps and dead wood across the woodland.

Invertebrates

The invertebrate fauna of Greno is not well understood and (with the exception of its northern hairy wood ant population) has not been the subject of systematic survey. From what is known from casual recording over the years, the species found are typical of the geographic region and habitats present on site. Given Greno’s size, antiquity and surroundings, and the recording of other adjacent woodlands such as Wheata, it is not unreasonable to suppose that the woodland is an important habitat for a wide variety of woodland

insect life. However, its lack of veteran trees and dead wood habitat will limit the presence of the saprolytic specialists often associated with ancient woodland.

The northern hairy wood ant, a carnivorous ant that lives in colonies, is widespread throughout Greno Woods though only occasional on other sites in the region. This species was historically used by game keepers to reduce insectivorous pests and it is possible that the population at Greno is the result of one such introduction.

16 species of Lepidoptera (butterflies and moths) have been recorded on the reserve since 2012, although this is undoubtedly an underestimate of the species actually present. White-letter hairstreak (*Satyrrium w-album*) has been recorded in Greno Woods in recent years, though little is known about its extent and distribution. This elusive butterfly is often under-recorded due to its preference for woodland canopies, and is rarely spotted at ground level. Elm (*Ulmus* spp) are the sole food plant of the caterpillar, consequently this species suffered a national decline as a result of Dutch elm disease in the 1970s and early 1980s, which destroyed stocks of English elm and is still reducing the number of mature wych elm. It is hoped that the planting of disease resistant English elm clones in Low Hall Wood will help support this species in future (see also 3.1)

The creation and rehabilitation of a series of ponds and natural flood management (NFM) features across the reserve has increased the habitat available to aquatic invertebrates, leading to a proliferation of a number of species across the reserve. Chief amongst these are the Odonata: dragonflies and damselflies, whose adult form allows them to spread easily between waterbodies. 5 species of dragonfly have been recorded on the reserve in recent years: emperor (*Anax imperator*), southern hawker (*Aeshna cyanea*), common hawker (*Aeshna juncea*), common darter (*Sympetrum striolatum*) and broad-bodied chaser (*Libellula depressa*). As an additional 6 species are recorded in ponds in the immediate vicinity of the reserve (Andrew Hall, pers.comms) it is likely that this number will increase over the period covered by this plan.

Amphibians and reptiles

Until recent years a lack of permanent freshwater features such as ponds on the reserve has limited its ability to support breeding populations of amphibians. In 2015 a survey of the reserve's (then) 4 ponds found no successful breeding activity at all. Since this time, work has been carried out at both the woodstack pond and Sharp's wood oyl. Frogspawn (*Rana temporaria*) has been reported in the wood 'oyl and the heathland pond, and common newt have been recorded in the pond in woodstack 1. Adult common toad (*Bufo bufo*) have been seen on the reserve but no breeding activity has, as yet, been recorded.

Birds

The reserve supports a diverse range of woodland birds. The commoner woodland species, such as wren (*Troglodytes troglodytes*), robin (*Erithacus rubecula*), chaffinch (*Fringilla coelebs*), blue tit (*Cyanistes caeruleus*), blackbird (*Turdus merula*) and wood pigeon (*Columba palumbus*) are found across the site. In areas of mature broadleaved woodland these are joined by species such as jay (*Garrulus glandarius*), tree creeper (*Certhia familiaris*), nuthatch (*Sitta europaea*) and bullfinch (*Pyrrhula pyrrhula*). Greater spotted woodpecker (*Dendrocopos major*) is found across the reserve, with green woodpecker (*Picus viridis*) also present but rare. Lesser spotted woodpecker (*D. minor*) is rumoured to be present in the Wharncliffe/Greno/Wheata Woodlands complex but have not been recorded at Greno in recent years, although a couple of "possible" sightings have been made in the vicinity of Low Hall Wood.

Between April and October, the woods support populations of summer migrants, including blackcap (*Sylvia atricapilla*), chiffchaff (*Phylloscopus collybita*) and cuckoo (*Cununculus canorus*). Conifer specialists such as

Crossbill (*Loxia curvirostra*) are regularly recorded during the winter months, feeding on the conifers along with flocks of the commoner great tit (*Parus major*), coal tit (*Periparus ater*) and long-tailed tit (*Aegithalos caudatus*).

Kestrel (*Falco tinnunculus*), sparrowhawk (*Accipiter nisus*) and buzzard (*Buteo buteo*) are present in the area, as is tawny owl (*Strix aluco*). *Redacted*.

A number of birds which are red or amber listed as being of conservation concern by the BTO are found on the reserve. These include woodcock (*Scolopax rusticola*), a shy, crepuscular woodland wader, which is found across Greno. Wood warbler (*Phylloscopus sibilatrix*), spotted flycatcher (*Muscicapa striata*) and pied flycatcher (*Ficedula hypoleuca*) are present in small numbers. Nightjar (*Caprimulgus europaeus*) is a recent arrival which favours clearfell areas and the heathland in which to breed. Dipper (*Cinclus cinclus*) has a restricted distribution on the reserve, being found only on the streams of Low Hall Wood which is the only watercourse on site to flow throughout the year.

Mammals

A wide variety of common terrestrial mammals, including roe deer (*Capreolus capreolus*), badger (*Meles meles*), fox (*Vulpes vulpes*), stoat (*Mustela erminea*), grey squirrel (*Sciurus carolinensis*), wood mice (*Apodemus sylvaticus*), short tailed vole (*Microtus agrestis*), common shrew (*Sorex araneus*) and hedgehog (*Erinaceus europaeus*) are found on the reserve. Mole (*Talpa europaea*) are recorded in Low Spring Wood and in the eastern (lower) parts of Greno Wood.

Grey squirrels are ubiquitous throughout the woodland and are the most often seen mammal. Browse damage by squirrels is a significant problem in the sweet chestnut coppice, and pole stage beech are also targeted. Badger roam widely across the eastern and northern parts of the reserve, favouring areas of broadleaved woodland with deeper soils where earthworms (*Lumbricus terrestris*), a favoured prey species, are found but no active badger setts are currently present on site.

The roe deer population had fallen between 2014 and 2020 due to poaching but is beginning to rise again. Muntjac deer (*Muntiacus reevesi*) were recorded on the reserve in 2021 but are currently believed to only be present in low numbers.

Several bat species have been recorded on the reserve and adjacent sites. These include common pipistrelle and some bats of the *Myotis* genus. Given the general paucity of mature and veteran trees on site, natural roosting potential is limited and has therefore been supplemented by the installation of bat boxes by the South Yorkshire Bat Group, who use these to monitor bat populations in the area.

2.18 Site archaeology

Greno Woods contain one Scheduled Monument (Handlands) and at least 400 other archaeological features. These range in scale from the (possible) remains of a fortified medieval hall, to a vast array of quarry holes, walls and features associated with the woodlands working past.

Handlands SM, a small Romano-British settlement, comprises a network of earth and stony banks demarking old field enclosures and the foundations of a number of huts, and date to the same period as similar remains in Wheata Wood.

Sharp's Wood 'Oyl is a post-medieval pond used by the Sharp family for soaking wood for the production of spelt baskets. The 'Oyl takes the form of a rectangular tank, with stone lined sides. These sides have been restored in recent years thanks to funding received from the Grenoside Conservation Society.

The Trig Point at Greno Knoll is another historic artefact. Standing at the highest point in the woodland and surrounding countryside, marks a place where signal beacons were formerly set.

The 2013/14 archaeological survey identified the possible remains of a fortified medieval hall in Hall Wood, however further archaeological research will be necessary before definitive conclusions can be made on its true nature.

SRWT propose to seek funding and a suitable partnership to carry out further investigation of the site, clarifying its function and purpose if possible, with a view to its future interpretation (either on or off site).

In addition to Handlands, several other archaeological features require specific attention in the period covered by this plan. The distribution of 'living archaeology' - worked trees (old coppice stools), and veteran and ancient trees - will be mapped as a matter of priority, to increase knowledge of this resource and so better ensure their preservation during future forestry operations

The Trust also plans to carry out an oral history project amongst local communities, to capture and record the history of the woods through local eyes. This will help to capture the post-war history of the woodland, which is currently not collated nor recorded, and changes in use (such as the development of downhill mountain-biking in the area).

2.19 Recreation

Recreational facilities

Greno Woods contain an extensive Public Rights of Way network, including a bridleway loop, on surfaced tracks. Three dedicated downhill mountain bike trails were installed in 2013 and will be refurbished in 2022. A permanent orienteering course was installed in 2014, which includes three courses of varying levels of challenge (from beginners to intermediate).

The woods also have a dedicated den building area, a toddler trail, an outdoor shelter with associated fire pit and seating areas for use by schools and youth groups (by prior arrangement only) and a number of geocache sites. Benches and picnic benches are available within the main body of the site (excluding Low Hall Wood).

The main parking facility is the Forestry Commission car park on Woodhead Road, although laybys on both the A61 and the Woodhead Road are occasionally used by visitors.

Recreational usage

Greno Woods nature reserve is well used as a place of recreation. Walking, including dog walking, running, orienteering, wildlife watching, horse riding and mountain biking are the chief recreational pursuits here, and the woods are also used by local children for play. At least two riding schools regularly use the woods for hacking.

Public consultation has shown that the woods are popular due to their natural character, the opportunities for peace and tranquillity they provide but also because of their facilities e.g. downhill mountain bike trails and their network of tracks and paths. Although the majority of visitors use Greno Woods *only*, during a single visit, others use it in combination with the adjacent areas of Wheata and Wharncliffe Woods, for example by riding a route that passes through all three.

Different areas of Greno Woods receive different amounts of visitor traffic. Low Hall Wood and Low Spring Wood receives low visitor numbers, and visitors are generally locals who walk in the woodland, reaching it

on foot from nearby housing. Visitor numbers in this part of the woodland have increased in recent years, following the restrictions on recreational and other pursuits during the coronavirus pandemic.

In contrast, the main body of the woodland (west of the A61) receives far greater visitor numbers. Here southern and central areas of the woodland (in particular the Trans-Pennine Trail, and the area including and within the bridleway loop) are most used. This area of the woodland is the most easily accessed (both from Grenoside village and the FC car park), and contains the majority of the recreational features, so attracts visitors from the local community and the wider city. Outside of this area, the northern and eastern portions of the woodland are crossed only by footpaths or desire lines and are much quieter.

A visitor survey, conducted in 2015 showed that the woods are predominantly used by local people, who access them on foot, or horseback, on a regular basis. However, the work of the Trust - improving access, installing dedicated mountain bike trails and running a wide range of walks and events - has resulted in an increase in the number of people visiting Greno, and the number of visitors from outside the S35 postcode area.

As well as these and other legitimate uses of the woods, motorcycle, quad biking and off roading activity are a frequent problem.

2.20 Community

Community profile

Greno Woods are located in the north of Sheffield and lie within the electoral ward of West Ecclesfield. Several local communities have access to the woods – Grenoside, Burncross, High Green and Charltonbrook, all of which are included within the West Ecclesfield ward. In addition, High Green and Grenoside are also included within the authority of Ecclesfield Parish Council.

Data from the 2021 UK census has not been published at the time of writing. Consequently, the following is based on the 2011 census.

In 2011, the total registered population for West Ecclesfield Ward was 18,495 with the following distribution: Burncross 3,935 registered residents, Grenoside 4,413 and High Green 10,043.

The overwhelming majority (97.1%) of the residents in the West Ecclesfield ward ethnically identified as White and Mixed White – significantly higher than the Sheffield average of 83.7%. The three largest Black and Minority Ethnic groupings in the ward comprised individuals of Black Caribbean, Indian, and Pakistani descent. All three neighbourhoods had a higher proportion of people aged 45+ (56.6% Grenoside, 54.1% Burncross and 45.1% High Green) compared to the Sheffield average of 38.7%. Burncross and Grenoside are also notable for the large size of their 65+ age group which is notably higher than the Sheffield average.

Data on economic activity is not available at a neighbourhood level, but is available for the West Ecclesfield ward as a whole. Based on the statistics from Census 2011, it shows that out of 69.8% of residents aged 16-74 who are economically active, 63.7% are employed, and the remaining are either full-time students or unemployed. Of the 30.2% who are economically inactive, 18.8% are retired, 3.8% have a disability or long-term illness, and the remaining percentage are either students or looking after home or family. In terms of economically active percentage of population, West Ecclesfield ward comes 12th out of 28 wards for the city.

Conversely, West Ecclesfield is ranked 18th out of 28 in Sheffield for deprivation, with 9% of people living in areas classified amongst the top 10% most deprived in England. High Green's score for deprivation is much higher than that of the other two areas (24.7% compared to 11.7% for both Burncross and Grenoside) but, in general, the communities surrounding the woodland are less deprived than the city average.

As a ward, West Ecclesfield has significantly worse than average scores in several areas measured by the Comprehensive Health and Wellbeing profiles compiled by Sheffield City Council. While several characteristics on the ward level are the same across all three neighbourhoods (in particular rates of cancer admissions and elective admissions), a closer look at individual neighbourhood profiles shows that Burncross has a significantly higher level of hospital admissions for Stroke and Asthma and for Cancer. The same is true for High Green, where rates for admissions for Asthma, Chronic Diseases and Circulatory Diseases are also significantly higher. Both Burncross and High Green also fare significantly worse than the city average on modelled adult obesity and High Green also has a significantly lower ration of adults eating five or more vegetables and/or fruit a day .

Grenoside in general fares better than the other two neighbourhoods health-wise: it has a significantly higher than the Sheffield average five a day fruit and vegetable consumption and its adult obesity rate, while still higher than the city average, is lower than that of Burncross or High Green.

On a ward level, 63.4% of pupils achieved Key Stage 2 Level 4+ (including English and Maths), which is higher than the Sheffield average of 56.1%. Conversely, in the attainment of 5 or more GCSEs with the grades C or above (including Maths and English), the ward fared worse than Sheffield average – 77.9% compared to 82.2%. Within the ward, the level of GCSE attainment varied greatly, with Burncross having the highest rate (76%), while Grenoside and High Green had only 61% and 60%, respectively. Finally, regarding post-16 education, only 5.4% of 16-18 year olds were not in education, employment or training, which was lower than the Sheffield average of 9.9%.

To summarise, when compared with others in the city, West Ecclesfield can be regarded as a moderately affluent ward, whose households score well in terms of wealth, employment, housing, health and child wellbeing. The ward's population is mostly white or mixed white, and is characterised by a significantly higher than Sheffield average number of people aged 45+. In addition, it has a higher than average proportion of couple households. Data indicate that households in the vicinity of the woods are, on average, wealthier than the Sheffield average.

Community services

Grenoside village supports a good range of community services, including shops, a post office, pubs, a primary school, a community centre and the Reading Rooms. Many community organisations are active within the village which has a thriving and varied social scene.

Unlike Grenoside, the populations of High Green and Burncross are not placed around a single centre or hub. Although shops, schools and community facilities are present within these communities they are more dispersed (or in adjacent Chapeltown) and tend to be on the eastern side of the area away from the woods. For this reason, they provide a less suitable interface for disseminating information to local people about the woods, and other methods (such as on-site advertising) are required.

Two community newspapers/letters cover the area. In Grenoside this is the 'Grenoside News' and in High Green and Burncross 'Look Local'. Both provide a helpful medium for communicating with local people.

The most serious problems within the ward are health (high rates of cancer admissions, adult obesity, etc.), and anti-social behaviour. However, high rates of cancer admissions in particular are likely to be the result of a higher proportion of elderly within the ward.

On the neighbourhood level, however, there are some differences between the three communities. Data shows that High Green is often at a disadvantage when compared to Burncross or Grenoside, which is

especially evident when looking at the Indices of Multiple Deprivation data, where it has the lowest rank. High Green also has a higher proportion of people living in social housing.

In terms of available services, Grenoside has the highest number of local community oriented services (groups, churches, community centres, etc.), followed by High Green, while Burncross has the least, probably due to its proximity to Chapeltown. Out of the three neighbourhoods, Burncross can be classified as the least deprived among the three communities in terms of education and safety.

Communities of interest

As well as local people, Greno Woods serves a number of 'communities of interest' from across the city/region. These include:

The **walking community**, represented by organisations such as the Ramblers and other local walking groups. The majority of walkers are local, but people also travel from across the surrounding area (Sheffield, Barnsley) to walk in the Wharncliffe/Greno woodlands.

The **horse-riding community**, represented by organisations such as the British Horse Association. Due in part to lack of parking for vehicles towing horse boxes, most riders are local or ride the woods in conjunction with one of the local stables.

The **mountain-biking community**, represented by organisations such as Ride Sheffield. Local mountain bikers use the woods but many bikers travel from across the city/region to access the trails at Wharncliffe/Greno. This is a well known area for downhill mountain bike racing due to the development of the sport in the area, the profile of national champion (and local boy) Steve Peat and latterly due to the development of trails in the area. This community is experiencing rapid growth in the Sheffield area and nationally.

The **orienteering community**, represented by Sheffield Orienteers, whose membership is taken from across the city.

The **wildlife community**, represented by a variety of organisations including the Wildlife Trust, Sorby Natural History Society, South Yorkshire Bat Group, Sorby Bird Study Group and the Sorby Breck Ringing Group. Members of these and other groups travel to the woods from across the city to enjoy and record wildlife. A number of excellent naturalists are also resident in the communities surrounding the woods.

Community engagement

The Trust aim to engage local people, our members and the wider community of Sheffield in the management of the reserve. Opportunities for engagement include volunteer work days – these are held monthly and allow participation in practical conservation work -, corporate work days, and a range of activities and events for adults, children or families. All of these are advertised and can be booked through the Trust's website www.wildsheffield.com

The **Grenoside Conservation Society** have a long-standing interest in the woodlands around the village. Rather than run an independent group to allow individuals to discuss and input into the management of Greno Woods, the Trust attend every second meeting of the Grenoside Conservation Society where it presents an up-date on management of the reserve, events and related matters. At these meetings, which are open to the public, the Trust's representative also answers any questions regarding the reserve and seeks the meeting's opinion on management activities.

Should matters arise that require greater or wider public consultation or engagement, such as the production of a management plan, then independent meetings for that purpose are held on site, or in Grenoside village.

In addition to Trust-run events, a number of external organisations run, or have run, events in Greno Woods. Most significant of these is the annual 'Steel City Downhill Mountain Bike' race organised by Ride Sheffield in conjunction with Steve Peat. This whole day event sees approximately 200 competitors and many hundreds of spectators from across the region come together around the Steel City trail.

2.21 Outdoor learning

Since 2013 SRWT has been working to develop and deliver outdoor learning sessions in Greno Woods, working with primary schools, secondary schools and youth groups. Uptake has varied across the period 2013-2019, and was generally highest when the Trust was able to subsidise coach travel. Between 2020 and the present day, very few school visits have been made due to the impact of the coronavirus pandemic and its effect on education.

An outdoor shelter with shelter and fire pit and a waterless toilet are available on site for use by schools and groups and, outside of forestry operations, parking for coaches and minibuses is available in Woodstack 1. The "Academy of Danger" trail is also available for use by schools and groups under SRWT guidance.

SRWT plans to continue to utilise the reserve for outdoor learning and engagement activities over the period covered by this plan. This will be done both directly and also by promoting independent use of the site by schools and accredited groups.

3.0 VISION AND FEATURES

Our vision for Greno Woods in 2070 is:

"Greno Woods is a rich tapestry of restored semi-natural ancient woodland, heathland and grassland where wildlife is both diverse and abundant. The reserve's woodland heritage is conserved and celebrated and people of all ages from local communities and across the city of Sheffield come to enjoy a variety of recreational pursuits in a beautiful, natural setting."

Forming one part of the larger Grenoside woodlands complex which spans from the River Don to the west to High Green in the east, Greno Woods is a site rich in wildlife.

From the reserve's western edge, W16 oak-birch woodland spreads up to the watershed then down the hillside, grading into W10 oak-bracken-bramble woodland and W14 beech-bramble woodland on the deeper soils to the north and west. Pockets of mature broadleaf woodlands dominated by oak and beech and containing some mature conifers are interspersed with areas of younger, more open birch woodland which have developed in formerly coniferous areas. The woodland is structurally complex and contains an increasingly large number of mature trees. Dead wood, both standing and fallen, is an important component of the woodland across the reserve. A number of specimen English Elm are present in Low Hall Wood.

A ground flora including a variety of flowers indicative of ancient woodland is present to the east of the reserve. Relic coppice stools and holly hags are scattered throughout the woodland, testifying to its past management history. An area of working sweet chestnut coppice is present on site.

Forming the headwaters of the Blackburn Brook catchment, the reserve plays an important role in natural flood management. It contains a network of ponds and ditches ready to capture, store and slowly disperse rainwater into the ground and its streams. These ponds contain a healthy population of freshwater invertebrates which, in turn, support populations of common frog, common toad, palmate and smooth newts and grass snake.

An area of open woodland and heathland lies at the heart of the reserve, providing nesting opportunities for willow warbler and nightjar and is home to populations of hairy wood ants and common lizard, which are also found along the extensive ride network.

The woods are a good place for birds, with over 40 species breeding here on a regular basis, including tree pipit, wood warbler, spotted flycatcher, bullfinch, great spotted woodpecker, dipper and woodcock. Together with the adjacent Wharncliffe Woods and Heath, the reserve is also supports breeding populations of lesser spotted woodpecker, nightjar and pied flycatcher. The woodland area also supports a cross-section of the British mammal fauna, including roe deer, badger, weasel, pipistrelle bat, brown long-eared bat, red squirrel and pine martin.

The reserve's man-made features are well-kept and in keeping with the naturalistic 'feel' of the site, and the surrounding countryside. Rights of Way offer a variety of possible routes around the site which is well-used by walkers, horse-riders and cyclists. The majority of visitor usage is concentrated in Greno Wood itself, with Hall Wood, Low Hall Wood and Low Spring Wood seeing little recreational disturbance. Undisturbed areas, where wildlife can thrive away from disturbance by humans and dogs, are scattered across the woods.

The reserve's visitor profile reflects that of the wider community and the reserve allows people of all ages to experience the natural world and encounter our native wildlife. Visitors have the opportunity to learn about the woodland and its wildlife and Trust's work whilst on site, with links to sources of further information provided.

3.1 Feature 1. Woodland

Objective: 155 hectares of broadleaved woodland in good ecological condition by 2070

Attributes of woodland in good ecological condition

Attribute	Performance Indicator	Monitoring	
Species composition.	<p>≥ 70% of the canopy comprises native broadleaf species.</p> <p>≥ 3 native broadleaved tree and shrub species represented in the canopy and understory.</p> <p>In areas of upland oak woodland (W10) the dominant canopy species will be oak (<i>Quercus petraea</i>) or the hybrid <i>Q. petraea x robur</i>), birch (<i>Betula</i> sp) and rowan (<i>Sorbus aucuparia</i>) with < 10% of the canopy comprising coniferous species.</p> <p>In areas of lowland woodland the dominant canopy species will be oak (<i>Quercus robur</i> or <i>Q. petraea x robur</i>) or beech (<i>Fagus sylvatica</i>) with < 10% of the canopy comprising coniferous species.</p> <p>A number of scattered mature and veteran conifers (Corsican Pine and Scots Pine) to be retained across the woodland.</p>	Woodland Monitoring	Condition
Successful broadleaf regeneration beneath canopy	<p>Evidence of browsing damage present across <40% of woodland.</p> <p>Evidence of regeneration present across >40% of woodland, of which 80% is native broadleaved species.</p>	Woodland Monitoring	Condition
Woodland structure	<p>10 – 40% of woodland has areas of temporary open space, of at least 10m in diameter.</p> <p>Width of woodland edge habitat should be at least 1.5 times the height of the nearest mature tree.</p>	Woodland Monitoring	Condition

Attribute	Performance Indicator	Monitoring
Woodland structure cont.	Average of 3 different tree size classes present per 100m ² across woodland.** Average of 3 veteran trees in each ha**.	Woodland Monitoring Condition
Dead Wood	>3 snags (standing dead wood including dead wood in live trees) per 100m ² across woodland. >50% of woodland area contains large* fallen dead wood (including large branches, stems, excluding stumps).	Woodland Monitoring Condition

* >20cm diameter & >50cm long.

** Very mature/veteran (at least 80cm DBH) Mature/ mid-range (at least 35cm DBH) Young / Pole stage (at least 7cm DBH) Saplings (Over 50cm, under 7cm DBH) Seedlings (up to 50cm)

Reference: Woodland Condition Survey (2017), Online: (The England Woodland Biodiversity Group and Forest Research.).

Factors

A factor is anything that has the potential to influence or change a feature, or to affect the way in which a feature is managed.

Factors	Rationale	Management Required (Yes/no/monitor)	Technical Indicator of control	Monitoring
Invasive non-native species	Rhododendron (<i>Rhododendrum ponticum</i>), cherry laurel (<i>Prunus laurocerasus</i>), variegated yellow archangel (<i>Lamium galeobdolon argentatum</i>) and Japanese Knotweed (<i>Reynoutria japonica</i>) are present but scarce on the reserve. If no action is taken these species will spread, displacing the native flora.	Yes	No invasive non-native species (INNS) present in woodland.	Woodland Condition Monitoring
Invasive non-native tree species	Sycamore is an introduced species which can outcompete oak and thus, over time, displace it from the canopy.	Yes	Sycamore regeneration is limited in areas of semi natural ancient woodland	Woodland Condition Monitoring
Invasive native species (holly)	<p>This native species is spreading across woodlands in Sheffield, due to lack of natural control processes (grazing by deer and rooting by swine) and the cessation of past woodland management practices such as cutting for winter fodder.</p> <p>Without control holly forms dense thickets, displacing other species and preventing the regeneration of trees.</p> <p>Holly is currently problematic in Low Spring Wood and the older parts of Greno, Low Hall and Hall Woods.</p>	Yes	<p>Holly cover is frequent over <50% of woodland.</p> <p>Holly cover is very frequent or continuous over <10% of woodland.</p>	Woodland Condition Monitoring

Factors	Rationale	Management Required	Technical Indicator of control	Monitoring
Tree disease	<p>Many species of native broadleaved trees are vulnerable to pathogens, several of which are active in the Sheffield area.</p> <p>Species known to be at imminent risk – ash, sweet chestnut – are present on the reserve. However, diseases of oak and beech are active in the UK and may pose a significant future threat to the woodland</p>	No, monitor	Persistence of oak, beech, and birch as dominant species in the woodland canopy, with at least 5 other native broadleaved species present on the reserve.	Woodland Condition Monitoring
Past management	Past management of the area has resulted in the introduction of conifers to the reserve, which in turn has affected the species diversity in the canopy, understory and ground flora and the reserve's soils, leaving it in unfavourable ecological condition.	Yes	<p>≥ 70% of the canopy comprises native broadleaf species.</p> <p>≥ 8 native broadleaved tree and shrub species represented in the canopy and understory across the reserve.</p>	Woodland Condition Monitoring
On-site archaeology	The reserve contains a number of features of archaeological interest. These may be vulnerable to damage during management operations, especially those involving ground disturbance or heavy machinery.	No, monitor	Archaeological features identified and, if necessary, protected during management operations.	Operational checklists (Appendix III)

Factors	Rationale	Management Required	Technical Indicator of control	Monitoring
Climate change	<p>Global temperatures are predicted to continue rising over the course of the century. Although the exact effect on the climate of the UK is not known, it is thought that the result is likely to include to an increase in climatic variability, with extremes in temperature, wind speed and rainfall becoming more common. Consequently, increasing the reserve's resilience to drought, high rainfall, fire events and gales (increased risk of wind fall) should be a priority when management decisions are made.</p> <p>Long-term changes in climate may also affect the species which the reserve is able to support long-term and future species conservation plans will need to take this into account.</p>	No, monitor	No loss of habitats across the reserve due to wind or fire	<p>Woodland Condition Monitoring</p> <p>Site Risk Assessment.</p> <p>Fire Risk Assessment Plan</p>

Woodland: Evaluation of current condition

The structure, species composition and management regime of the woodlands which now comprise Greno Woods have changed many times over the past 1,000 years, in response to the social and economic needs of the time. This need – to change with the times – is still relevant to the woodland today. This said, the nature of woodland, the longevity of tree species and the requirement for a stable environment for many of the species it supports, suggests that a change from one system to another should, overall, be a gradual one. This plan then, sets the following long-term aims for the woodland, against which shorter term objectives and work programmes may be set and monitored:

Woodland is the climax community over much of the UK and certainly over the area covered by the reserve. Native woodland, particularly semi-natural ancient woodland, is considered a priority habitat across the UK¹ in recognition of its importance in supporting both biodiversity and bioabundance.

The biodiversity of any particular woodland will be determined by a range of factors. Factors that increase biodiversity are a long period of continuous tree cover, a large size, good connectivity, a wide range of tree species, the presence of trees of all ages including old and senescent trees and a lack of disturbance from human activities.

Greno Woods is an ancient woodland. It is well connected with adjacent woodlands and especially with the woodlands of Wharncliffe and Wheata, and thus forms part of a large woodland block (c700ha). These factors mean it is home to a wide range of species, including several which are particularly associated with ancient woodlands. However, much of the woodland at Greno lies on thin, dry, acidic soils. Over the centuries it has been intensively managed for timber production, resulting in constant disturbance and removal of biomass. It is fragmented by the Woodhead, Hallwood and Penistone Roads. Large areas of broadleaved woodland were lost to fire in 1958 and it remains vulnerable to fire to the present day. Widespread coniferization has occurred meaning that the majority of Greno is now classified as Plantation on an Ancient Woodland Site.

As a consequence of these plus other factors, the biodiversity value of Greno Woods is currently lower than might be expected for a woodland of this size, age and location. Or - to reframe this in a more positive light - the reserve contains plenty of scope for biodiversity gain through sympathetic management.

Species composition

The reserve currently contains 173 ha of woodland, of which 91 ha (53%) is deciduous woodland, whilst 19 hectares (11%) ha are mixed broadleaved/coniferous woodland (> 10% conifer component) and 64 ha (36%) are coniferous.

In the twentieth century, 40% of Britain's ancient woodland was converted to conifer plantation², with devastating effects for wildlife. In the UK, broadleaved trees support a far greater variety of wildlife than coniferous species. This is partly a consequence of most coniferous species being non-native and generally found growing in plantations, (meaning they never grow to an advanced age or take a complex form). However, even a well grown, wild Scot's pine, a native of the UK, supports only around 50 species, compared to an oak tree's 2,300³. The simple and uniform structure of conifer needles and their high cellulose and pinene content, make them a less attractive food source to most animals than the leaves of most broadleaves. The needles, when fallen, produce an acidic soil which discourages the growth of many plant and fungal species. The presence of a small number of well grown conifers in a woodland are beneficial a narrow range of wildlife: they are often favoured by raptors as nesting sites and their cones providing an important seed source for conifer specialists during the winter months. Nonetheless these benefits are marginal and an increase in biodiversity would result from the widespread replacement of conifers across the UK by native broadleaved trees.⁴

¹ UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008. (Updated 'HF 2011) JNCC

² Atkinson and Townsend 2011

³ Woodland Trust

⁴ Rebirding: restoring Britain's wildlife B MacDonald 2019

Coniferous woodland is not native to the Sheffield region and it is known that the conifers in Greno Wood were introduced in the early 1960s following a forest fire, with further planting in Hall and Low Hall Wood during the 1950s and the early 2000s. Surveys and biological recording at Greno⁵ have shown that species diversity within areas of conifer woodland are significantly less for every taxa or kingdom for which data has been gathered – plants, fungi, birds, mammals, invertebrates. These findings are in line with what is known of the ecology of conifer plantations vs that of semi-natural woodland across England. Consequently, the presence of large areas of conifer plantation are detrimental to the biodiversity value of Greno Woods as a whole, although the presence of a coniferous element within the reserve’s woodlands – especially of “legacy” trees allowed to mature and veteranise in non-plantation conditions – would be beneficial. **The long-term reversion of Greno Woods to native broadleaf woodland with the retention of a coniferous element would provide woodland of the greatest biodiversity value.**

The natural vegetation type for the Greno area is oak woodland (either W16 upland or W10 lowland; **Figure 11**) and many broadleaf areas of the reserve are succeeding towards this community, with other areas becoming beech dominated. Research suggests that a diverse woodland, with a canopy and understory comprising multiple species, will prove more resilient to factors such as tree disease and climate change. Consequently, the woodland at Greno will be judged to be in good ecological condition if at least 3 native tree species are found in each 100m x 100m square of woodland. Currently, only 95% (Greno/Hall Wood) and 86% (Low Hall Wood) meet this criteria, due to the presence of areas of dense conifer plantation (Low Spring Wood displays a good variety of tree and shrub diversity across the entire woodland area). **The thinning of conifer cover from the reserve will allow broadleaf species to regenerate in coniferous areas by increasing the light levels reaching the woodland floor, thus increasing tree diversity and will be continued over the period covered by this plan.**

As well as native broadleaved species the reserve supports a couple of non-native (or locally native) broadleaved species, notably beech, sycamore and sweet chestnut. Beech is a locally non-native species but is native to the south of England. Its canopy casts a dense shade, suppressing the understory, ground flora and regeneration of other tree species (holly excepted) beneath its canopy. For this reason, it tends, in time, to dominate oak woodland causing the loss of diversity in canopy, understory and ground flora alike. However, mature beech trees provide food for a variety of birds and mammals, as well as supporting a diverse community of mycorrhizal and saprophytic fungi.

Early research suggests that beech will fare well if the climate of the UK warms over the coming century, moving the natural distribution of this species to the north. For this reason, **a beech element will be retained** at Greno (particularly in compartments 1, 2 and 19) **but not be permitted to dominate** areas where oak is already established.

Beech trees are prone to damage by grey squirrel which strip the bark off pole stage specimens, causing entry points that are then attacked by fungi. Monitoring of tree stock for signs of damage by browsing will therefore form part of the woodland condition monitoring, which will also record browse damage from deer.

Sycamore is currently present in many compartments throughout Greno Woods. This non-native species supports a high biomass of invertebrates, as well as providing large amounts of leaf litter for detritic communities. Conversely, its tendency to dominate woodlands with its heavy canopy and prolific seeding makes it a long-term threat to broadleaf diversity by its displacement of other species.

In a changing climate, with a proliferation of tree diseases, the loss of a key canopy component such as sycamore would be considered to decrease the resilience of the reserve’s woodlands to possible threats. Consequently, sycamore will be retained although not allowed to dominate large areas of canopy at the expense of oak, to maintain canopy diversity. **The active removal of sycamore seedlings and saplings will take place in areas classed as semi-natural ancient woodland** (Low Spring Wood, Cpt 2b Low Hall Wood) in line with UK Woodland Assurance Scheme (UKWAS) protocols.

⁵ “Bird Survey Point Counts” (2015) Riley, J. “Phase 1 Survey of Greno Woods” (2018); Doar, C. S.Clements, pers.comms

Sweet Chestnut is well established throughout Greno Woods. This species is native to southern Europe and North Africa but, as with sycamore, is now naturalised into the UK. The flowers provide an important source of nectar and pollen to bees and other insects. A large number of micro-moths feed on the leaves and nuts, which are also enjoyed by squirrels. However, its rapid rate of establishment and growth, which makes it ideal for coppice, means that it can outcompete slower growing species such as oak.

It is thought that **sweet chestnut** will fare well if the climate of the UK warms over the coming century, although its susceptibility to the fungi *Cryphonectria parasitica* (chestnut blight) and *Phytophthora ramorum*, which is active in the vicinity of the reserve at the present time, may limit this success in the future. Nevertheless, it **constitutes an important and attractive component of the woodland at Greno and will be retained**, although action may be required on a compartment by compartment basis to ensure that it does not prevent the establishment of the slower growing oak.

Natural regeneration

Analysis of the species-composition for natural regeneration of tree species at Greno Woods shows the regeneration of deciduous and, to a lesser extent, coniferous species across the reserve. Silver birch, a pioneer species, is quick to colonise areas of open ground along with oak and rowan. Goat willow is found along drainage ditches and flushes, rowan, sweet chestnut colonise woodland where the canopy has been thinned, whilst beech and holly seedlings can tolerate dense shade. The regeneration of conifers however, is overwhelmingly confined to open areas such as the heathland and new clearfell areas. This is due to the high light levels required by coniferous seedlings and saplings to thrive. **In consequence, the thinning of coniferous areas will promote the regeneration of broadleaved species such as birch, beech and holly**, whilst clear-felling is required for conifer regeneration, whether natural or through planting. Oak, in general, requires glades to regenerate and its seedlings do poorly in shaded conditions, with the majority failing to progress to the sapling stage unless gaps in the canopy are created and competing vegetation eg beech and sycamore regeneration are suppressed⁶.

The high level of native broadleaf regeneration across the reserve suggests that natural regeneration rather than reliance on planting could be used to restore broadleaf woodland across the reserve as conifers are removed (see also Silvicultural Systems below).

Tree disease

Tree disease is a current and ever-increasing issue in the management of woodlands, with many broadleaved species – oak, beech, hornbeam, rowan, ash, sweet chestnut, elm, sycamore – being susceptible to one or more of the diseases currently circulating in the UK. A number of tree diseases are circulating in the Sheffield area, notably *Phytophthora ramorum*, *Ophiostoma novo-ulmi* and *Hymenoscyphus fraxineus*. Two of these are windborne whilst the third is endemic in the UK and transmitted via an insect vector. None can therefore be avoided by standard forestry practises in disease control.

Phytophthora ramorum is active across the Sheffield area. A highly destructive, algae-like organism called a water mould, its spores can infect a number of woodland species, notably larch, and sweet chestnut. Forestry Research tracks the spread of the disease across the UK using aerial survey backed up by on the ground testing when the disease is suspected. Infection can spread rapidly so when infection is confirmed affected trees must be felled to limit its spread.

Greno Woods contains several compartments of mature larch and a large number of pole stage larch concentrated in Hall Wood and Low Hall Wood, as well as a significant component of sweet chestnut. It is therefore extremely vulnerable to infection, with known outbreaks of the disease occurring in adjacent woodland. **Larch will therefore**

⁶ 'On the knowns and unknowns of natural regeneration of silviculturally managed sessile oak (*Quercus petraea* (Matt.) Liebl.) forests—a literature review.' (2020) Kohler, M., Pyttel, P., Kuehne, C. *et al. Annals of Forest Science* **77**, 101

be prioritised for harvesting over the period covered by this plan and will be clear-felled if necessary to contain this disease.

Hymenoscyphus fraxineus is a fungal pathogen that causes the disease known as ash dieback. This is now also widespread across the UK and in recent years has begun to affect ash trees in Greno Woods and other Trust nature reserves. Infected trees decline over a number of years, with the timber becoming brittle and prone to sudden failure as the disease progresses. In response to this the Trust has initiated an annual monitoring programme for ash, with failing trees being identified and, if necessary for safety, felled. Due to the presence of this disease in the region, it is believed that all ash at Greno will be lost over the period covered by this plan.

Dutch elm disease *Ophiostoma novo-ulmi* is another fungal pathogen which affects elm (*Ulmus* spp.) Unlike the pathogens discussed above this disease is spread by elm bark beetle, a wood-boring beetle that favours trees of above a certain size. The disease has resulted in the loss of large English elm (*Ulmus procera*) across mainland UK and will also attack mature wych elm (*U.glabra*), although young and coppiced specimens are unaffected.

Dutch elm disease and the subsequent loss of elms is of particular consequence for the white-letter hairstreak butterfly (*Satyrrium w-album*). This species oviposits only on mature elm as its caterpillars feed on elm blossom until they reach the first instar, latterly moving on to feed on its leaves. Consequently, the loss of maturing wych elm is a threat to the survival of this butterfly in the UK.

Since 2018 Greno Woods has been part of a field trial for the growth of disease-resistant English elm hybrids. **A number of different disease-resistant elm clones** have been planted in the woods and **will be managed and monitored over the period covered by this plan** to see both how they develop and which wildlife they will support. It is hoped therefore that these trees will provide suitable habitat for white-letter hairstreak as they mature.

Invasive non-native species

A number of invasive non-native species (INNS), notably rhododendron, cherry laurel, variegated yellow archangel and Japanese knotweed are present across the woodland in small quantity. These species are invasive and, if unchecked, will dominate areas of the woodland displacing the native flora. For this reason **they will be systematically removed**.

Woodland Structure

Woodland structure is also a key attribute of woodland in good ecological condition. Factors which affect structure include the age structure of the woodland, the presence and complexity of the understory and ground flora, features such as veteran trees and the dead wood component, woodland glades and the presence of an ecotone on the woodland edge.

Age structure

Woodland with a diverse age structure provides more ecological niches for exploitation than even-aged woodland. Equally, mature and, in particular, veteran trees provide extremely important ecological resource, attracting a range of specialist saprophytic species not otherwise supported by younger vegetation. The structural complexity of such trees also allows them to provide suitable roost and nest sites for a range of animals, including the bats for which this site is of importance.

The canopy at Greno Woods as a whole is very varied (**Figure 12**) by compartment but even aged within compartments is closed with many well grown trees present. As such, it is relatively even-aged, and lacks veteran and senescent trees, reflecting past management practices. Woodland with a diverse age structure provides more ecological niches for exploitation than even-aged woodland. Equally, mature and, in particular, veteran trees provide extremely important ecological resource, attracting a range of specialist saprophytic species not otherwise

supported by younger vegetation. The structural complexity of such trees also allows them to provide suitable roost and nest sites for a range of animals, including the bats for which this site is of importance.

The greatest diversity in age is found in the oldest broadleaved areas to the east and north which contain numbers of trees over 70 years in age, however the vast majority of trees on the reserve are younger than this. Whilst the reserve does contain a considerable number of tree (notably oak and holly) of a great age, the growth form of these trees belies their years. These are trees that have been repeatedly coppiced throughout their lifetimes, rejuvenating them and causing them to become multi-stemmed. Consequently, despite their several hundred years, these veterans provide none of the features – dead wood, rot holes, hollowing – that provide greatest ecological benefit. In terms of woodland structure then, Greno can said to be a young woodland. **Increasing the proportion of mature trees on the reserve and, eventually, the proportion of ecologically veteran trees is an important long term management aim.**

Holly

Holly, a native shrub, has been and is spreading across woodlands throughout broadleaf areas of Greno Woods. It is particularly problematic in combination with a beech canopy, where its spread is favoured by low light levels, however, as can be seen in Low Spring Wood, it can form a monoculture under an oak canopy.

The reasons for holly's spread are not absolutely understood but is a pattern that is repeated across the majority of Sheffield's woodlands. It is believed to be related to the cessation of the active management of woodlands (it was previously harvested for fodder and fuel wood and managed as part of the coppice crop) and, additionally, reflect the loss of grazing herbivores and rooting omnivores from our woodlands.

A natural component of the woodland ecosystem, holly has great benefit for wildlife. Holly hags provide food and shelter during the winter months, and areas of dense holly affect the woodland microclimate, blocking wind and so increasing humidity. Dense hags are used for nesting by several species of woodland bird.

However, where holly becomes a monoculture, it blocks out light to the woodland floor to such an extent that all other understory, the ground flora and any possibility of tree regeneration is lost. In addition continuous or abundant holly cover can be considered a potential fire risk in a woodland system prone to fire due to its dry, persistent leaf litter and high fuel load adjacent to the forest floor. Consequently continuous holly cover is considered damaging to woodland condition and **work to reduce (but not eradicate) holly cover** has been taking place across Greno Woods nature reserve over the past 5 years and **will continue during the period covered by this management plan**. This work will focus on controlling the spread of holly in areas where the ancient woodland ground flora is richest or has potential to become richest (see 4.2) and to break up large blocks of holly in areas where a lack of tree regeneration is becoming problematic. Where possible this work will be carried out by hand and focus on the removal of seedling and sapling holly but where extensive cover is present mechanical cutting followed by manual control of regrowth may be necessary.

Temporary and permanent open space

Temporary open spaces (glades, clearings) are an important feature of woodland health as they provide habitat for early successional plants, basking spaces for invertebrates and reptiles and offer opportunities for the recruitment of tree seedlings. Temporary open spaces of at least 10m in diameter are currently found across 63% and 41% of Greno Wood and Low Hall Wood respectively, with no open space at all present in Low Spring Wood. Consequently, the reserve performs poorly on this target, with too much open space across the majority of the reserve and too little in Low Spring Wood. Changes in management practice away from clear-felling and toward CCF will improve the situation (see silvicultural systems below), although the predicted loss of larch to *Phytophthora* across the reserve will exacerbate the problem in the short-medium term.

Woodland edge is defined as the transition zone between a maturing forest and adjacent habitats, such as grassland, crop land, or wetland. A well-developed woodland edge typically consists of plant communities that are intermediate in height when compared to adjoining habitat types. Many species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations. Productive woodland edge habitats are those where the width of the woodland edge habitat is at least 1.5 times the height of the nearest mature tree.

At Greno Woods none of the woodland at the periphery of the reserve meets this criteria, with woodland edge habitats either being largely absent or, where present, lying on adjacent land. However, given that the periphery of the reserve is by and large where the best stands of mature broadleaf and oldest trees are found, and given the abundance of open space and open woodland across the majority of the reserve, no attempt to create such an ecotone on the reserve boundary will be made. Instead, **management effort will concentrate on the creation and retention of ecotone along a number of wide rides where this can be done without the loss of mature trees** (see also 3.5 below).

Dead and dying wood

In the UK up to a fifth of woodland fungi and animals depend on dead or dying trees for all or part of their lifecycle and many of these species are rare or threatened. It is clear from the historical data that centuries of timber harvesting and coppice management has stripped Greno of much of the mature, senescent dead and decaying wood that one might expect to find in an ancient woodland. This loss can be seen at all levels but is most notable in the dearth of veteran trees and standing dead wood.

Despite this, the 2020-2022 monitoring programme shows that the reserve does meet the attribute for minimum dead standing and fallen deadwood content, with >3 snags per 100m² being found over 96% of the reserve (minimum target 80%) and 3 large pieces of fallen dead wood (excluding stumps) being present in 96% (minimum target 50%). That said, there is no doubt that an increase in dead wood – as part of living trees, as monoliths, as fallen wood – would prove beneficial to biodiversity. **The Trust will therefore promote the retention of dead and dying wood on the reserve** by managing for veteranisation, and through the retention of dead wood in all situations and quantities which are compatible with public safety and other management practices.

Fungal communities

Greno Woods supports a varied mycological community (*S. Clements; pers comm*). Perhaps due to its long history of intensive management, involving both the regular harvesting of timber and, latterly, a severe fire and compaction to the forest floor, a number of locally common species are absent, although the reserve does also support a number of rarities. The lack of a UK standard methodology for woodland fungal surveys means that it cannot be directly compared to that of other woodlands in the region, neither has the entire reserve been recorded. Nevertheless, it can be concluded to harbour less variety of species than other similarly sized woodlands with less turbulent histories.

The fungal communities present in a woodland are the result of multiple factors. Chief amongst these are the woodland species composition and structure, the amount of dead wood available on site and the levels of disturbance through management (intensive woodland management is damaging to fungi) and recreational pressure.

A number of fungal ‘hotspots’ were identified within Greno Wood. Factors that were positively associated with fungal diversity were path edges where these were slightly banked and therefore not subject to trampling by humans or dogs, the presence of oak, birch, beech and sweet chestnut, associated with a number of habitat factors. Additionally, vegetation that dissuaded human animal access: bracken, bramble and dense holly, was also associated with higher fungal diversity, presumably again due to the lack of disturbance and ground compaction.

Retaining and increasing the reserve's tree diversity and in particular the proportion of oak, birch and beech will promote and enhance the reserve's fungal community, as will the prevention of fires and a general increase in dead wood and other detritic matter. A move from intensive forestry to extensive CCF will also provide long-term benefits for this Kingdom, as will the general principle of minimising the use of heavy machinery in areas of broadleaved woodland.

The management needs of fungi (low levels of disturbance, dense understory) conflict somewhat with the management needs of other of the reserve's features (northern wood ant and AWIS). In particular, the need to limit holly spread across the woodland to benefit AWIS needs to be balanced with the need to retain holly for fungi. Holly hags are beneficial to fungi as they create a microclimate which in hot dry periods help to retain soil moisture which is required for fungal fruiting. Additionally, holly can be protective of fungi by acting as a barrier deterring visitors (and their dogs) from straying from the footpaths. Consequently, management works will therefore need to be carefully balanced to promote the requirements of all groups. **Care will be taken that the removal of continuous or dense holly cover and the subsequent creation of bare ground does not lead to an expansion in footfall across the woodland floor as the resultant compaction would be damaging both to the ancient woodland ground flora but also the fungal community.**

Data suggests that the collection of fungi for culinary purposes (foraging) does not adversely affect the fungal communities. However, the data set is limited and given Greno's designation as a nature reserve, its proximity to a large population centre, and the need to keep people on the official path network to limit disturbance, **foraging for fungi is not permitted on the reserve.**

Sylvicultural Systems

Three sylvicultural systems – clear-fell and restocking, coppicing and continuous cover forestry (CCF) have been in operation at Greno over the course of the last 70 years. Clear-fell forestry involves the removal of single age stands of conifers and restocking by replanting young trees to form another single age block. Coppicing involves the rotational cutting of coppice stools to produce a timber crop whilst retaining the living root system and growth points to regrow in multi-stemmed form. Continuous cover forestry is a system whereby the forest canopy is maintained at one or more levels without clear-felling.

Under continuous cover, the stands in the forest are seen as the framework for an ecosystem from which timber is harvested at intervals but where other aspects such as landscape or wildlife habitat are of equal importance. The impact of the harvest on this framework is considered and the quantity of felling adjusted to ensure that the changes brought about do not impair the wider system. The use of natural regeneration is a key component in such a system. Clear-fell forestry and restocking on the other hand is primarily a form of crop production in which the economic value of the timber is prioritised and the stands are managed to maximise and optimise the growth of the crop species. Coppicing likewise is primarily a system designed to produce timber. However, its reliance on broadleaved species and long history in the area mean that it benefits a wider range of the local fauna and flora.

PAWS restoration

At Greno, the semi-natural oak woodland and its associated ground flora was first damaged by the introduction of the non-native broadleaved species beech, sycamore and sweet chestnut during the 19th and 20th centuries, then by a severe fire which swept the southern half of the reserve in 1958 and finally by widespread coniferisation (1959 onwards). Consequently, only fragments of semi-natural ancient woodland remain on site, although some of the species associated with the habitat are able to utilise broadleaf plantation and are therefore spread a little more widely. Nevertheless, the woodland seen on the reserve today is only a pale ecological shadow of what once was present.

The aim of PAWS restoration is to retain remnant features of ancient semi-natural woodlands and to enhance these and allow the species associated with them to spread and, over time, recreate a woodland character supporting the range of species and ecosystem services previously lost. At Greno this would comprise retaining the oak woodland (upland and lowland) with its associated communities of plants, fungi and animals.

PAWS restoration work was carried out across the reserve between 2003 and 2021, with large areas selectively thinned or clearfelled to remove non-native trees and saplings and local provenance tree species being planted, using a planting mix which included sessile oak, English oak, rowan, silver birch, wild cherry, hornbeam, yew, hazel, wych elm, hawthorn and blackthorn. The initial phase of PAWS restoration, between 2004 and 2006, extended to 36 ha of mixed broadleaves through the removal of non-native species, with further restoration occurring between 2011 and 2021 focusing largely in the deconiferisation of woodland blocks, but selective thinning to favour oak in areas of mixed broadleaved woodland.

Oak woodland, of a type intermediate between the lowland (W10) and upland (W16) communities, is characteristic of the Sheffield area and represents the natural vegetation community for Greno Woods. This type of woodland is particularly beneficial for the wildlife of Sheffield, as well as being aesthetically appealing, and is therefore the obvious choice for the 'end point' of restoration. However, the extent of modification of the woodland from this "natural" state has been extensive at Greno, both in time and extent. Changes in silvicultural system, the exportation of timber and canopy modification have all left their mark on the fragmented communities we see today and the changes that have been wrought cannot be quickly or easily undone.

Given the stresses that climate change and tree disease are and are likely to place on the reserve's woodland, a reduction in broadleaved species diversity on the reserve may not be considered desirable at the present time. Additionally, because a significant percentage of the reserve's most mature broadleaf trees are beech, sycamore and sweet chestnut and given the paucity of mature and veteran trees on the reserve in general, the resultant loss of biomass and canopy cover involved in their elimination would equally prove deleterious to biodiversity and character of the reserve. **PAWS restoration will therefore continue but focus exclusively on the reduction in coniferous cover over the period covered by this plan**, although oak and other native broadleaves will generally be selected for during operations in broadleaved areas going forward. Consequently, **a reversion to mixed broadleaf rather than exclusively to native oak woodland is the goal of management over the short-medium term.**

Broadleaved management

Broadleaved areas of woodland require periodic management in order for them to reach their silvicultural and biodiversity potential, with the type and extent of management required dependent on age, species composition and other confounding features eg management history, presence of public rights of way.

At Greno, broadleaved areas will continue to be managed under a system of continuous cover forestry. Biodiversity will be prioritised but other aspects, such as landscape amenity and public recreation may also be considered. Trees may be felled for reasons of safety, to improve the habitat for wildlife or to increase structural regeneration. Healthy, well-grown trees will be nurtured and promoted to full maturity and eventual veteran status whilst also allowing for veterans, standing dead wood and the formation of pole stage thickets.

Management in existing stands of mature broadleaf (70+ years) will be as light touch and low impact as any work required to promote biodiversity or public safety allows, with timber extraction only taking place if the scale of operation means that the volume of arisings is such that retention on site would be deleterious to the existing ecology or prove an unacceptable fire risk. The goal of management will be to increase the average age of canopy trees within these compartments whilst allowing for the formation of a well-developed understory and ground flora, with an element of natural regeneration.

Areas of semi-natural woodland will generally only require minimal intervention as described for ASNW below, but may require management to thin out non-native and/or fast-growing species to allow the oak component to develop, or holly management to prevent a loss of ground flora.

Given the overall paucity of mature and veteran trees on the reserve, and the abundance of open and young woodland, no glade creation in areas of broadleaved woodland will take place over the course of this plan, except within the coppice area (cpt 17).

Areas of young broadleaf woodland ie those planted since 2000, will be allowed to develop naturally into pole stage thickets with intervention only to remove tree guards as these are outgrown. Bramble development within these thickets will not be suppressed as its growth is protective against deer browsing.

Conifer plantation

Over the period covered by the last management plan coniferous woodland was managed for the production of timber through a number of thinning and clearfell operations, followed by replanting with native broadleaf stock in areas designated for PAWS restoration to the north and east of Greno, and restocking of Scots pine to the south and west. During this period the amount of conifer on the reserve was substantively reduced from 90 hectares in 2015 to 64 hectares in 2021.

During the 2014 public consultation, concerns were expressed about the impact of clear-felling on the biodiversity, visual amenity and 'peace and quiet' of the woods. Consequently, the Trust committed to exploring the benefits and drawbacks of restoring broadleaf woodland through CCF management of coniferous areas. This method is not without its risks – the longer conifers are retained on the reserve, and the taller they grow, the greater the risk of significant loss through windthrow during storms or gales. Additionally, the longer coniferous areas remain on the reserve the greater the risk of a second, serious fire. However, the benefits of a gradual restoration of broadleaf for biodiversity and amenity value are also great and in 2021 the decision was made to move away from clearfell across the majority of the reserve. Additionally, no further conifer planting will take place after winter 2022/23.

Over the period covered by this management plan, the clearfell and replanting of coniferous areas will be supplanted by the extension of CCF to all stands of mature Corsican and lodgepole pine. Under this new approach **selective thinning of coniferous** areas will take place, gradually opening up the canopy of these dense stands and allowing broadleaved species to seed in. As these broadleaved trees then develop, further thinning and strip clearing will take place, further opening up opportunities for natural regeneration of broadleaf. Gradually then, and over a period of 50 years, the stands will transition from conifer to mixed stands and eventually to broadleaved woodland with less than 10% coniferous element.

These conifer stands will be worked mechanically with the vast majority of harvested timber being removed from site.

Natural regeneration

The use of natural regeneration brings with it multiple benefits: it allows for the conservation of local genetic diversity and promotes the propagation of genotypes proved successful in the local conditions; it reduces the likelihood of tree diseases being imported onto site accidentally; it is cost neutral and negates the use of plastics and pesticides for the establishment of a crop. The downsides of natural regeneration are the time lag in tree establishment, although this has previously been found to be small (<2 years) and the inability to determine exactly which species establish and where.

Roe deer were first seen within the woodlands in June 2008 and are now established throughout the area, with muntjac being sighted in 2021. These species may present severe challenges to regeneration within the woodland, with the browsing of broadleaved already visible in sub-cpt 4a and 17. However, with an increase in the deer population comes an increase in poaching and it is not, at the current time, possible to establish whether the local

deer population is increasing to problematic levels or verging upon extinction – and this is a situation that may alter rapidly. Deer control measures are already in place on adjacent land holdings and this too may impact on the population size in Greno Woods.

The Trust will work with South Yorkshire Police to prevent poaching, and hunting of deer with dogs, within Greno – for both animal welfare and public safety reasons. Additionally, the impact of browsing on regenerating tree stock will be monitored over the course of the plan.

Areas of larch planting will not be managed under CCF due to the action of *Phytophthora ramorum* in the area but will be clear-felled and replanted with native broadleaved species.

The mixed areas of young Scot's pine and silver birch in compartments 8, 9 and 12 will be allowed to develop over the period covered by this management plan, with gradual thinning then taking place to move them gradually towards broadleaf woodland with a lesser coniferous component in future years.

A woodland operations plan will be developed during 2022, providing greater detail on how the move towards broadleaf will be accomplished. This will outline a programme of thinning and felling works.

Coppice management

Over the past 10 years the Trust has worked to regenerate areas of stored (abandoned) sweet chestnut coppice within compartment 17 by re-coppicing it and managing the regrowth (**Figure 13**).

Some of the stored coppice has been used to manufacture chestnut cleft fencing, gates, hurdles and, lately, newt hibernaculae and stakes for leaky dams. These products have been used within the woods and in the wider Sheffield area. However, the majority of the timber has been harvested mechanically as part of wider forest operations and has been sold as firewood.

The young coppice has proved difficult to work, due to its vigorous rate of growth. It is also prone to damage by deer and squirrels. It does not yet meet its biodiversity targets for the establishment of an ancient woodland ground flora, with some coupes being too dense with stools to allow the establishment of a ground flora but in other areas newly cut coupes have developed into well vegetated glades with the young coppice stools as scrub.

This area of coppice woodland is intended to provide an open habitat for wildlife, in contrast to the areas of high broadleaf forest that will (eventually) surround it. It will also provide a working example of the historical management system under which Greno Woods was managed for centuries, as well as providing a small revenue stream through the sustainable production of timber to cover its management for biodiversity gain. In order to achieve this the coppice will be moved away from mechanical harvesting of coupes and towards hand-working and harvesting, with the product being utilised for fencing and leaky dam construction. Wood will be harvested on rotation of between 15 and 30 years, depending on the coppice products for which markets are found.

A detailed operational plan for the coppice will be produced in 2022, which will be periodically reviewed in 2024 to ensure its sustainability.

Disease resistant elms

White-letter hairstreak forms discrete colonies which are sometimes very small containing only a few dozen individuals. Colonies are typically focused on a small clump of trees or even an individual tree. **SRWT will work to increase the proportion of Wych Elm at Greno Woods, by including it in woodland planting mixes, to support this species.**

Management Objectives

- 1.0 155+ ha of broadleaved woodland in good ecological condition by 2070, including 60 ha of oak woodland.
 - 1.1 To decrease the proportion of conifers in the canopy across the reserve by 2032.
 - 1.2 To provide for the long-term retention of conifers in compartments 6h, 13a and compartment 16a.
 - 1.3 To manage areas of young broadleaved planting to ensure native sapling establishment.
 - 1.4 Establish a selection of disease resistant elm varieties in cpt 2a.
 - 1.5 To prevent the domination of the woodland understory by holly.
 - 1.6 To ensure 80% percent of the reserve's woodlands meet the target for standing and fallen deadwood by 2032 and to actively recruit veteran trees.
 - 1.7 To eradicate invasive non-native plant species from the reserve by 2032.
 - 1.8 Manage coppice to yield a sustainable source of wood products and to create a mosaic of biodiverse coupes of different ages.
 - 1.9 Actively manage woodland rides to create ecotone.

All works to be carried out in compliance with the directory of Operational Standards and Techniques given in Appendix III.

3.2 Feature 2 Ancient Woodland Ground Flora

Objective Reserve supports 10 ha of species rich ancient woodland ground flora.

Attributes of species rich ancient woodland ground flora

Attribute	Performance Indicator	Monitoring
Species richness	Overall Ancient Woodland Indicator species richness score of ≥ 10 . AWI species richness score of ≥ 4 in at least 80% of woodland grid squares	Ancient Woodland Indicator Monitoring
Bluebell	Cover score of ≥ 2 in at least 50% of the woodland squares. Cover score of 2 in at least 25% of the woodland squares	Ancient Woodland Indicator Monitoring
Holly cover	No squares with a cover score of 3 No more than 50% woodland squares in areas prioritised for AWIS with cover score of ≥ 2	Ancient Woodland Indicator Monitoring

Factors

Factors	Rationale	Management Required (Yes/no/monitor)	Technical Indicator of control	Monitoring
Invasive non-native species	No rhododendron, cherry laurel, Japanese knotweed or Himalayan Balsam are present on the reserve. If these species are present and no action is taken their spread will displace the native flora.	Yes	No invasive non-native species (INNS) present in woodland.	Woodland Condition Monitoring
Invasive native species (holly)	This native species is spreading across broadleaved woodland in all parts of Greno Wood due to lack of natural control processes (grazing by deer and rooting by swine) and the cessation of past woodland management practices such as cutting for winter fodder. Without control holly forms dense thickets, displacing other species and preventing the regeneration of trees.	Yes	No continuous holly cover on the reserve. No more than 50% woodland squares in areas prioritised for AWIS with cover score of ≥ 2	Woodland Condition Monitoring
Access	Increased recreational pressure can damage ancient woodland ground flora which is susceptible to damage from trampling	Yes	No desire lines on the reserve	Casual observation, patrolling
Canopy cover	A shaded environment suppresses competition from more vigorous woodland plants such as bracken and bramble which can outcompete Ancient Woodland Indicator Species (AWIS).	No	AWIS stable or spreading	AWI monitoring

Factors	Rationale	Management Required	Technical control	Indicator of	Monitoring
Vehicle movements	Vehicular movements and the use of track machinery compacts the woodland floor and can prove damaging to AWIS	Restrict use of off road machinery/vehicles in areas managed for AWIS	AWIS stable or spreading		AWIS monitoring

Table 2. Ancient Woodland Indicator Species*

Wild garlic/Ransoms	<i>Allium ursinum</i>
Wood anemone	<i>Anemone nemorosa</i>
Opposite-leaved golden saxifrage	
Sweet woodruff	<i>Galium odoratum</i>
Bluebell (English)	<i>Hyacinthoides non-scripta</i>
Yellow archangel (not variegated)	<i>Lamium galeobdolon</i>
Yellow pimpernel	<i>Lysimachia nemorum</i>
Common cow-wheat	<i>Melampyrum pratense</i>
Cuckoo pint	<i>Arum maculatum</i>
Honeysuckle	<i>Lonicera periclymenum</i>
Dog's mercury	<i>Mercurialis perennis</i>
Wood sorrel	<i>Oxalis acetosella</i>
Sanicle	<i>Sanicula europaea</i>
Greater stitchwort	<i>Stellaria holostea</i>
Wood speedwell	<i>Veronica montana</i>
Remote sedge	<i>Carex remota</i>
Greater woodrush	<i>Luzula sylvatica</i>
Wood melick	<i>Melica uniflora</i>
Wood millet	<i>Milium effusum</i>

*This list covers the commoner ancient woodland indicators found on the reserve and is not intended to be comprehensive.

Ancient Woodland Ground Flora: Evaluation of current condition

Ancient semi natural woodland (ASNW) is an English designation referring to woodland that has existed continuously since 1600 or before. Plants which are particularly characteristic of these ancient woodland sites are called ancient woodland indicator species (AWIS). These species are typically poor dispersers, producing few and/or heavy seeds or utilizing asexual (clonal) reproduction and require stable environmental conditions in order to persist. They are poor competitors when challenged by more vigorous species, flowering and storing energy early in the year before the woodland canopy comes into leaf and relying on the subsequent shade to prevent competition from more vigorous species such as bramble. They are typically patch forming and, in the right conditions, produce the iconic “carpets” of spring flowers.

Greno Woodlands support a range of AWIS, including the majority of species seen in such woodlands in this area of the country and on these types of soils. As an ancient woodland, Greno should have a minimum of 10 AWI species present over the woodland; the reserve has 17 AWI species recorded overall, meeting this target. However their distribution is limited (**Figure 14**) and has declined within living memory (*J. Ranson, pers.comms*) due to fire, coniferisation, changes in management practice leading to the spread of species such as bracken and holly which displace them and through human action (trampling, picking). The richest areas are located within the most mature broadleaved woodland in Low Hall Wood, Low Spring wood and the far eastern and northern peripheries of Greno and Hall Woods. Some species such as ramsons and opposite-leaved golden saxifrage are found in association with the reserves streams as they prefer wet or damp conditions.

Three distinct vegetative communities supporting AWIS are found at Greno. The first, found on deeper soils and associated with creeping soft-grass is the most diverse and includes the greatest diversity of AWIS including bluebell, greater stitchwort, yellow archangel and wood anemone. The second, on thinner, drier soils and associated with wavy hair-grass supports common cow wheat is a hemi-parasitic plant, unusually for an AWIS, is an annual, producing heavy seeds with an elaiosome can be dispersed by ants. It is the most widespread AWIS on the reserve. The final community, found in damper areas supports greater woodrush, opposite-leaved golden saxifrage and ramsons, all moisture-loving plants.

Surveys of common cow wheat were conducted in Greno Woods in the summer of 2021⁷ to define the current distribution, describe the surrounding community and characterise some of the physical components of the micro-habitat. These surveys aimed to generate baseline data to underpin future studies and suggest lines of investigation that could contribute to the effective management of the species. The survey showed that the location of the cow wheat patches are quite localised and extremely dense patches of plants may occur within a metre or so of patches from which the species is entirely absent. This patchy distribution at small scales is very typical for the species so not cause for concern per se, but the isolated nature

⁷ Status of *Melampyrum pratense* L., Common Cow-wheat, in Greno Woods - Summer 2021: A report for Sheffield and Rotherham Wildlife Trust. S.Dalrymple.

of this population might promote the exploration of trial expansion studies to investigate the potential for exploited habitat that is currently unoccupied. Proximity to wood ant nests may also promotes dispersal of this species, whose seeds contain an elaiosome to attract ants and encourage distribution of the seed.

AWIS communities are under threat nationally, and in a local context, the ground flora in its entirety is of high conservation value, as centuries of charcoal and/or white coal production, changes in management practises or lack of management, and increases in recreational pressure have led to a severe decline, and often loss, of such communities in urban and urban fringe woodlands across the region. The preservation of these communities, is therefore a conservation priority for the reserve.

The AWIS richness target is for the 10 hectares of woodland to support ≥ 4 species across at least 80% of its area. Monitoring will provide a baseline AWIS richness score and provide ongoing data against which progress towards this target can be assessed.

Spanish bluebell (*Hyacinthoides hispanica*), a garden escape, is found in the far south of Greno Woods adjacent to Grenoside village. Its presence is of no concern as research shows that, although it can hybridise with the native bluebell, however as it occurs in low numbers, is less fertile and has genes are less adapted to the UK climate, its potential to genetically “overwhelm” the native bluebell through hybridisation is low.⁸

Variegated yellow archangel (*Lamium galeobdolon x argentatum*), another garden escape, is found in several places on the reserve. This species produces spreading stems (stolons) and, if left unchecked, forms single species carpets to the exclusion of other plants. It is listed on Schedule 9 of the Wildlife and Countryside Act lists non-native species that are already established in the wild, but which continue to pose a conservation threat to native biodiversity and habitats. As with other INNs it will be subject to removal where encountered.

AWIS will be protected in Greno Woods through the following:

Appropriate woodland management

AWIS grow best in undisturbed conditions where more competitive ground-cover is suppressed by a closed canopy over the summer. In particular, dense carpets of bluebells require areas with a dense summer canopy to maintain them. Conversely, they require access to sunlight during spring so will not thrive under evergreens such as holly, or under bracken (bracken coverage of >10 % is associated with low AWIS coverage in a given area).

In consequence, it must be realised that **management to diversify the woodland structure** through thinning the woodland canopy, or by creating ecotone on the woodland edge or along rides, **may conflict with the needs of the ancient woodland ground flora** and, if carried

⁸ Kohn, Ruhsam, Hulme, Barrett Hollingsworth (2019) Paternity analysis reveals constraints on hybridization potential between native and introduced bluebells (*Hyacinthoides*). Conservation Genetics

out injudiciously could adversely affect the density and distribution of AWIS across the woodland. To avoid this, **these management activities will be carefully planned to avoid areas where the ancient woodland ground flora is densest or most biodiverse.** However, dense **holly will be controlled in compartments where AWIS are found, or immediately adjacent to such areas,** to prevent future loss of AWIS and create areas for future AWIS recolonisation. Continuous holly cover and AWIS are mutually exclusive, consequently the removal of the densest holly will initially take place using a flail to avoid the generation of a large quantity of brash, with regrowth controlled manually. Manual control of young holly will also be carried out in the immediate vicinity of AWIS as required.

Protection from ground disturbance and trampling

AWIS generally and in particular bluebells are easily damaged by ground disturbance, by compaction and by trampling; this damage then prevents them from producing enough energy to flower and reproduce in subsequent years. Areas of high footfall or vehicle use can cause entire colonies to die out. In consequence, SRWT will minimise the use of vehicles when carrying out management within the woodland, and will carefully plan vehicle routes to avoid AWIS communities and, in particular, exclude machinery from sensitive areas such as stream sides.

Additionally, **SRWT will work to prevent the proliferation of desire lines across the woodland,** both by maintaining the official path network to a high standard and also by the use of dead hedging and other means to restrict access to unofficial paths.

2.0 Objective: Reserve supports 10 ha of species rich ancient woodland ground flora.

- 2.1 Plan woodland management works to avoid damage to ancient woodland ground flora.
- 2.2 Reduce holly cover across the reserve.
- 2.3 Protect AWIS from damage by visitor pressure.

All works to be carried out in compliance with the directory of Operational Standards and Techniques given in Appendix III.

3.3 Feature 3 Open habitats

Objective: 7.5 ha of intermediate heathland in good ecological condition and 2.5 ha of emerging heathland by 2032. 2.3 ha of grassland in good condition.

Attributes of heathland in good ecological condition

Attribute	Performance Indicator	Monitoring
Dwarf Shrub Cover	To be classified as heathland when part of a mosaic of other habitats, the cover of dwarf shrubs must be >25%	Remote sensing
Scrub and Bracken Cover	Maintenance of patchy scrub and bracken cover: $\leq 10\%$ scrub cover and $\leq 10\%$ continuous bracken cover.	Remote sensing
Heathland Structure	10% heather of mature/degenerate age 25-50% heather of pioneer age	Remote sensing
Bryophyte Community	>10% cover of naturally present bryophytes	-
Bare Ground	<10% bare ground	Casual observation

References: Sheffield Local Biodiversity Partnership (2012) Heathland Habitat Action Plan.

Natural England (2011) UK Biodiversity Action Plan Priority Habitat Descriptions.

Factors

A factor is anything that has the potential to influence or change a feature, or to affect the way in which a feature is managed.

Factor	Rationale	Management Required	Technical Indicator of Control	Monitoring
Scrub encroachment	Heathland will naturally succeed to scrub/woodland.	Yes	≤10% scrub cover within heathland compartments	Remote sensing
Bilberry dieback (<i>Phytophthora</i>)	The disease has not yet been reported in the Sheffield area, however the potential of an outbreak should be considered.	No, monitor	No presence of diseased vegetation	Remote sensing
Human disturbance	Excessive pressure from recreation can lead to erosion and a reduction in value for wildlife.	No, monitor	No reduction in size of heathland pockets selected to retain.	Remote sensing

Open habitats: Evaluation of Current Condition

Heathland

Greno Woods currently has 7.5 hectares of intermediate heathland concentrated in one block at the heart of the reserve (**Figure 10**). This heathland is primarily dominated by heather and bilberry, with frequent patches of bracken and bramble, scattered young silver birch, oak, and creeping soft-grass. Bryophyte communities are present within the heather, however these are not well developed.

Heathland in a good ecological condition has the potential to support a diverse community of invertebrates, bryophytes and birds. One of the primary ecological factors that will affect the species supported by the heathland is the complexity of its structure, with a diverse age assemblage of heather, species composition and presence of bare ground, all important components.

The heathland at Greno is stock-fenced and is lightly grazed by cattle during the spring and summer. There is no public access during the bird breeding season, consequently the area supports a number of ground-nesting species including nightjar and tree pipit.

The heathland is undergoing natural successional processes and becoming encroached by scrub. Currently approximately one third of the area has succeeded to secondary birch woodland, with much of the remainder comprising a heath and scrub mosaic. The succession of the heathland to woodland is considered to be an unfavourable outcome, as it would result in the loss of much biodiversity from the reserve and would also change its character. Consequently, **this succession will be set back by conservation grazing and the removal of scrub** over the period covered by this management plan.

Bracken also threatens the heathland habitat, due to a variety of reasons - warmer winters, nutrient enrichment from air pollution and lack of grazing or cutting. It may also have encroached onto the heathland due to the leaf litter from the surrounding birch, which has accumulated in localised areas. Whilst bracken does have limited value to wildlife, its displacement of the heather and bilberry is deleterious both for wildlife. Consequently, **bracken will be controlled on the heath** in the period covered by this plan.

Northern wood ant nests are found across the heath, being found in areas where the ground flora is sparse enough to allow sunlight to penetrate. The management proposed for nightjar (removal of almost all scrub and trees) conflicts with the ideal for wood ant which feed largely on tree aphid sap. The long-term retention of a coniferous element on the periphery of the heath and immediately adjacent to it is therefore necessary for this species.

An opportunity exists to extend the heathland area following thinning works in an adjacent compartment 10a. **This compartment may be added as an extension to the heath bringing it up to an area of 10ha**, thus making it large enough to support species such as Tree Pipit (*Anthus trivialis*) and Nightjar (*Caprimulgus europaeus*), should an EIA (Environmental Impact Assessment) of this proposal prove favourable.

Mike's Field

Over the next 10 years management the 2.3 ha area of grassland known as Mike's Field (acquired by the Trust in 2020) will concentrate on establishing new habitats (standard trees, deadwood, wetland and scrub) whilst maintaining the interest of the existing grassland.

During this period, the orchard area of the field will be kept separate from the rest of the field and will be managed by Mr Griffiths. Likewise, the hedge along Springwood Lane will be kept cut short by Mr Griffiths for as long as he cares to do so. Subsequently, its maintenance will revert to the Trust, who will allow the hedgerow trees to grow out to a height of 8-10', after which the hedge will be laid. It is not anticipated that this laying will occur during the period covered by this plan, consequently, it is not included in the work programme below.

A key feature of wood pasture is the presence of mature and over-mature (veteran) trees. Currently, the field contains a number of mature ash trees and a couple of mature oak, all on its boundaries. The oak will be retained, however, it is likely that the ash will be lost to the fungal pathogen *Hymenoscyphus fraxineus* (ash die back) over the period covered by this plan.

Trees in Mike's field will be checked for symptoms of ash dieback annually. When detected, a safety assessment will be made for the individual tree. Where safe, trees will be retained and allowed to deteriorate safely, creating standing dead wood. Where failure may reasonably be expected to cause a danger (i.e. adjacent to roads, buildings or footpaths) trees will be felled during the early stages of disease and retained on site as fallen dead wood. Further information about how the Trust manages tree health can be found in its tree risk management procedure.

As so many of the field's mature trees are likely to be lost, attention will be given to growing on replacements. A number of specimen trees, of various species, are planted across the grassland. These will be encouraged to establish themselves over the period covered by this plan. Currently the number of saplings is far greater than the number of mature trees that are required, so specimens that do not establish or thrive will not be replaced. In 2030, stock will be taken of the remaining young trees and, if necessary, their numbers will be reduced or added to, to result in a small number of well-spaced field trees, plus additional boundary trees, growing towards maturity.

The field's wetland habitats will be developed over the period covered by this brief. **The field pond will be vegetated**, with the intention that, within a few years, it begins to support a population of frogs, toads and newts.

It is intended that the field, in its entirety, provides a valuable resource both for insects, amphibians and birds. As well as the measures outline above, the grassland will be lightly grazed with hardy cattle, each autumn/winter, to help retain its floral diversity **and a belt of scrub will be established along its northern boundary.**

3.0 Objective: 7.5 ha of intermediate heathland in good ecological condition and 2.5 ha of emerging heathland by 2032. 2.3 ha of grassland in good condition.

3.1 To control the spread of bracken and birch across the heathland by 2032.

3.2 To increase the size of the heath to 10ha by 2032 (subject to a favourable EIA).

3.3 To support the development of Mike's Field towards wood pasture.

3.4 Feature 4 Bird Community

Objective: Reserve supports a diverse woodland bird community with 40 or more bird species recorded on the reserve during the breeding season including wood warbler, pied flycatcher, spotted flycatcher, bullfinch, great spotted woodpecker, *redacted*, dipper, woodcock and nightjar.

Attributes of a diverse bird community

Attribute	Performance Indicator	Monitoring
Diverse breeding bird assemblage	≥ 40 native species of bird nesting on the reserve on an annual basis.	MacKinnon List Survey
Breeding wood warbler	≥ 3 pairs of wood warbler breeding on the reserve.	MacKinnon List Survey Incidental monitoring by reserve manager
Breeding pied flycatcher	≥ 3 pairs pied flycatcher present on the reserve during the breeding season.	MacKinnon List Survey
Breeding spotted flycatcher	Spotted flycatcher present on the reserve during the breeding season.*	MacKinnon List Survey

Attribute	Performance Indicator	Monitoring
Breeding bullfinch	Bullfinch present on the reserve during the breeding season.*	MacKinnon List Survey
Breeding dipper	Dipper present on the reserve (Low Hall Wood only) during the breeding season.	MacKinnon List Survey
Breeding nightjar	≥ 2 pairs of nightjar regularly breeding on the reserve.	Nightjar territory monitoring
Breeding great spotted woodpecker	≥ 5 pairs of great spotted woodpecker present on the reserve during the breeding season.*	MacKinnon List Survey
<i>Redacted</i>	<i>Redacted</i>	<i>Redacted</i>
Breeding woodcock	Woodcock present on the reserve during the breeding season.*	MacKinnon List Survey
Suitable heathland / grassland habitat / scrub	As per Features 3: Open ground and Biodiversity	Remote sensing
Suitable woodland habitat	As per Feature 1. Broadleaved Woodland	Woodland condition monitoring

*PI minimum acceptable frequency of recording to be determined after 3 MacKinnon list surveys carried out.

Factors

A factor is anything that has the potential to influence or change a feature, or to affect the way in which a feature is managed.

Factors	Rationale	Management Required (Yes/no/monitor)	Technical Indicator of control	Monitoring
Woodland canopy species composition.	<p>The woodland's current canopy composition, in particular, its mixture of broadleaved and coniferous species, allow all the species given above to breed on the reserve but many at low number.</p> <p>Onward management to increase the proportion of broadleaved species in the canopy, whilst retaining mature conifers, will benefit the majority of species.</p>	Yes	Cross reference w those for Feature 1 above	Woodland Condition Monitoring
Woodland structure	A well-structured woodland containing trees of each age class, standing dead wood, a well-developed but not uniformly dense understory and network of glades and open areas is necessary to support a diverse bird assemblage, with each species having its own particular set of requirements.	Yes	Cross reference w those for Feature 1 above	Woodland Condition Monitoring
Invasive native species (holly)	This native species is spreading across the woodlands of Greno. Without control holly forms dense thickets, which are utilized by some species for shelter and nesting but make the understory to dense for others.	Yes	Cross reference w those for Feature 1 above	Woodland Condition Monitoring

Factors	Rationale	Management Required (Yes/no/monitor)	Technical Indicator of control	Monitoring
Scrub encroachment on heathland	Without management, heathland will succeed to woodland over time. Species such as nightjar and tree pipit require open heathland, with a high dwarf shrub/acid grassland component and low bracken and scrub component in order to breed.	Yes	Presence of 10 ha open heath on the reserve.	Nightjar survey
Regional, national or international decreases in population size for individual species	The bird species found at Greno Woods constitute a sub-set of a wider population and may therefore be indirectly affected by population changes on a national or international level. This is particularly true of species on the current red or amber lists which are already undergoing population declines.	Monitor	Local and national populations of individual species remain stable or increase.	BTO published data SBSG published data showing species trends
Fire	Wildfire is a significant risk across large areas of the reserve. A major burn would cause habitat loss and possibly the direct loss of eggs or young as burns are most common in the spring/early summer.	Yes	Wildfires are rare on site	Fire register

Bird communities: Evaluation of current condition

Greno Woods hosts a diverse bird community, with most species being those that utilise woodland habitats. The reserve's avian diversity is boosted by its proximity to Wharncliffe and Wheata Woods which considerably increases the area available to populations of different species.

Three breeding bird surveys, each using a different methodology, have been carried out in Greno Woods in recent years. These together with casual records provide the basis of a reasonable assessment of the variety and condition of the reserve's avifauna. Going forward the bird life of Greno will be monitored using the McKinnon List methodology, with specific surveying for nightjar.

The past 60 years have seen increasing afforestation across the Sheffield area. In consequence, and in comparison to those species of upland meadows, heathland or wetland, the city's woodland bird population is generally doing well, with the populations of most woodland species stable or increasing. Exceptions which are recorded in the vicinity of Greno Woods include the following species: common cuckoo, tawny owl (*Strix aluco*), dunnoek (*Prunella modularis*), redstart (*Phoenicurus phoenicurus*), spotted flycatcher (*Muscicapa striata*), willow tit (*Parus montanus*), tree pipit (*Anthus trivialis*) and tree sparrow (*Passer montanus*), all of which have suffered declines over the past 30 years.

Two bird communities can be identified on the reserve: a woodland bird community and birds of the woodland fringe, broadly reflecting the habitats and accompanying ecological niches available on the reserve. A handful of ground-nesting species that require more open habitat in which to breed are found on the reserve's heathland and in clearfell areas. While several of the species recorded are of conservation concern, none has conservation management needs that go beyond the management of their habitat(s) outlined elsewhere in this report. Current management activities such as bracken control, retaining veteran trees and both fallen and standing deadwood will benefit bird populations.

Much of the reserve's importance for birds lies in the diversity of the age and structure of its woodland, and the community it supports is typical for an area of upland woodland of this size. Areas of mature broadleaf favour many of the woodland birds, although a lack of mature and veteran trees with cavities for nesting is a limiting factor for species such as pied flycatcher. The large number of mature conifers adds additional interest, attracting species such as crossbill, and firecrest. However, surveys have shown that the majority of species favour the areas of mixed woodland or upland oak wood over mature conifer stands. Continued **diversity in tree age, woodland structure and species composition will therefore be promoted on the reserve in the long-term.**

Nest boxes can be used to encourage certain bird species to breed, where natural nesting features, such as knotholes, are absent or restricted. A small and eclectic collection of unofficial nest boxes are present on the reserve at the time of writing. A nest box scheme in the adjacent Wharncliffe Woods has had success in boosting the breeding population of pied flycatcher in the vicinity, as well as benefitting a range of hole-nesting species. This provision will be replicated at Greno with **nest boxes for pied flycatcher being installed on the reserve** to increase the number of nest sites available over the period covered by this management plan. A programme of **early blocking of nest boxes** have shown to be beneficial for pied flycatcher and will be undertaken should monitoring indicate its necessity due to competition from great tit and other hole nesting birds⁹.

Redacted

The management of woodland fringe is of particular importance to birds such as tree pipit and spotted flycatcher. Given the high proportion of young and developing woodland present on the reserve, these species are well catered for over the period covered by this plan, although factors such as disturbance

⁹ Slagsvold, T. (1975). Competition between the Great Tit *Parus major* and the Pied Flycatcher *Ficedula hypoleuca* in the Breeding Season. *Ornis Scandinavica* (Scandinavian Journal of Ornithology), 6(2), 179–190.

when nesting (tree pipit) and nest predation by grey squirrel and corvids (spotted flycatcher). However, successional processes mean that this woodland will mature and be lost over time, consequently efforts to **create and maintain scrub and woodland ecotone along certain of the reserve's rides** will be made. The reserve's heathland also provides long-term breeding habitat for tree pipit.

Healthy populations of bullfinch are known to nest and breed on the reserve, preferring to nest in shrubs in areas of scrub and woodland, especially hawthorn. This will therefore be considered during scrub thinning and woodland edge management activities, to ensure that any areas of preference are identified and retained.

Lesser Spotted Woodpecker has been recorded in both Greno and in adjacent Wheata Woods although the size of the population in the area is unknown. This species has suffered large population declines nationwide and in Europe over the latter part of the twentieth century and is red listed as of being of high conservation priority.

Lesser Spotted Woodpecker numbers are strongly associated with broadleaved woodland, and will therefore benefit, long-term, by the broadleaf reversion work carried out in this plan although in the short-term a paucity of mature and veteran trees makes large parts of the reserve unsuitable for this species. In the short-term, the creation of standing dead wood across the woodland will benefit this species by increasing its nesting and feeding habitat, particularly where whole trees rather than monoliths are retained as it specialises in feeding on the smaller branches which will not bear the weight of the larger great spotted woodpecker.

Woodcock (*Scolopax rusticola*) have been recorded across the reserve and, in the breeding season, can be seen roding over areas of new clearfell. Their secretive nature makes them hard to survey and the numbers present on the reserve, and their distribution are not known. They are thought to breed on the reserve but this has not been confirmed. This species is largely nocturnal, spending most of the day in dense cover but requiring more open woodland in which to breed. They are insectivorous, preferring woodland with damp patches and wet flushes in which to forage.

Sheffield's breeding population of woodcock is undergoing a long-term decline, perhaps due to restrictions in suitable breeding habitat as conifer plantations become too mature for them to find suitably open areas. This being the case, the ongoing felling work at Greno will benefit the species, introducing as it will, a network of more open woodland. However, Woodcock are vulnerable to disturbance and therefore favour the quieter areas of mature woodland away from the central recreational 'hub'.

Nightjar are nocturnal and insectivorous birds and are ground-nesting, utilising heathland, moorland and open woodland clearings to breed. Nightjar are red listed due to national declines but the population of this species is actually increasing in the Sheffield area and were recorded as breeding on the reserve in 2021.

Nightjar require open heathland, with a high dwarf shrub component and low bracken and scrub component in order to breed. It is estimated that each pair of Nightjar require 10 ha of suitable habitat to support a brood. **Compartment specific management will be carried out to support this species.**

A lack of berry-bearing scrub habitat on the reserve limits its ability to support a range of species, such as song thrush and linnet, which utilise this habitat to feed and nest. Opportunities to enhance scrub cover, in Mike's Field and in Low Hall Wood (in areas previously vegetated by larch), will consequently be sought.

Greno Woods nature reserve supports a number of ground nesting and near ground nesting birds such as wood warbler. Ground nesting species are at high risk of predation and/or disturbance by dogs. Consequently, visitors will be actively encouraged to keep their dogs on a short lead or close at heel during the bird breeding season and all visitors will be encouraged to stay on the public rights of way

network at this time of year. Additionally, the Trust will act to deter the formation of additional desire lines across the reserve to increase the percentage of woodland undisturbed by public access.

Management Objectives

4.0 Reserve supports a diverse woodland bird community with 40 or more bird species recorded on the reserve during the breeding season including wood warbler, pied flycatcher, spotted flycatcher, bullfinch, great spotted woodpecker, *redacted*, dipper, woodcock and nightjar.

- 4.1 To maintain woodland habitat in good ecological condition across the reserve.
- 4.2 To install nest boxes in areas of deciduous areas to benefit pied flycatcher.
- 4.3 To manage and extend the reserve's heathland heart to benefit nightjar.
- 4.4 To protect trees favoured for raptor nesting during woodland management operations.

For management prescriptions see 4.0 Work Programme.

All works to be carried out in compliance with the directory of Operational Standards and Techniques given in Appendix III.

3.5 Feature 5 Northern (hairy) wood ant

Objective: Population of northern wood ant is maintained and expanded at Greno.

Attributes

Attribute	Performance Indicator	Monitoring
Distribution of wood ant population is maintained or is increasing across the reserve	Wood ant population is retained in compartments 10-16	Wood ant nest monitoring

Factors

Factors	Rationale	Management Required (Yes/no/monitor)	Technical Indicator of control	Monitoring
Woodland species composition	Northern wood ants inhabit conifer or mixed woodland, a high proportion of their diet comes from the honeydew produced by pine needle aphids.	Yes	Retention of coniferous element in woodland canopy across compartments 10, 11, 12, 13, 14, 15 and 16.	Woodland Condition Monitoring
Woodland structure	Northern wood ants require open woodland containing open glades and rides that allow sunshine to reach the forest floor but where bracken and bramble do not dominate and overshadow their nests.	Yes	Cross reference w those for Feature 1 above	Woodland Condition Monitoring
Invasive native species (bracken)	This native species is a common component of the woodland ground flora at Greno, particularly in coniferous areas. When the woodland canopy is removed it can proliferate forming dense bracken beds which outcompete other species of plant and which will shade out wood ant nests.	Yes	Cross reference w those for Feature 1 above	Woodland Condition Monitoring

Factors	Rationale	Management Required (Yes/no/monitor)	Technical Indicator of control	Monitoring
Bramble cover	This native species is a common component of the woodland ground flora at Greno. Where the woodland canopy is removed it can proliferate forming dense bramble patches. These are utilized by species such as wood mouse for shelter and the fruits are fed on by many species, however they can shade out wood ant nests.	Yes	Cross reference w those for Feature 1.9 above	Woodland Condition Monitoring
Fire	Wood ants are vulnerable to forest fires which can destroy both worker ants and their nests, as well as decreasing the availability of food sources around the nest to unsustainable levels.	Yes	Reduction in the number and extent of forest fires	Site Risk Assessment. Fire Risk Assessment Plan
Climate change	Increases in the frequency and duration of droughts and average spring/summer temperatures increase the risk of forest fires.	N/A	N/A	Site Risk Assessment. Fire Risk Assessment Plan

Wood ant: Evaluation of current condition

Northern wood ant populations are found on a small number of sites in the Sheffield area where they are associated with coniferous and mixed woodland in upland areas. Northern wood ants will inhabit non-native conifer plantations but favour more successional habitat with open sunny glades, colonising young woodland but moving to the edges once the canopy closes.

Northern Wood Ants have a specific association with Common Cow Wheat which is also found at Greno and whose seeds they help to spread. They also cater for the needs of the Shining Guest Ant, a UK BAP Priority species previously recorded at Greno. They also form a major component of the diet of Green Woodpecker. The species performs a number of important roles in the forest ecosystem, earning them the status of “keystone” species.

Northern wood ant are omnivores. Honeydew from the pine aphid forms a significant part of their diet in areas where pine is present, in addition to which the ants will gather a variety of foodstuffs from the surrounding woodland and will also hunt other invertebrate prey. The extent to which the species will adapt to feeding from honeydew from other species on other trees is not known. Therefore, it is possible, though not proven, that a decrease in conifer cover at Greno beyond a certain point may adversely affect the distribution and abundance of wood ant colonies, although the threshold at which this becomes an issue is not known. Consequently, a baseline **survey of the wood ant population will take place in summer 2022** from which precise conservation objectives for the species will be set. This will then be followed by **periodic monitoring to assess the effect of the management programme on the ant population** over the period covered by this plan and beyond. To date, the Northern wood ant population has been surveyed on two occasions in recent years (1984 and 2012, Sorby Record) and the general distribution and number of nests was not found to have altered between the two surveys.

Northern wood ants live communally in nests, large mounds which extend under the ground. Nests are thatched with organic material in such a way that it intercepts the sun's rays raising the temperature of the nest above that of its' surroundings. This is especially important early in the year when the ants require warming up to begin foraging, and means that nest must be placed in areas which catch the morning sun.

At Greno, nests are found most frequently on ride sides and in areas of young, open woodland across Greno Woods but the ants are rare in Hall Wood and absent from Low Hall and Low Spring Woods. They are negatively associated with dense bramble and/or bracken which overwhelm them and cast a deep shade. Nests are plentiful on the heath, and are found in areas of clearfell, with numbers falling as the density of young woodland regeneration increases.

The greatest short-term threat to the wood ant population at Greno therefore, comes from the loss of sunny spots in the woodland and along rides where ants create their nests, and encroachment of bracken and bramble. The edges of rides, particularly those that are wider and not under a full canopy, provide a valuable habitat for a wide variety of plants and animals including wood ants. Here the ruderal vegetation, scrub and grassland forms an ecotone between the high forest and bare ground of the tracks.

Due to successional processes and a lack of natural processes such as grazing and browsing, rides will require proactive management in order to preserve their open aspect. **A rolling programme of ride management will be carried out** over the period covered by this management plan and the length of wide (3 zone rides) extended. Particular care will be taken on rides where ants are present to ensure the habitat is not encroached by bracken or bramble growth which can swamp out existing nests.

Management Objectives

5.0: Population of northern wood ant is maintained at Greno.

5.1 Create and maintain open habitats adjacent to woodland suitable for wood ant.

3.6 Feature 6 Biodiversity

Objective: reserve supports a representative cross section of British amphibians, reptiles and mammals.

Attributes

Attribute	Performance Indicator	Monitoring
Reserve supports a breeding population of common frog.	2 ponds supporting breeding populations of common frog present on reserve.	Casual observation
Reserve supports a breeding population of common toad.	2 ponds supporting breeding populations of common toad present on reserve.	Casual observation
Reserve supports a breeding population of smooth newt.	2 ponds supporting breeding populations of smooth newt present on reserve.	Casual observation
Reserve supports a breeding population of palmate newt.	2 ponds supporting breeding populations of palmate newt present on reserve.	Casual observation
Reserve supports a population of grass snake.	Grass snake recorded on reserve.	Casual observation
Reserve supports a population of common lizard.	Common lizard recorded on reserve.	Casual observation
<i>Redacted</i>	<i>Redacted.</i>	<i>Redacted</i>

Factors

Factors	Rationale	Management Required (Yes/no/monitor)	Technical Indicator of control	Monitoring
Woodland species composition and structure	Deciduous woodland in good ecological condition is able to support a wider range of fauna and flora.	Yes	As per Feature 1 (above)	Woodland Condition Monitoring
Presence of permanent waterbodies on the reserve.	The majority of species listed above have been lost as a result of the loss or deterioration of woodland ponds on the reserve.	Yes	≥ 6 wildlife quality waterbodies present on the reserve	Casual observation
Fire	Amphibians and reptiles are vulnerable to forest fires which can destroy both the animals themselves and the availability of food sources in the vicinity.	Yes	Reduction in the number and extent of forest fires	Site Risk Assessment. Fire Risk Assessment Plan
Presence of open ground for basking	Herpetofauna require areas of open ground in which to bask to help regulate their body temperature.	Yes	Presence of open woodland and wide rides allows movement of these species across the reserve.	Woodland condition monitoring

Factors	Rationale	Management Required (Yes/no/monitor)	Technical Indicator of control	Monitoring
Connectivity of reserve with wider area	The more “joined up” the reserve is with the wider landscape, the greater the opportunity for it to increase its biodiversity through the natural migration of species.	Yes	Reserve is gaining species from adjacent sites eg Wharnccliffe	Casual observation
Climate change	Increases in the frequency and duration of droughts and average spring/summer temperatures increase the risk of forest fires.	N/A	N/A	Site Risk Assessment. Fire Risk Assessment Plan

Biodiversity: Evaluation of current condition

Over the years and particularly over the twentieth century, Greno Woods and the surrounding area have seen the loss of biodiversity. The fragmentation and loss of habitat, increased traffic, hunting pressures, disturbance, fire, pesticide use, changes in land use, increasing urbanisation and habitat change have all contributed to the contraction in range, population fragmentation and ultimately the loss of species that were once common both on the reserve and in the general area— a pattern that is repeated across both the city and the UK as a whole.

The conservation of biodiversity is central to the management of Greno Woods. The restoration of the reserve to broadleaved woodland reserve will ultimately allow it to provide habitats for a large array of plants, fungi and animals, including species which are increasingly rare or threatened.

SRWT believes that reversing the decline in biodiversity is important and that the management of Greno Woods and its other nature reserves should be such that not only are existing species retained but that recolonisation (and possibly eventually reintroduction) of lost species can occur. At Greno, species lost in the last century are numerous but include: brown trout (*Salmo trutta*), red deer (*Cervus elaphus*), red squirrel (*Sciurus vulgaris*), pine martin (*Martes martes*), adder (*Vipera berus*), grass snake (*Natrix natrix*), and common lizard (*Zootoca vivipara*). Other species, such as badger, common toad and common frog are still recorded on the reserve but no longer breed there following a loss of breeding habitat (the amphibians) and the destruction of their setts by baiters (badgers).

For some of these species, the factors governing their loss are complex and local populations from which recolonisation could occur are not present. Although the Trust aspires to their recolonisation at some point in the future, their recovery is likely to arise in the context of a national action plan (hawfinch), or not be possible without further advances in science (red squirrel). For these species, no beyond improving the quality of habitats currently present on the reserve, is contained within this management plan. The suitability of the Greno/Wharnccliffe complex for pine martin will be assessed, as a precursor to any discussion regarding possible recolonisation/reintroduction.

Other of these species: common frog, common toad, palmate newt, grass snake and common lizard still persist in the locality and for these habitat creation and management will be undertaken, with the objective of restoring them to their rightful place on the reserve.

To this end a network of ponds will be created on the reserve (some of these will double as flood attenuation ponds, others will be stand-alone wildlife ponds) to support breeding amphibians. Dead hedging, fencing and vegetation will be used to dissuade dogs from entering the water to avoid disturbance to wildlife and accidental contamination of the water by fipronil, a highly toxic insecticide used in pet flea treatments¹⁰.

The dearth of scrub and grassland habitat on the reserve is acknowledged and opportunities to acquire such habitat on adjacent sites, or land on which such habitats can be created, may be sought to further enrich the reserve's biodiversity. Opportunities to create patches of scrub habitat on areas previously vegetated by larch will be utilised.

Redacted

The reserve provides suitable feeding habitat for a number of bat species. Given the paucity of veteran trees, there is a corresponding lack of natural roosting spots within the reserve, which is somewhat remedied by the erection of a number of bat boxes by the South Yorkshire bat group which monitors

¹⁰ The occurrence of fipronil and imidacloprid in English rivers as indicators of the potential contamination of waterways from the use of pet flea treatments. Whitehead, Civil and Gould (2021)

their usage, along with similar boxes in Wharnccliffe Woods. The Trust will continue to work with the bat group to support its work on the reserve during the period covered by this plan.

Management objectives

6.0 Objective: reserve supports a representative cross section of British amphibians, reptiles and mammals.

6.1 Reserve contains a network of wildlife ponds suitable for breeding amphibians.

6.2 Reserve contains suitable open habitat to support herpetofauna and to allow its movement onto and across the site.

6.3 *Redacted.*

6.4 Provide artificial roosts across the reserve's woodlands.

6.5 Assess the suitability of the Greno/Wharnccliffe woodlands for pine martin.

3.7 Feature 7 Ecosystem services

Objective 7: Reserve provides carbon storage, local cooling and natural flood management services to local environment.

Attributes

Attribute	Performance Indicator	Monitoring
Percentage cover of broadleaved woodland	% cover of mature broadleaved woodland on the reserve increases by 50% by 2070. No broadleaved woodland under 10 years of age present on reserve by 2035.	Woodland condition monitoring
Formation of woodland soils	Depth of woodland soils increases over time.	
Reserve captures and slowly releases rainwater	Reserve's streams engineered to hold back water during times of high rainfall. Network of ponds, ditches and scrapes collect and slowly release rainwater input from paths and roads.	

Factors

Factors	Rationale	Management Required (Yes/no/monitor)	Technical Indicator of control	Monitoring
Felling/ replanting/natural regeneration	The removal of coniferous timber from the reserve will, in the short-term, decrease its carbon stocks. However, this will, in the medium term be balanced by the growth of new trees. Efforts should therefore be made to encourage the recruitment of new trees, esp following clear felling.	Yes	Woodland compartments >90% broadleaved species	Woodland condition monitoring
Fire	Fire depletes the reserve's carbon stocks. Measures that retard the development of forest fires and lessen their extent should therefore be taken.	Yes	Fire is a rare occurrence on the reserve. Fires that do occur are limited in extent and do little damage.	Incident log
Climate change	The increasing likelihood of extremer weather events will affect both fire risk and flood risk on the reserve.	N/A	Fire is a rare occurrence on the reserve. Reserve is resilient to drought and high rainfall.	N/A

Ecosystem services: Evaluation of current condition

Ecosystem services are the many and varied benefits to humans provided by the natural environment and from healthy ecosystems. As well as supporting biodiversity and providing a place that allows people of all ages to experience the natural world, Greno Woods is one of a network of sites across the city that are vital in ensuring environmental functions such as climate regulation, regulating water flow and soil conservation. By providing these important ecosystem services, the woodlands contribute to the sustainability of the wider landscape.

Carbon capture and storage

The woodland canopy has a cooling effect on the locality during periods of high temperatures, helping to ameliorate urban heat island effects on the adjacent suburbs. Additional to this the woodland sequesters (seize temporary possession of) carbon, thus playing a role in the global carbon cycle.

Forests account for almost three-quarters of the annual exchange of carbon between the land and the atmosphere. Carbon is continually being exchanged between the atmosphere and forests; individual atoms are only captured from the atmosphere temporarily, as carbon being sequestered can be returned to the atmosphere through dieback, decay, the burning of wood or disturbance to the soil. That said, sympathetically managed woodlands, more carbon atoms are captured than are released so there is net accumulation of carbon in the forest.

The sum of all the carbon in the Greno Woods ecosystem is known as its 'carbon stock'. This carbon is stored in the reserve's trees, its wildlife and its soils. When timber is harvested from the woodland then this is counted as a carbon release – unless the timber in question is incorporated into a permanent structure such as a building. Likewise, many management practices beneficial to biodiversity – ride management, creation of dead wood, pond creation all result in release of carbon. This release is however then balanced by the growth of new trees. Over a cycle of 50 or 60 years then the effect of forestry operations can then be said to be carbon neutral.

SRWT will manage Greno Woods to act as both a carbon stock and a carbon sink i.e. a site than maximises carbon storage over the long term. However, this aspiration is secondary to its purpose to be a site that supports biodiversity. Consequently:

- The conversion of the reserve's woodlands from conifer to broadleaved woodland will continue to maximise biodiversity gains. Timber harvested during this process will contribute to climate change mitigation as a source of renewable energy and sustainable wood products.
- The stored carbon lost from the woodland as timber will be replaced by carbon stored by the growth of new broadleaved trees. Once the process of restoration is complete further felling, except as required to enhance biodiversity, will not be carried out.
- Over the medium/long-term the move from conifer to broadleaved woodland will increase the reserve's capacity to store carbon in rich woodland soils.
- The move away from clearfell/replant forestry to CCF/natural regeneration will decrease carbon loss through soil disturbance as well as requiring less carbon expenditure in the form of inputs for sapling management. As afforestation with broadleaved trees occurs, maintaining forest cover will help ensure these stocks of carbon are protected.
- The Trust will continue to plan forest operations to minimise energy use and to minimise the use of pesticides and fertilisers in accordance with Forestry Commission and Forest Service and UK Woodland Assurance Scheme guidance.

The reserve's ability to both support biodiversity and store carbon is threatened by the risk of forest fires. The topography, hydrology and geology of Greno render it a dry site throughout most of the year,

whilst its vegetation, both natural and non-natural (heather, bracken, holly, conifers) also increase fire risk.

Greno is no stranger to forest fires, with much of the reserve's woodlands being consumed by fire in 1958, following a long, hot summer. At this time the predominant woodland types on the area consumed by the fire were beech woodland with a holly understory (J. Ranson, *pers. comms*).

Conifer needles contain a high proportion of volatile oils. The needle thatch that is often found on the ground beneath them will therefore carry a smouldering fire which may often follow their roots underground and prove difficult to extinguish. Additionally, the "ladder" of dead lower branches common to plantation trees, can help to transmit fire from the woodland floor to the canopy. Holly, which is found throughout the reserve's broadleaved woodland, often in great volume, builds up a dense leaf litter beneath its hags whilst its wood burns quickly and will burn whilst green. Large areas of continuous holly cover are therefore deemed a potential fire risk as they will feed a groundfire once started. Likewise bracken, although not a fire risk when green, produces dry bracken beds that are a particular risk during dry springs. Mature or senescent heather holds a significant fuel load in the form of dead wood and dry foliage. Consequently, the heather-dominated heathland is at high fire risk during dry spells (a risk that is somewhat ameliorated by the heath being closed for grazing at these times).

The majority of forest fires that occur at Greno are accidental and result from human actions such as tossing a cigarette butt or dropping a glass bottle. However, a number of fires due to arson occurred in spring/summer 2021.

As climate change leads to a generalised trend of warmer spring/summers and more frequent droughts, the reserve will become increasingly vulnerable to fire. A number of general and specific management actions will therefore be carried out to combat this:

- The conversion of the reserve's woodlands from conifer to broadleaved will reduce the risk of fire in the long term.
- The network of surfaced tracks across the reserve form a series of natural fire breaks. These will be augmented by the creation of a number of wide rides and ditches.
- Windrows to be set to run across slope to prevent them conducting fire uphill.
- During ride clearance, scrub arisings will be distributed widely under the canopy or chipped rather than habitat piled. Likewise, trees felled for safety reasons will be, where possible, left intact or scattered.
- No build up of brash will be allowed on the heath or in other heather-dominated areas. Large pieces of standing or dead wood will however be retained.
- Priority tracks through woodland to be kept in good repair to allow access by fire engines.
- Fire ponds and bowsers to be placed strategically in woodland to provide a source of water for fire-fighting.
- Trust to liaise closely with SY Fire Service over fire prevention and fighting on the reserve.
- Trust to engage with public to educate re risk of forest fires and to change behaviours likely to result in the same.

Natural flood management

Greno Woods form part of the head of the Blackburn Brook catchment. Water falling on Greno passes through the site (sometimes as surface water, sometimes as subsurface flows) and drains into a number of unnamed streamlets that pass east through Low Hall and Low Spring Woods before emptying into Hall Wood Dike and Robin Hood's Spring, which in turn flow into Charlton then Blackburn Brook. The reserve

also receives rainfall from a significant section of the Woodhead Road which flows down from the high point of the road by Greno Knoll and enters the reserve at Woodstack 1

Flooding, both localised and more widespread, is a problem in the Blackburn Brook catchment following periods of high rainfall. Whilst the topography and geology of the reserve itself means that flooding here is not an issue, the network of sunken bridleways can act as arteries, moving rainfall very fast down the site and onto adjacent roads and land, whilst the free-draining nature of its geology can also cause rapid stream level rises. Sympathetic management to capture and slowly release rainfall across the site can therefore both help ameliorate the effects of flooding downstream and also provide freshwater habitats valuable to wildlife.

Natural flood management (NFM) is the implementation of natural measures which help to alleviate the risk of flooding. Since 2020 the Trust has been implementing a number of such measures across the reserve, including the installation of a number of flood alleviation ponds, some hybrid flood alleviation/wildlife ponds, water bars and leaky dams, to “slow the flow” of rainwater across the reserve and through its watercourses. **This work will continue over the period covered by this management plan.**

As woodlands soak up and slowly release heavy rains, with the tree roots and other vegetation binding the topsoil and preventing erosion, **the Trust will work to revegetate clearfell areas of the reserve** and whenever possible, to move away from clear felling and into CCF to minimise the amount of bare ground on the reserve at any time.

Management Objectives

- 7.0 Reserve provides carbon storage, local cooling and natural flood management services to local environment.
 - 7.1 Reserve has 95% tree coverage
 - 7.2 Reserve is resistant to fire.
 - 7.3 Natural flood management features present across reserve to increase the absorption and slow the release of rainwater (Figure 15).

3.8 Feature 8 Recreation and outdoor learning

Objective: Reserve is a safe and welcoming space offering a variety of opportunities for public recreation and the chance for visitors of all ages to get close to nature.

Attributes

Attribute	Performance Indicator	Monitoring
Path network	7.3 km of footpaths maintained in line with PRow standards. 4.4 km of bridleway maintained in line with PRow standards. TPT surfacing suitable for mobility scooters. PRow network is suitably way-marked to assist visitor orientation	Through routine patrols
Cleanliness	Reserve has low levels of litter and dog waste. Fly tipping on reserve is rare and cleared promptly.	Through routine patrols
Safety	≥ 90% of visitors feel that the reserve is safe and well-cared for.	Visitor survey
Disabled access	TPT is accessible to those with limited mobility, both on foot and by mobility scooter. Benches provided along the bridleway loop to aid accessibility.	Through routine patrols
Recreational and educational facilities	Reserve supports 3 downhill mountain bike trails in good condition. Reserve supports a fixed-point orienteering course in good condition. Reserve supports a toddler trail and picnic benches in good condition. Reserve supports an outdoor shelter area providing shelter for group activities in good condition.	Through routine patrols/maintenance
Sanitary facilities	Waterless toilet available for use by staff, volunteers and school groups	Through routine patrols

Factors

Factors	Rationale	Management Required (Yes/no/monitor)	Technical Indicator of control	Monitoring
Visitor numbers	Visitor numbers are increasing in Greno Woods, with this increase likely to continue as population levels in the city rise ¹¹ . Without careful management, this increase will result in increased disturbance to wildlife, and may also place a strain on the condition of the reserve and lead to an increase in conflicts between user groups.	Yes	Outside of the recreation zone the reserve remains a tranquil place for the quiet enjoyment of nature. Reserve remains clean, with recreational facilities in good repair. Levels of conflict between user groups remains low.	Through routine patrols Visitor survey Monitoring of incident log Visitor counts
Climate change	Increasing incidents of high rainfall are increasing erosion of the track network. Network must be protected by increasing its water-shedding capabilities.	Yes	Track surfacing remains adequate for recreational usage and emergency services access	Infrastructure survey Through routine patrols
Dogs and dog walking services	Increasing dog ownership and the popularity of the reserve for commercial dog walking are leading to increasing amounts negative encounters between different user groups and dog-related nuisance, such as fouling, on the reserve.	Yes	Dogs are kept under owner's control at all times, and on leads during the bird breeding season. Dog faeces and abandoned bags containing the same are rare on the reserve.	Through routine patrols Visitor survey Monitoring of incident log Proactive campaigns on site during spring

¹¹ Sheffield's population is projected to increase by around 88,600 people over the 25-year period to 652,300 in 2039. Office for National Statistics (2016)

Factors	Rationale	Management Required (Yes/no/monitor)	Technical Indicator of control	Monitoring
Incursion by off-road motor vehicles	Problems are regularly encountered by motor bikes and quad bikes accessing the reserve and causing erosion of unsurfaced paths and proving a danger to other reserve users).	Yes	Motorbikes and quads not reported on the reserve.	Through routine patrols Monitoring of incident log.

Recreation and Outdoor Learning: Evaluation of current condition

Greno Woods remains a popular site with members of the public. Visitor numbers increased sharply in 2020 and have not returned to pre-pandemic levels in Greno and Hall Woods, although Low Hall Wood and Low Spring Wood are again quieter. Visitor numbers are generally low during the week and highest on Friday afternoons and weekends. Most visitors are walkers or dog walkers, but the reserve is also popular with runners, local horse riders and, most especially, mountain bikers, who are attracted both to the reserve's 3 downhill trails and the unofficial trail network in adjacent Wharncliffe Woods.

Respondents to the 2015 visitor survey show that the majority of visitors live within a couple of miles of the reserve, but that a significant proportion (27%) come from elsewhere in Sheffield and 24% from beyond the city limits. Those who travel furthest are generally mountain bikers.

Levels of visitor satisfaction with the reserve are generally high. The combination of varied, well maintained paths in a natural setting with a high level of visual attractiveness are what attract people to the reserve. That said, there is little public appetite for and concern regarding the continued clear-felling of the reserve's woodlands, with proposed move to broadleaved restoration through continuous cover forestry receiving popular support. With half a million people on its doorstep Greno Woods will need to offer multiple benefits to the population of the city including the potential for nature based recreation and this will need to be managed to ensure that the without compromising the nature value of the reserve is not compromised.

Recreation and wildlife

The provision of recreational facilities in Greno Woods will be carefully balanced with other priorities – such as protecting and enhancing the woodland's wildlife – and must also ensure that the peace, tranquillity and natural character for which people visit the woods is not unduly compromised. In consideration of this, **the Trust will continuing with its current zoning strategy** when considering visitor management in Greno Woods. Under this, the central southern area of the site – the coniferised area within and including the bridleway loop– is the area where recreational activity will be most heavily promoted and provided for, with areas to the north and east (including Low Hall and Low Spring Woods) and that adjacent to Grenoside village remaining undeveloped for recreation, other than maintenance of the existing bridleway and footpaths network (**Figure 16**). Extensions to the existing network will not be permitted.

Motorcyclists, quad bike riders and off road drivers are **not** permitted to use **any** part of the reserve or adjacent woodland areas, however incursions do occur on a regular basis. The Trust will continue to work with neighbouring land owners to strengthen its boundaries and with South Yorkshire Police to deter such activity on the reserve.

Walkers, horse riders and cyclists will be encouraged and guided to remain on the official network of footpaths, bridleways and bike trails across the reserve, and the development of new desire lines or unofficial bike trails will be strongly discouraged, thus providing undisturbed areas of woodland for wildlife.

The reserve supports a number of ground-nesting bird species. Consequently, dog walkers will be asked to remain on the RoW network during the bird breeding season (March-July) and to keep their dogs under close control at all times. In addition dog owners should remove their pet's faeces from the reserve. "Stick and flick" is not considered a suitable strategy for the disposal of dog waste in the woods due to the high number of dogs walked here each day.

Additionally, events (other than those associated with the ecological survey and monitoring and seasonally specific habitat management) that require off track activity will increasingly be restricted during the bird breeding season. This restriction will, by 2024, cover both recreation zones, reflecting their increasing biodiversity importance of the coniferised woodland compartments as they revert to broadleaf. Examples of events thus affected includes orienteering events, fell running type events and events with a high footfall, such as the Steel City downhill bike race.

Activities that cause disturbance to wildlife or archaeological heritage, such as the flying of drones (unless for survey purposes) and metal detecting are not permitted on the reserve.

Low visitor numbers and the considerate behaviour of the majority of visitors to the reserve mean that levels of damage and disturbance, both to wildlife and to the recreational enjoyment of others is, in general, low. That said, the high coverage of the reserve by footpaths and bridleways mean that most areas receive some footfall and undisturbed areas are becoming limited as visitor numbers increase.

To counteract this increasing pressure, two areas of the reserve – the heathland and Mike's Field – are to be kept free from public access. Additionally, the quietest areas of Greno and Hall Woods – compartments 4, 5 and 12 – are to be designated "wildlife sanctuary" areas. Currently very low numbers of people access these areas and few desire lines run through them. **Increasing footfall and the development of well used desire lines through these areas will be discouraged.**

Recreational and educational infrastructure

The reserve contains an extensive network of made and unmade rights of way. This network will be maintained and waymarked over the period covered by this management plan. In general, desire lines will be neither promoted nor maintained, the exceptions to this being the links from Mike's field to the Hallwood Road entrance to the reserve in Low Hall Wood, and the route through the coppice to woodstack 4.

Walkers and horse riders are well catered for on the reserve by the extensive footpath and bridleway network. The main body of the reserve (Greno and Hall Woods) is well served by a network of surfaced tracks (historic timber extraction tracks) many of which are rights of way. Drainage of this network is of the utmost importance to prevent the erosion of the surfacing and **further work to improve drainage will be carried out in the period covered by this plan.** Where surfaced tracks are present they will be maintained, however the Trust have no plans to extend this network during the period covered by this management plan. **Spot surfacing and drainage** will however be carried out on unmade footpaths if necessary to prevent braiding.

Wheelchair access is not possible across the majority of the reserve due to the gradients of the path network and a lack of suitable parking. One exception to this is the section of TPT that runs from Greno Gate to Sandy Lane. The Trust will therefore work with the TPT network

and the Public Rights of Way Department **to maintain the drainage and surfacing of this section** to a standard that allows access for wheelchairs and mobility scooters.

In addition to the above, the reserve supports a number of recreational features. These include benches, picnic benches, 3 downhill mountain bike trails, a fixed point orienteering course, a toddler trail and an outdoor classroom (**Figure 17**).

The benches and picnic benches will be maintained over the period covered by this management plan and replaced as necessary. **Additional benches will be added on uphill climbs** to increase accessibility.

Three downhill mountain bike trails have been developed at Greno, to formalise provision for this recreational pursuit in the woods, and the Trust will continue to work closely with Ride Sheffield, to ensure that these are kept in good repair with appropriate signage. **The practise of digging for surfacing in the areas adjacent to these trails will be discontinued** over the period covered by this plan, in recognition of the increasing ecological value of the woodland in which the tracks are present.

The Trust continues to support the responsible, safe use of its trails by mountain bikers. To this end it will continue to support the provision of training by local mountain bike instructors to promote safe and sustainable cycling on the reserve over the period covered by this plan. The Trust acknowledges the important role of Woodhead Mountain Rescue in dealing with mountain biking casualties on the reserve and will liaise with them to facilitate their work as required.

The Trust will also continue to liaise closely with the Forestry Commission, Sheffield City Council and other local landowners and recreational groups to encourage the appropriate development and management of this sport in the area.

The Trust will work with Ride Sheffield to ensure the maintenance of the 3 downhill mountain bike trails (DH3, Steel City and Pub Run) over the period covered by this management plan.

The Trust will work with South Yorkshire Orienteers to maintain the fixed-point orienteering trail and associated map over the period covered by this management plan.

The toddler trail and the outdoor shelter will be maintained to the end of their natural lifespan during the period covered by this plan at which point a decision will be made about their renewal based on their usage.

Outdoor Learning and Events

The Trust will utilise the reserve to provide a variety of outdoor learning and nature-based learning opportunities to people of all ages, with a particular emphasis on children and young people. These activities will be concentrated in, but not exclusively confined to, the zone of high recreational use.

The Trust will also offer like-minded individuals and organisations the opportunity to use the reserve and its facilities to extend the learning opportunities provided by the woodland as widely as possible.

The Trust will run an annual programme of guided walks and volunteer work days to encourage members of the public to explore the reserve, and to learn about its management and take action for wildlife.

Larger events will only be held infrequently and then only within the central recreation 'zone' (Figure 16). Such events will not be held within the bird breeding season if the associated activity is likely to cause disturbance to wildlife.

The reserve's waterless toilet is generally not open to the public due to a lack of on-site staff presence. It is however available during events and work days to increase the accessibility of these activities to both sexes and people of all age groups.

Visitor Information, interpretation and engagement

The Trust's strategic plan states: "As a result of our work, more local people will understand, enjoy, value and be inspired by local nature and wildlife, regularly visiting wildlife sites and green spaces." In consequence, **the reserve will be managed to provide opportunities for visitors of all ages to experience the natural world and encounter our native wildlife. Visitors have the opportunity to learn about the woodland and its wildlife and Trust's work whilst on site, with links to sources of further information provided.**

Basic information for visitors is displayed on notice boards at 6 of the reserve's entrances: Greno Knoll, Woodhead Road, Greno Gate, Middle Lane, Sandy Lane and Hallwood Road. This includes contact information for the Trust and sign-posting to the Greno Woods section of its website, which will then contain details of up-and-coming works, to increase the potential for members of the public to learn about, comment on and become involved in, management of the woodland.

Interpretation panels are currently present at spaghetti junction close to the reserve's main entrance and on the TPT. These will be replaced during the period covered by this plan. Additionally, temporary boards giving information about particular aspects of the reserve's management or wildlife, may be displayed.

Links to the Trust's website, where additional information about both the reserve and the Trust can be found, will be displayed on site.

Walks and on line talks about the reserve and its wildlife will be held annually and advertised to Trust members and the wider public. The Trust will also send representatives to meetings of the Grenoside Conservation Society to provide information about the management of the woods and to answer questions. The Trust's Volunteer Ranger Scheme covers Greno Woods, with members of the public encouraged to join the scheme and so contribute to the management and monitoring of the reserve.

Future recreational development

The bridleway network on the main part of the reserve is extensive and well connected with that in Wharnccliffe Woods. Suitable parking for horse boxes is however absent and the Trust will work with other land owners to rectify this if the opportunity arises (see below). No bridleways are present in Low Hall or Low Spring Woods and the Trust does not support the development of circular bridleway routes in these woodlands. The Trust *does* however

support the creation of a safe horse-crossing point of the A61 to allow riders from the High Green area to access the bridleway network in Greno Woods via Sandy Lane.

The growth in climbing, mountain-biking and other recreational activities across Sheffield and in the countryside surrounding it, has led to the rebranding of the city as a destination for outdoor pursuits. Keen to capitalise on this growth, Sheffield City Council is pursuing plans to develop the north of the city – from Parkwood Springs to the Wharncliffe/Grenoside complex as a centre for mountain biking, with plans to open a biker's hub and café at the site of the old ski village.

Whilst recognition of the importance that green spaces such as Greno Woods in contributing to the city's outdoor economy are welcome, SRWT will carefully consider the possible impacts of this scheme on the woodland (in terms of damage and disturbance) and ensure that the reserve's primary function i.e. the conservation of nature, is not negatively impacted. Going forward, **no expansion of the number or extent of official downhill bike trails will be permitted on the reserve** and any unofficial trails and features encountered on site may be dismantled and/or blocked without consultation.

Many visitors currently drive to the reserve, with most of these parking in the Forestry Commission car park or laybys on the Woodhead Road. This car park is often filled to capacity at weekends, a problem that is likely to increase as visitor numbers to the area continue to rise. The Trust has identified Woodstack 1, located on the Woodhead Road adjacent to the existing car park and main entrance, as its favoured site should it, in future, wish to develop a public car park. This area could provide parking for some 28 cars (nearly doubling the current capacity) plus other visitor facilities such as parking for horse boxes, bicycle racks or a refreshments van. However, such development would undoubtedly promote an increase in visitor numbers to the reserve – a change which may conflict with its nature conservation objectives. Such a development is dependent on planning permission and the availability of funding and is, in any case, unlikely to happen in the short term as the woodstack is periodically required for timber storage during forestry operations. In the interim, the Trust will work with the local community and partners to identify other, sustainable solutions to the provision of parking and other visitor services in the Wharncliffe area. It will also support the use of public transport to reach the reserve, and the development of safe cycling and riding routes in from the south and east.

Management Objectives

8.0 Objective: Reserve is a safe and welcoming space offering a variety of opportunities for public recreation and the chance for visitors of all ages to get close to nature.

- 8.1 To maintain the Public Rights of Way network in line with national and local standards.
- 8.2 To increase the accessibility of the reserve to those with reduced mobility.
- 8.3 To ensure the reserve is kept clean of litter, and safe for public usage.
- 8.4 To maintain recreational and educational infrastructure on the reserve.
- 8.5 Supply the public with information about the reserve's natural heritage.
- 8.6 To engage the public in the management of the reserve.

For management prescriptions see 4.0 Work Programme.

All works to be carried out in compliance with the directory of Operational Standards and Techniques given in Appendix III.

4.0 WORK PROGRAMME

To be read in conjunction with the woodland compartment map in Appendix II

[illegible]

Feature	Objective no.	Objective with prescriptions	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2030/31	2031/32
		Selective fell in cpt 12a to decrease % conifers in canopy by 10% and to favour regeneration by birch and other native broadleaved species.					X				
		Selective fell in cpt 13 to decrease % conifers in canopy by 10% and to favour regeneration by birch and other native broadleaved species.								X	
	1.2	To provide for the long-term retention of conifers in compartments 6h, 13a and compartment 16a									
		Lightly thin cpt 6h if required for the long-term retention of conifers, favouring best formed trees.									X
		Lightly thin cpt 16a if required for the long-term retention of conifers, favouring best formed trees.									X
		Plant groups of Scot's pine in cpt 13a	X								
		Aftercare for new Scots pine planting		X							
	1.3	To manage areas of young broadleaved planting to ensure sapling establishment.									
		Monitor levels of browse damage across the reserve using the deer exclosures and using data from the woodland condition assessment monitoring.	X	X	X	X	X	X	X	X	X
		Monitor establishment of broadleaf woodland in cpts 1b, 2c, 4a, 4b, 5a, 6b, 8a, 9a, 13a, 14a and 14a and beat up, if required, 10 years following establishment.		X		X			X		X
		Beat up cpt 6b as required to achieve target stocking densities.	X								
		Beat up cpt 18a as required to achieve target stocking densities following fire damage.	X								
		Plant cpt 13a with oak, silver birch and rowan	X								
		Aftercare for new planting, cpt 13a		X		X					
		Aftercare for new planting, cpt 6b		X		X					
		Aftercare for new planting, cpt 10d		X		X					
		Remove plastic tubing from young saplings in cpt 15c	X								
		Remove plastic tubing from young saplings in cpt 1b		X							
		Remove plastic tubing from young saplings in cpt 6a and 6b			X						
		Remove plastic tubing from young saplings in cpt 8g				X					
		Remove plastic tubing from young saplings in cpt 9					X				
		Remove plastic tubing from young saplings in cpt 4a and 5a						X			
		Remove plastic tubing from young saplings in cpt 17a							X		
		Control of sycamore regeneration, Low Spring Wood	X	X						X	X
		Control of sycamore regeneration, cpt 2b Low Hall Wood					X	X			
		Control of sycamore regeneration, cpt 17c Greno Wood			X	X					

Feature	Objective no.	Objective with prescriptions	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2030/31	2031/32
	1.4	Establish a selection of disease resistant elm varieties in cpt 2a.									
		Suppress competing vegetation around clones until 2m in height	X	X	X						
		Monitor clone growth and use by invertebrates	X	X	X	X	X	X	X	X	X
	1.5	To prevent the domination of the woodland understory by holly across the reserve.									
		To monitor and map the extent of holly cover across the reserve's woodlands using data from the woodland condition assessment monitoring.									
		To remove 30% of existing holly cover Trust's holding in Low Spring Wood to support AWIS		X		X		X			
		To remove 30% of existing holly cover across cpt 2b to support AWIS	X		X		X				
		Control spread of holly in cpt 18c to support AWIS					X		X		
		Control spread of holly in cpt 1b to support AWIS								X	
		Control spread of holly in cpt 19b as required to support tree regeneration									X
		Control spread of holly in cpt 19a as required to support tree regeneration									X
	1.6	To ensure 80% percent of the reserve's woodlands meet the target for standing and fallen deadwood by 2032 and to actively recruit veteran trees.									
		Map deadwood resource across the reserve using data from the woodland condition assessment monitoring.	X				X				
		Use data to identify compartments and areas where dead wood is lacking, and target these areas for deadwood creation during forestry works.		X	X	X			X	X	X
		Select, mark and halo thin 10 (in total) mature or notable trees on the reserve, to assist their succession to veteran status				X		X			
	1.7	To control invasive non-native plant species on the reserve.									
		To map the distribution of rhododendron and Indian balsalm on the reserve using data from the woodland condition assessment monitoring.	X				X				
		Fell rhododendron and cherry laurel and treat stumps, cpts 12 and 13		X	X						
		Fell rhododendron and cherry laurel and treat stumps, cpts 8 and 10			X	X					
		Fell rhododendron and cherry laurel and treat stumps, LSW				X	X				
		Treat Japanese Knotweed in cpt 2b	X	X							
		Mechanical removal of variagated yellow archangel, cpts 11 and 12					X	X			
		Mechanical removal of variagated yellow archangel, cpt 19							X	X	
		Control sycamore regeneration in Low Spring Wood	X	X					X	X	
		Control sycamore regeneration in cpt 2b, Low Hall Wood				X					
		Control sycamore regeneration in cpt 2b, Low Hall Wood				X					

Feature	Objective no.	Objective with prescriptions	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2030/31	2031/32
	1.8	Manage coppice to yield a sustainable source of wood products and to create a mosaic of biodiverse coupes of different ages.									
		Coppice remainder sweet chestnut in coupe 14	X								
		Tend stools in coupe 13 to promote healthy shoots	X	X							
		Coppice 50% sweet chestnut in coupe 12		X				X			
		Tend stools in coupe 12 to promote healthy shoots			X	X			X	X	
		Coppice sweet chestnut in coupe 2			X						
		Tend stools in coupe 2 to promote healthy shoots				X	X				
		Part coppice sweet chestnut in coupe 6				X					
		Tend stools in coupe 2 to promote healthy shoots					X	X			
		Coppice sweet chestnut in coupe 13					X				
		Tend stools in coupe 13 to promote healthy shoots						X	X		
		Coppice sweet chestnut in coupe 7							X		
		Tend stools in coupe 7 to promote healthy shoots								X	X
		Coppice sweet chestnut in coupe 6								X	
		Tend stools in coupe 6 to promote healthy shoots									X
		Coppice 50% sweet chestnut in coupe 3									X
		Thin stools in coupe 5 removing damaged growth	X		X		X				
		Tend stools in coupes 4, 8 and 9 to promote healthy shoots	X	X	X						
	1.9	Actively manage woodland rides to create ecotone.									
		Create and maintain 800m of wide (3 zone) ride on the reserve on the periphery of cpts 10c/11b, 10c/13, 12/13, 8/9 and 10d and 14a	X	X	X	X	X	X	X	X	X
		Maintain a further 2km of two zone ride on the reserve.	X	X	X	X	X	X	X	X	X
AWIS	2.1	Plan woodland management works to avoid damage to ancient woodland ground flora.									
		Protection of AWIS to be included in woodland operations plan.	X	X	X	X	X	X	X	X	X
		Historic extraction routes to be reused and new routes plotted to avoid areas where AWIS found.	X	X	X	X	X	X	X	X	X
	2.2	Reduce holly cover in areas of the reserve where it threatens AWIS.									
		Cross reference with 1.5 above									

Feature	Objective no.	Objective with prescriptions	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2030/31	2031/32
AWIS	2.3	Protect AWIS from damage by visitor pressure.									
		Keep RoW network cleared and well maintained to encourage visitor usage.	X	X	X	X	X	X	X	X	X
		Keep main desire line in cpts 1d, 2a and 2b clear to prevent braiding.	X	X	X	X	X	X	X	X	X
		Use dead hedging to block desire lines where these threaten AWIS, Low Spring Wood			X			X			X
Open habitats	3.1	To control the spread of bracken and birch across the heathland by 2032.									
		Graze the heathland with cattle at a stocking rate of no more than 0.5 LSU/ha.	X	X	X	X	X	X	X	X	X
		Reduce tree/scrub cover on the heathland to ≤10% scrub total area by 2032.	X	X	X	X	X	X	X	X	X
		Scythe or cut bracken to reduce coverage ≤20% continuous bracken cover by 2032.	X	X	X	X	X	X	X	X	X
		Keep heathland fencing in good repair	X	X	X	X	X	X	X	X	X
	3.2	To increase the size of the heath to 10ha by 2032.									
		Enclose 2.5 ha of cpt 10a following thinning.									X
	3.3	To support the development of Mike's Field to wood pasture.									
		Autumn graze the heathland with cattle at a stocking rate of no more than 2 LSU/ha.	X	X	X	X	X	X	X	X	X
		Replace western boundary fence to field.	X								
		Replace roadside fencing		X							
		Replace boundary trees with oak or disease resistant elm as required.	X			X			X		
		Support and protect specimen trees to support healthy growth.	X			X			X		
		Selective reduction of field trees to 10 specimens.									X
Bird communities	4.1	To maintain woodland habitat in good ecological condition across the reserve.									
		Cross reference with objective 1.0.									
		To create scrub habitat in Mike's Field and Low Hall Wood				X	X				
	4.2	To install nest boxes in areas of deciduous woodland to benefit pied flycatcher.									
		Install 20 nest boxes suitable for pied flycatcher in cpt 11a.		X							
		Install 20 nest boxes suitable for pied flycatcher in cpt 6.			X						
		Install 20 nest boxes suitable for pied flycatcher in cpt 16.		X							
		Undertake early blocking programme for pied flycatcher nest boxes across woodland to encourage uptake.				X	X	X	X	X	X

[illegible]

[illegible]

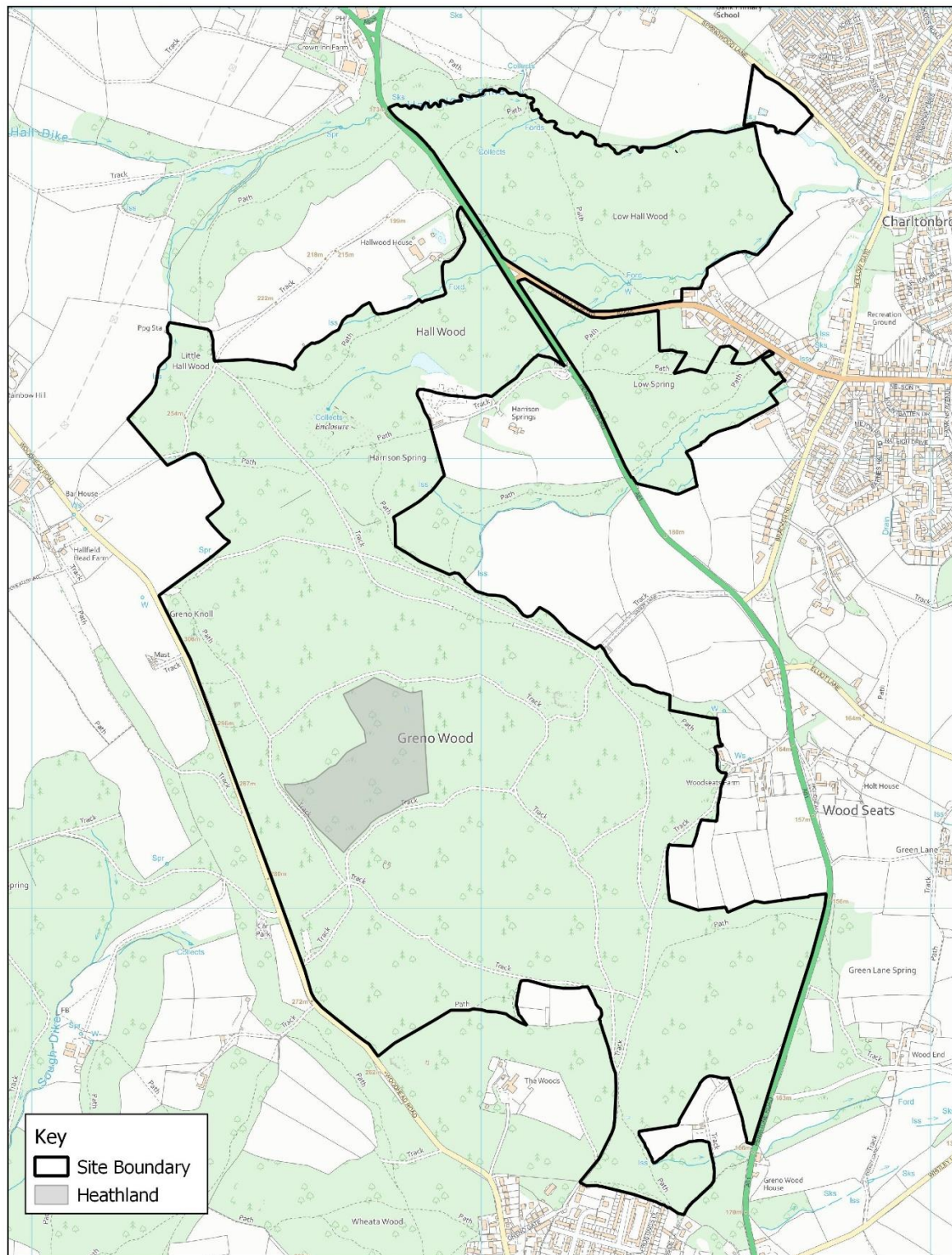
5.0 FIGURES

Please see Appendix II for a map showing the woodland compartments.



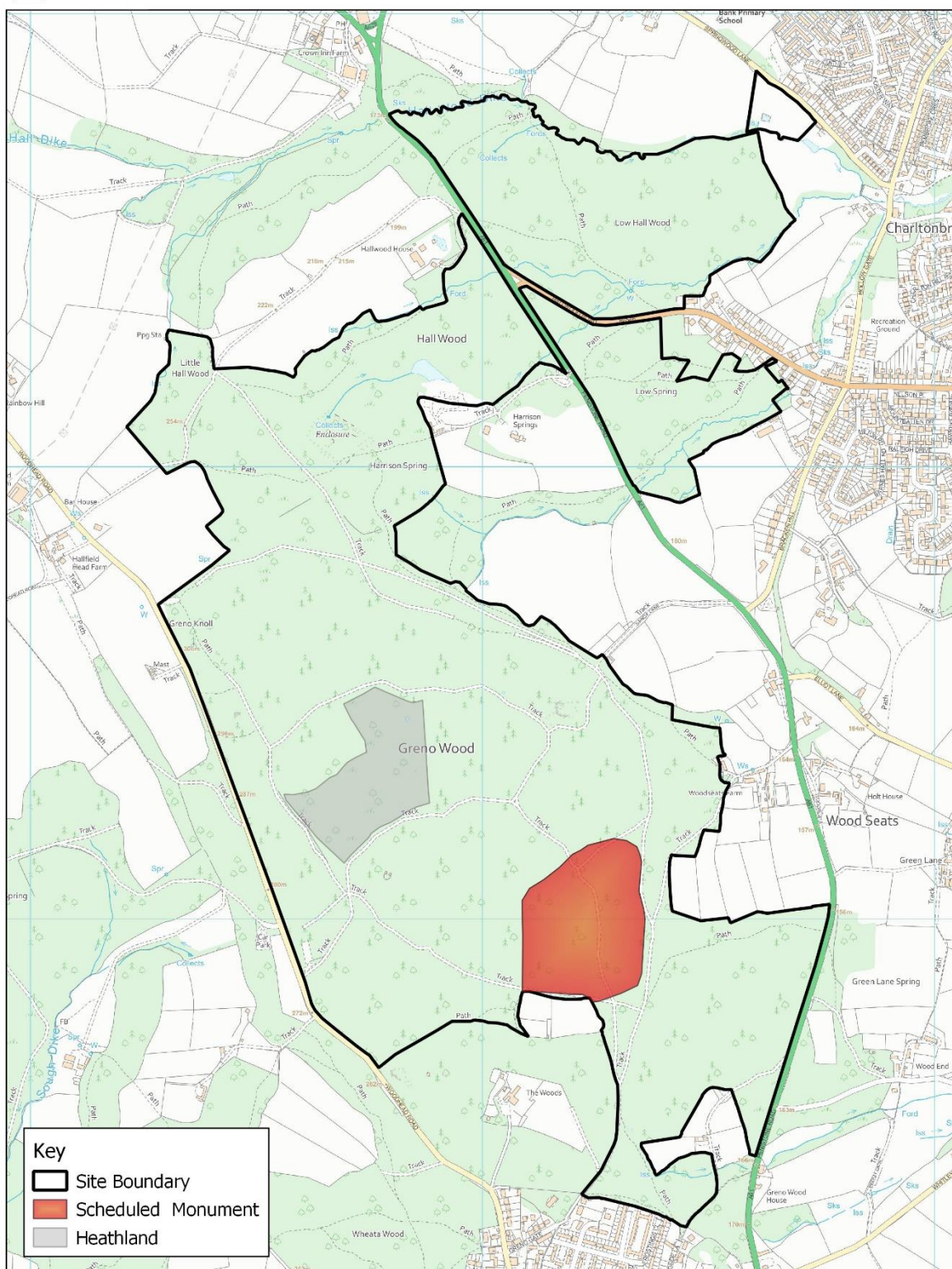
Greno Woods

Figure 1:
Site location & extent



Greno Woods

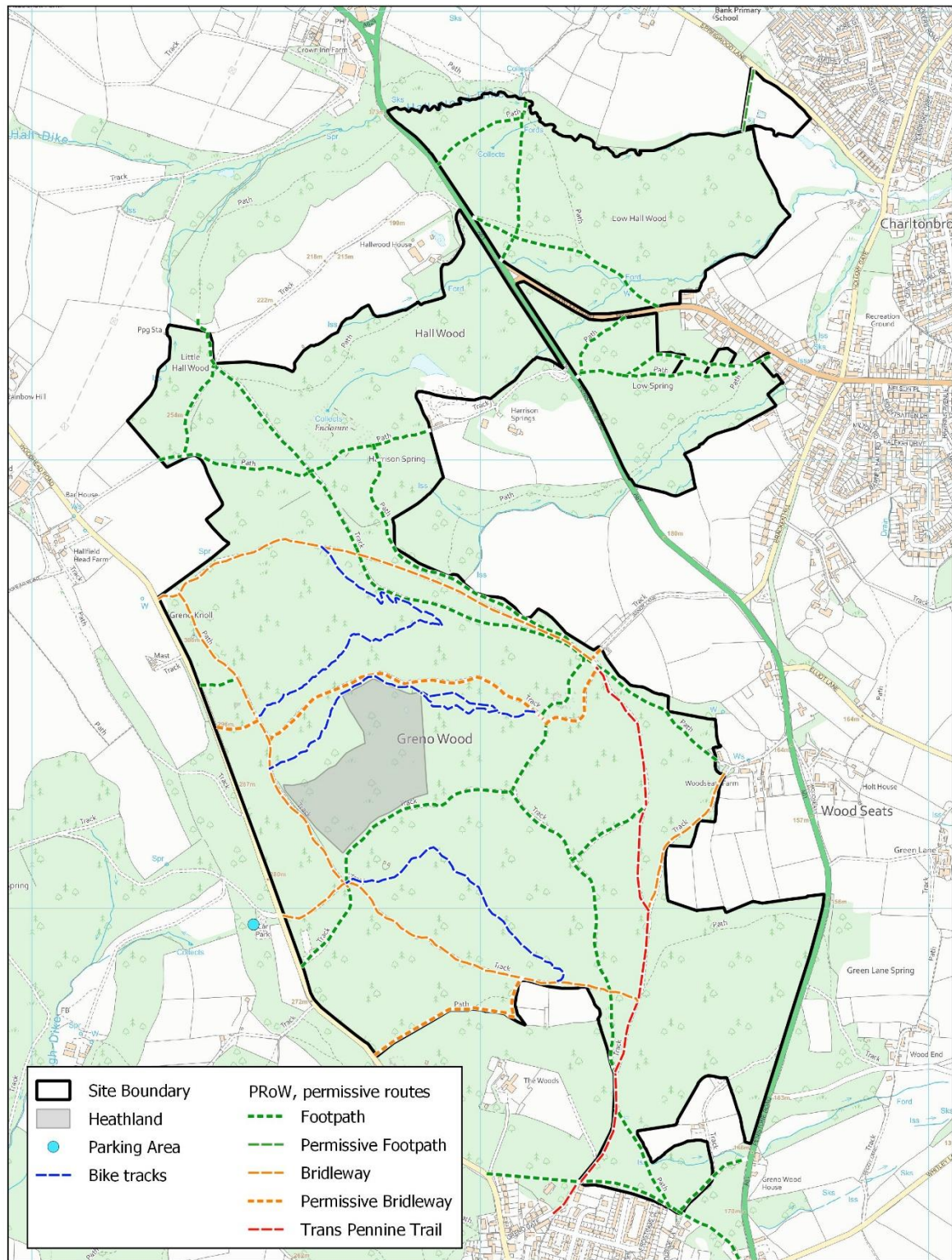
Figure 2: Scheduled Monument



0 100 200 300 400 500 m

Greno Woods

Figure 3: PRoW, permissive routes, bike tracks

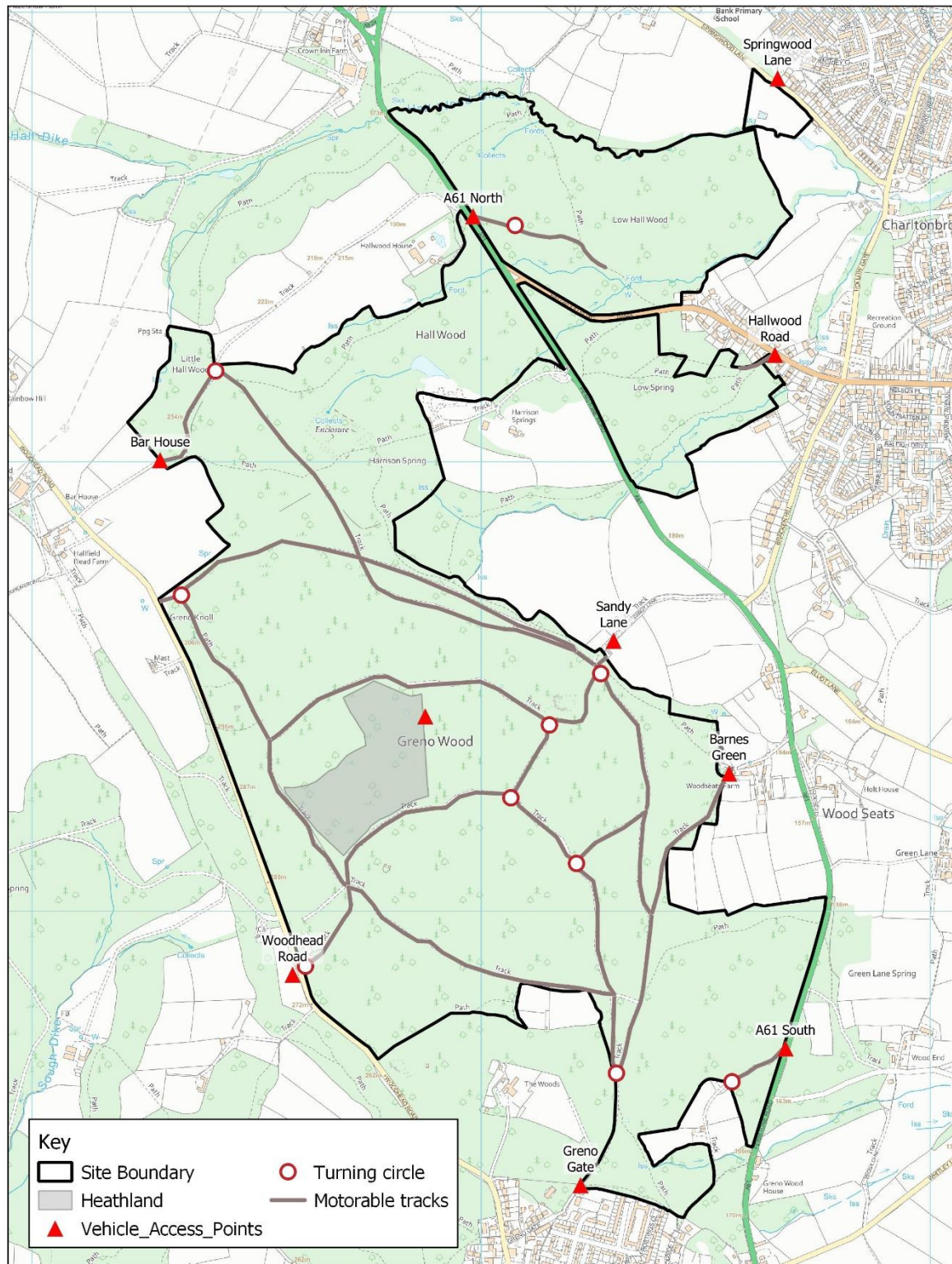


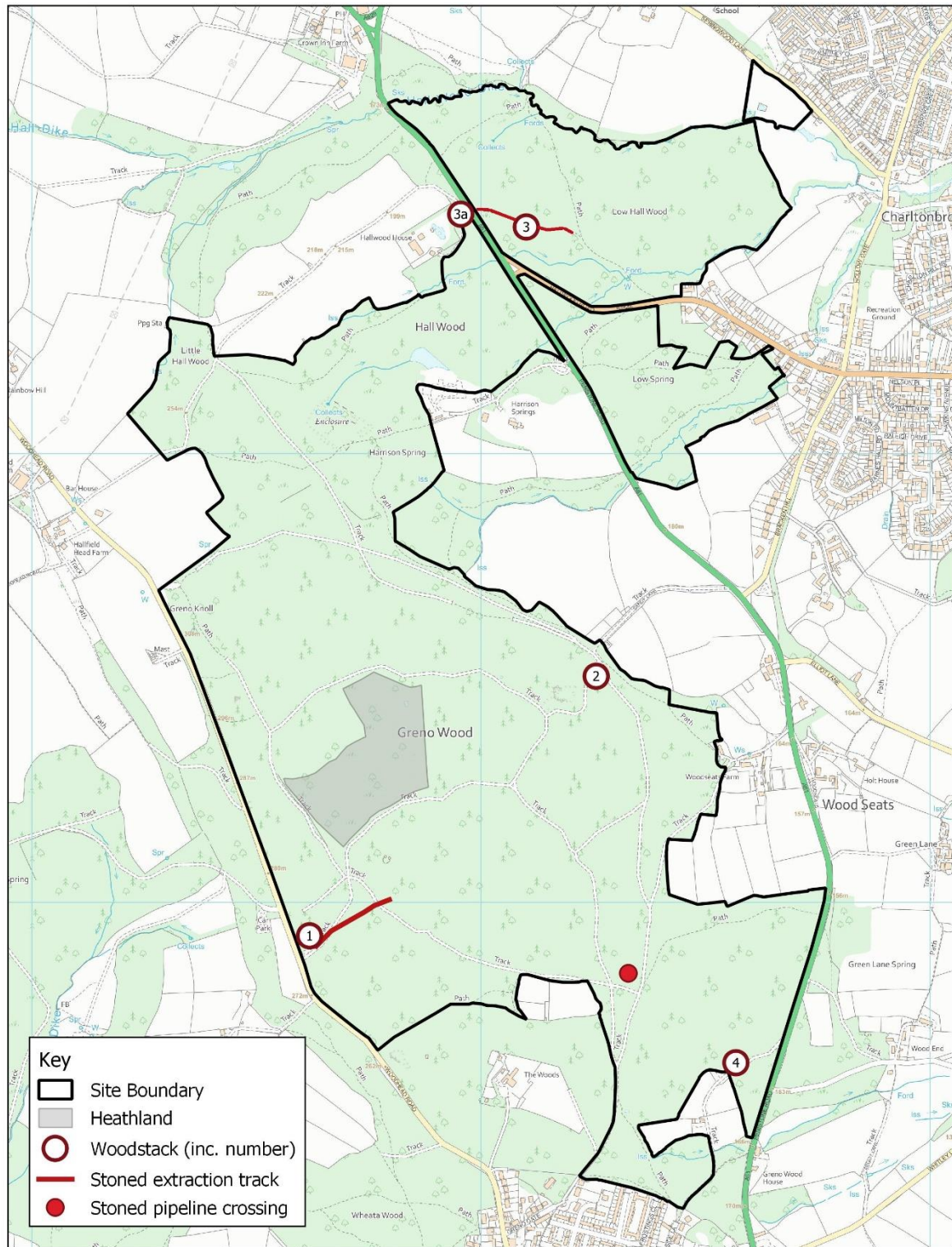
0 100 200 300 400 500 m



Greno Woods

Figure 5: Vehicular access, turning circles, motorable tracks

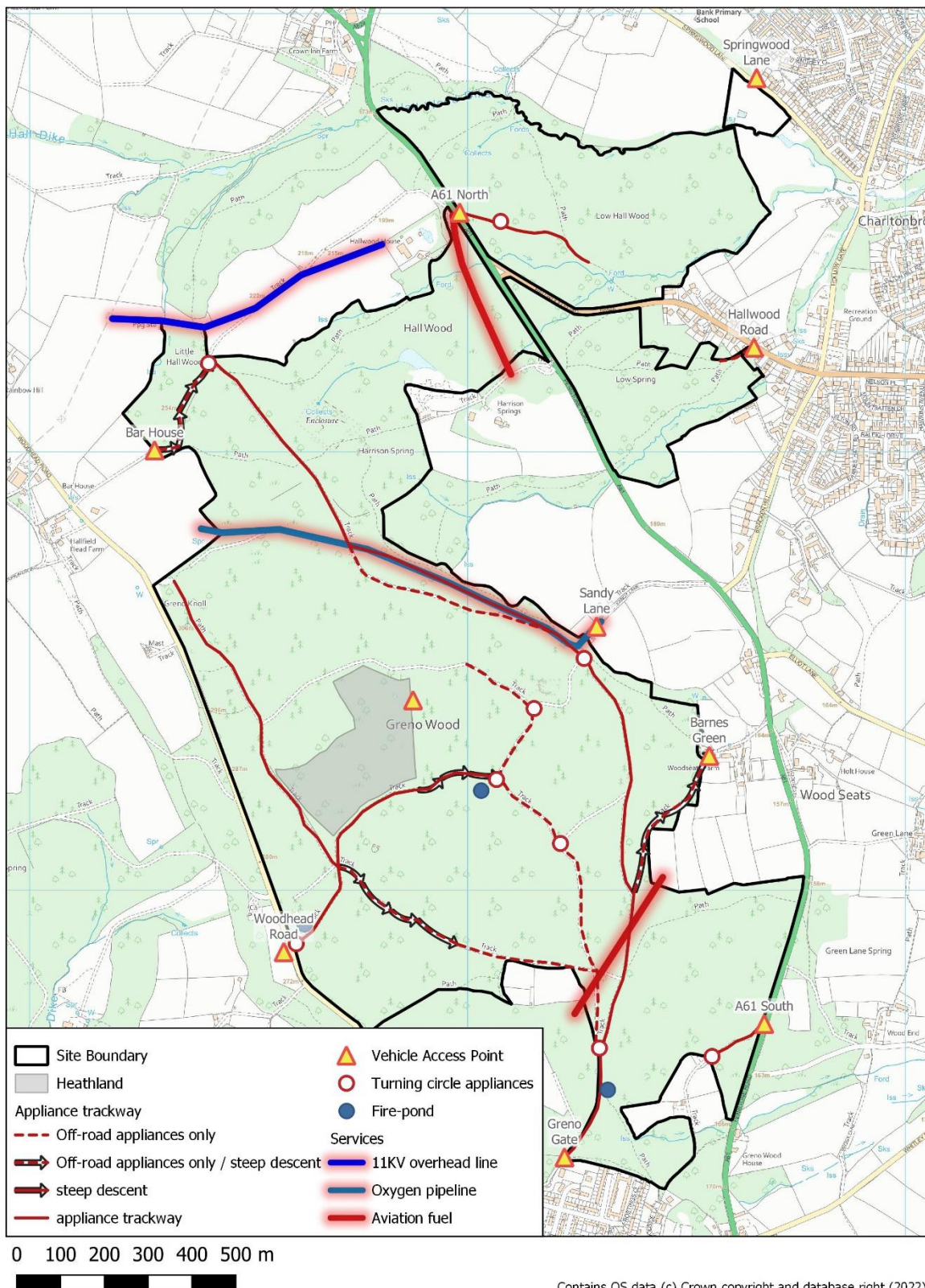




- Key**
- Site Boundary
 - Heathland
 - Woodstack (inc. number)
 - Stoned extraction track
 - Stoned pipeline crossing

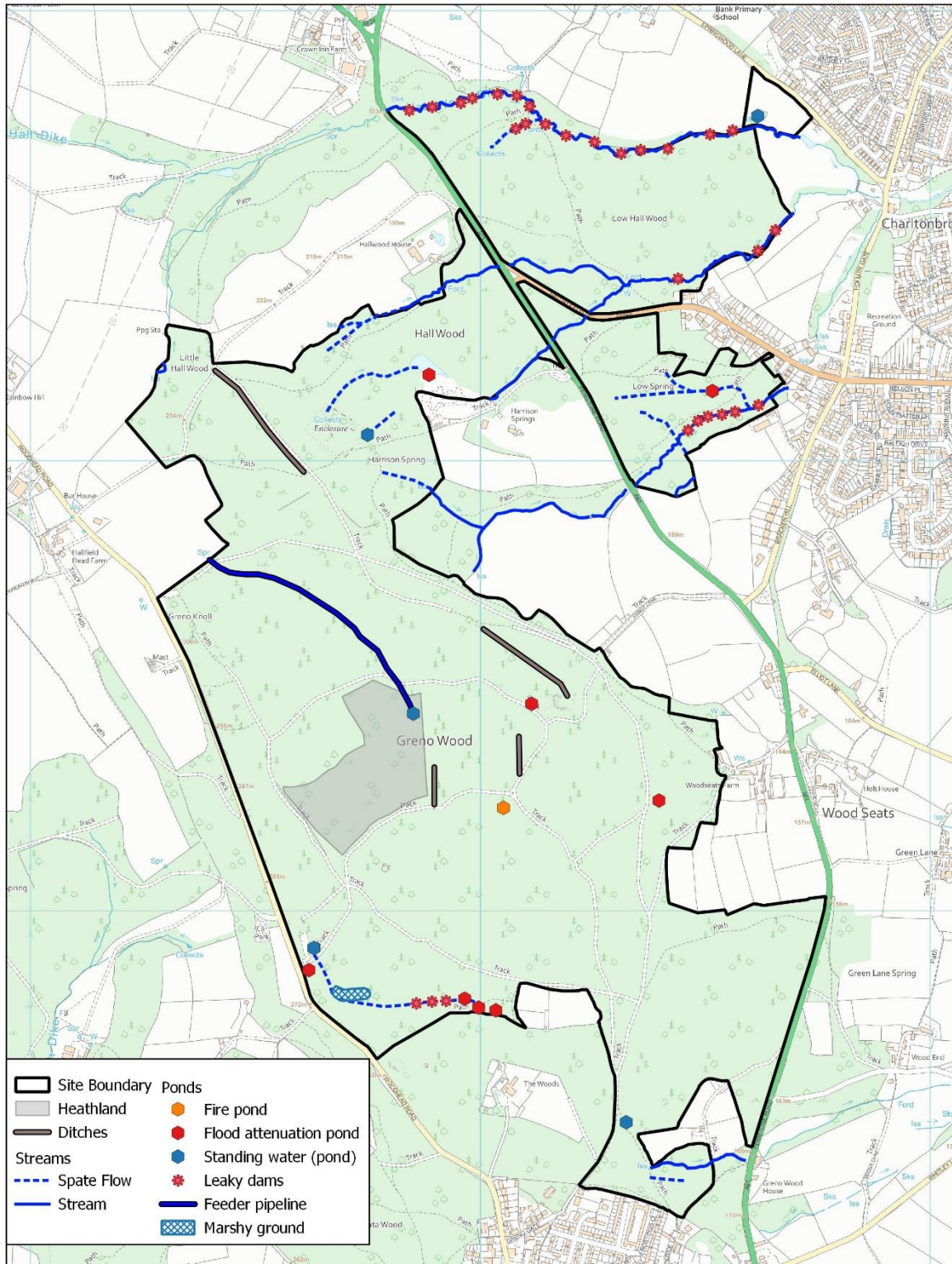
0 100 200 300 400 500 m





Greno Woods

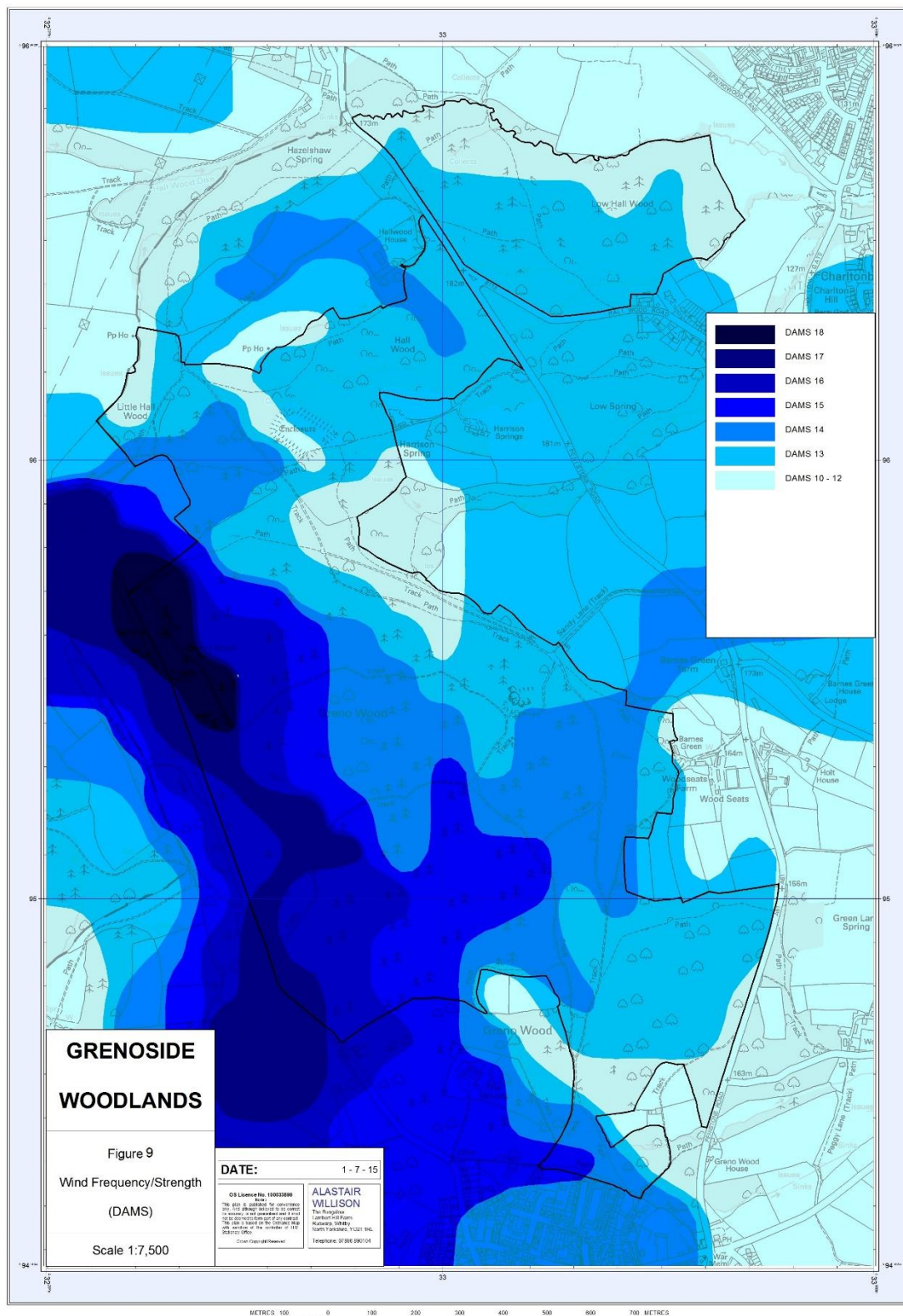
Figure 8: Hydrology

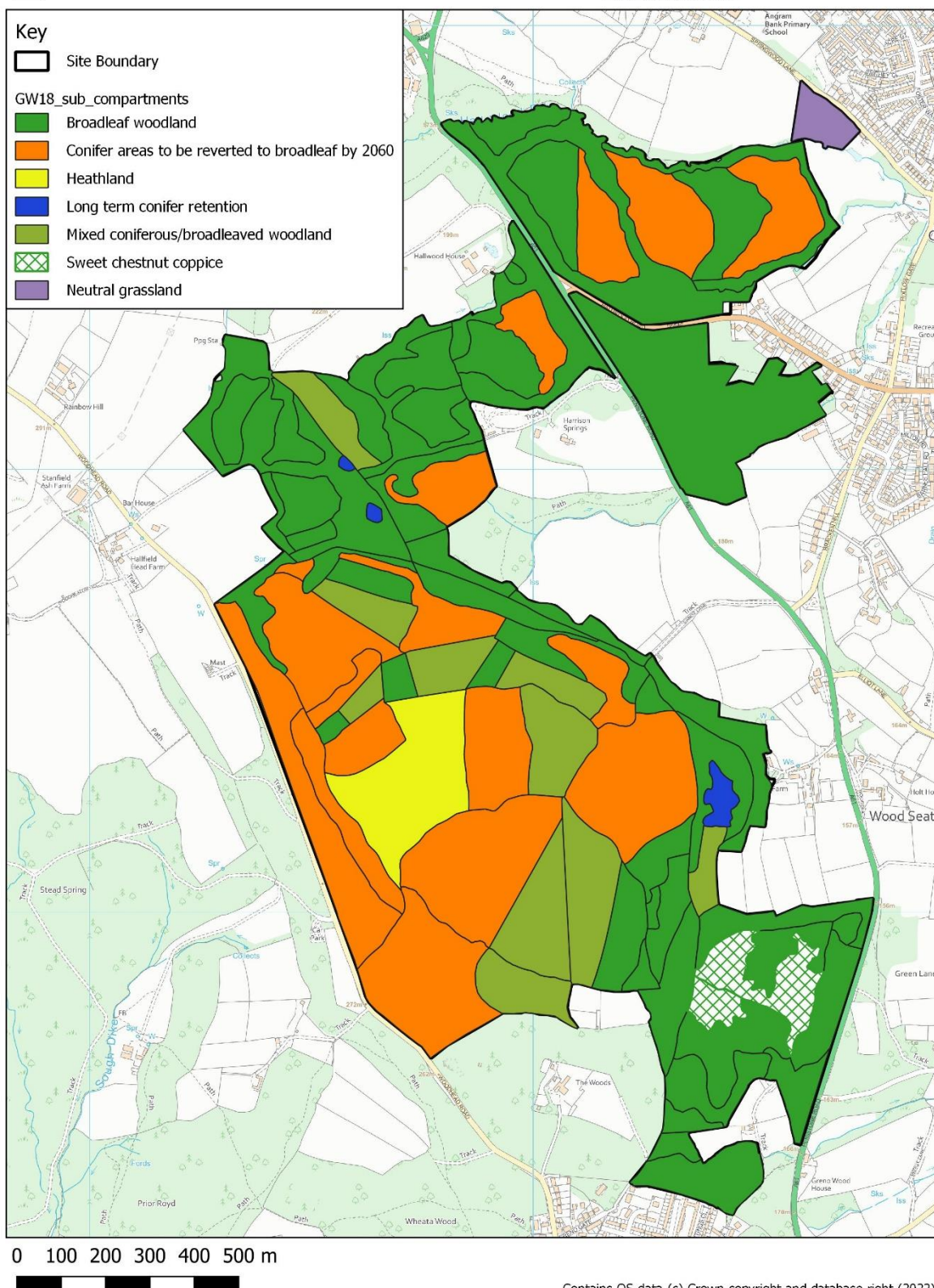


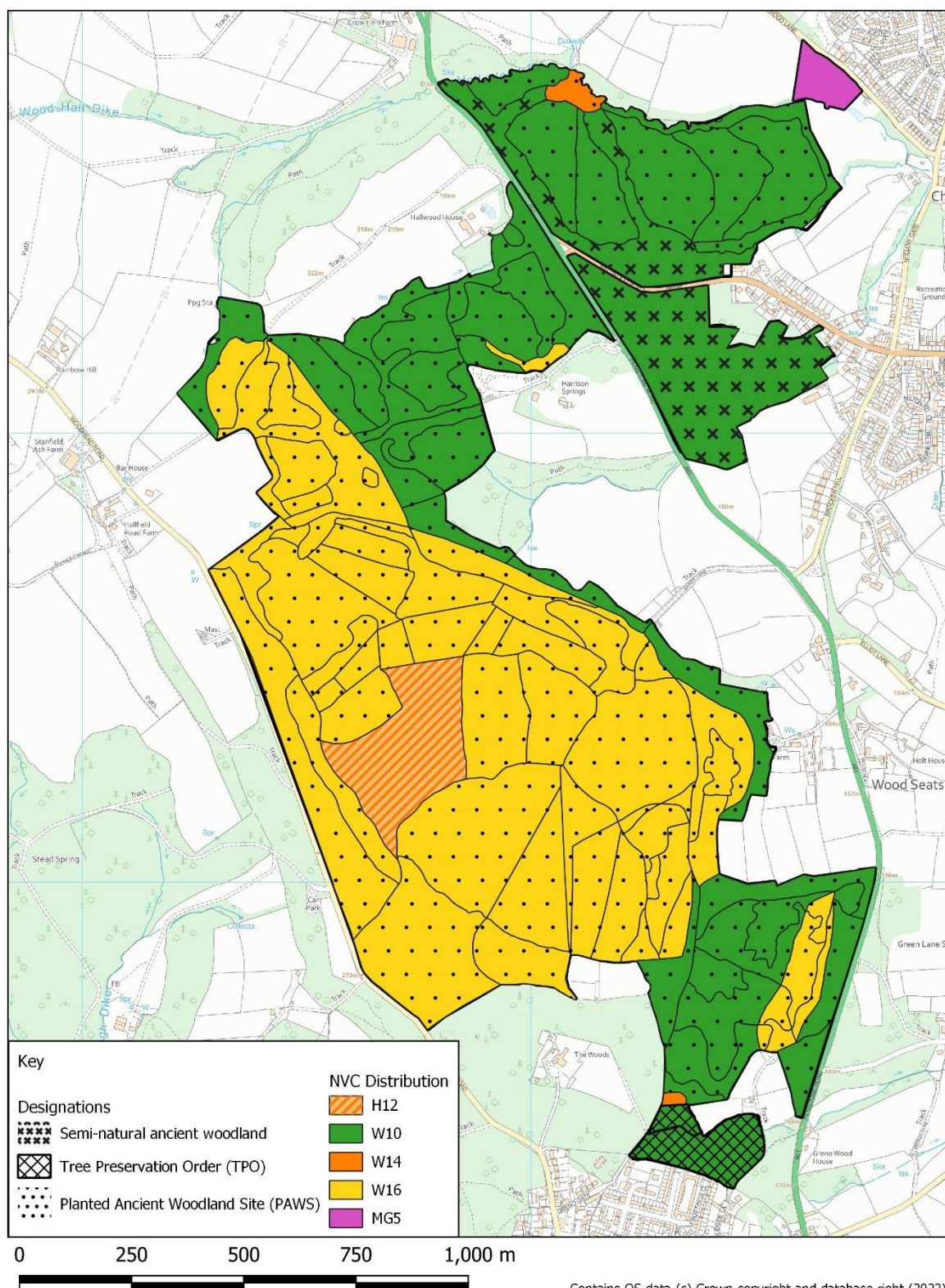
0 100 200 300 400 500 m

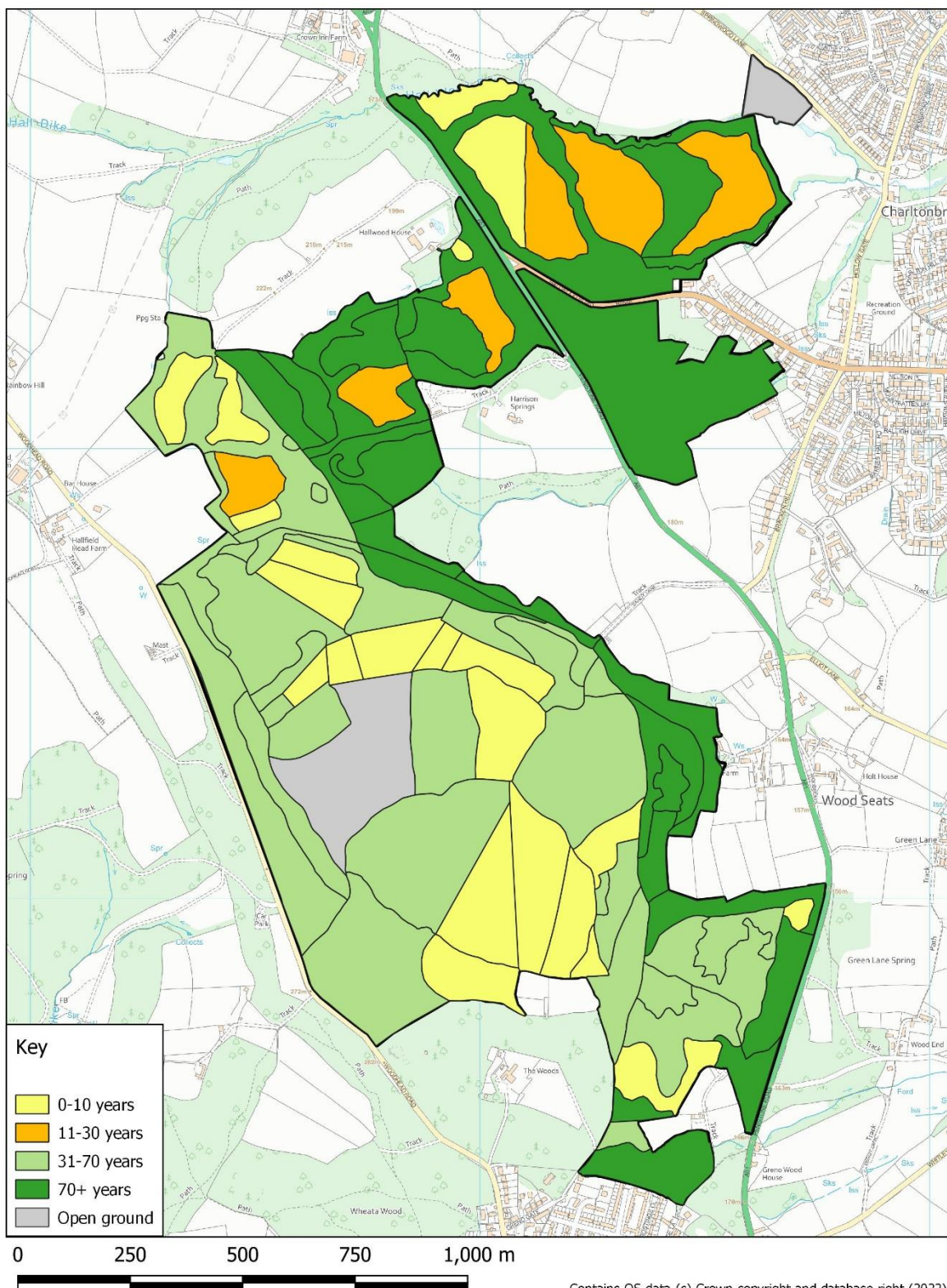


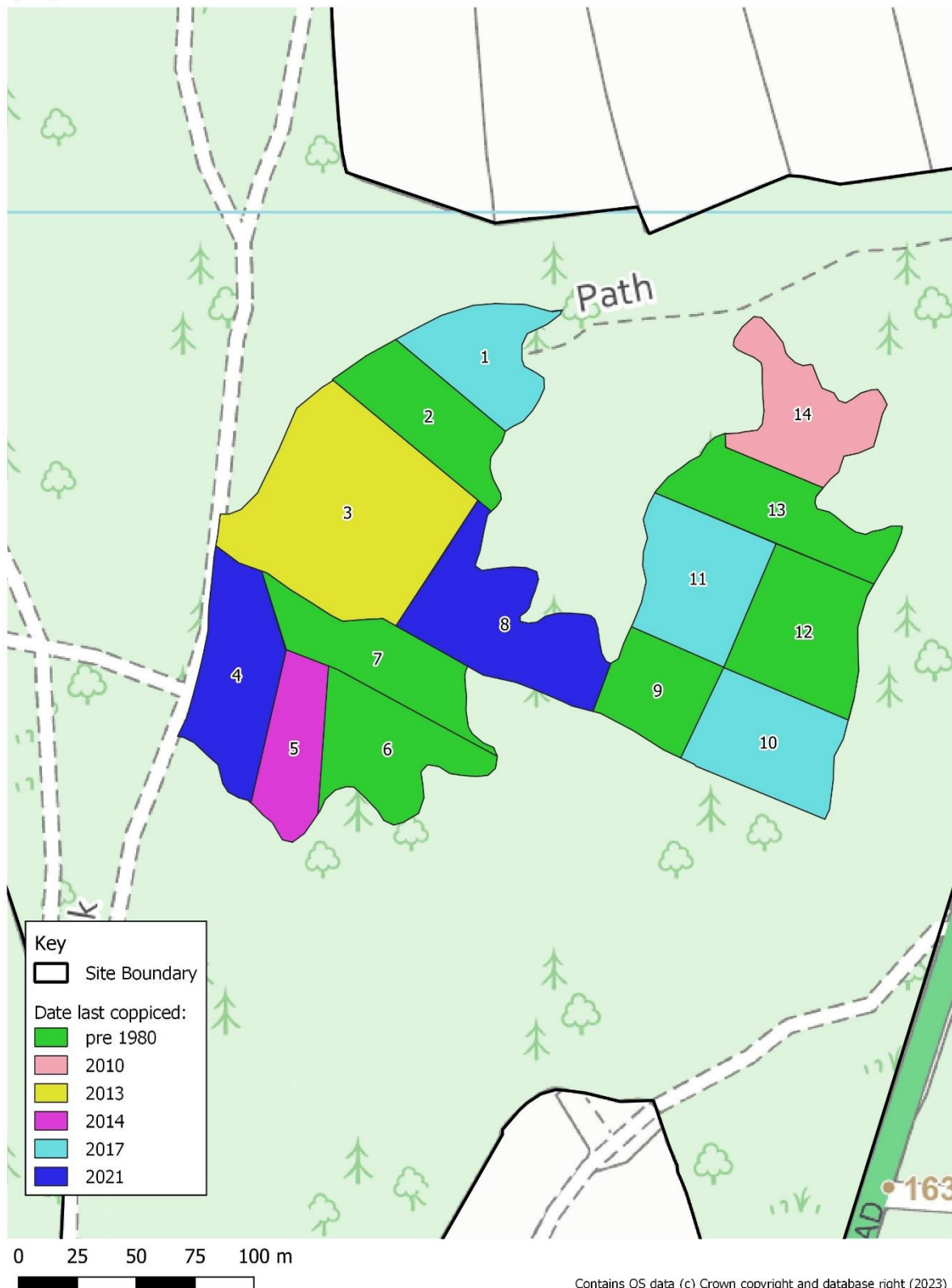
Contains OS data (c) Crown copyright and database right (2022)

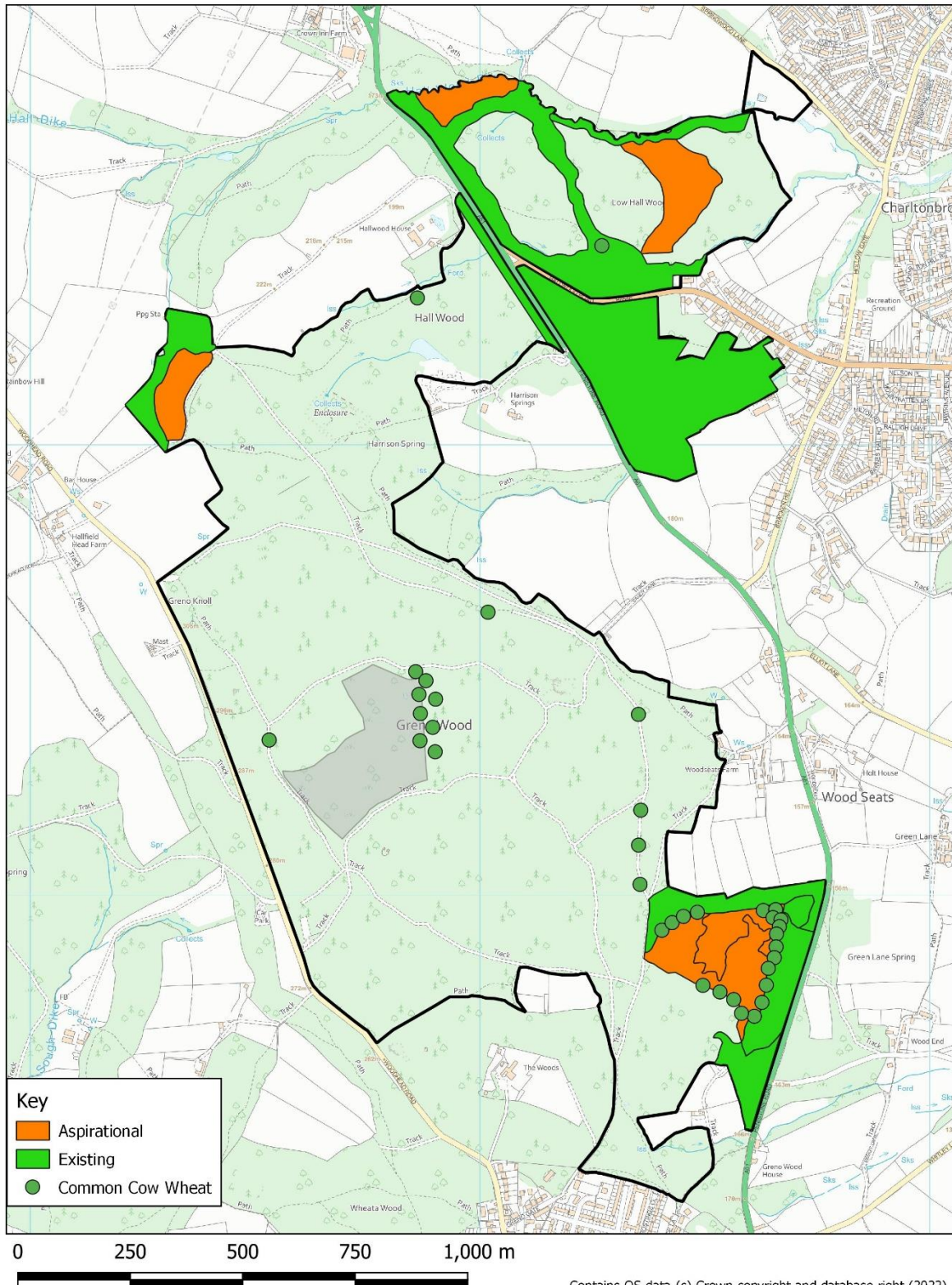


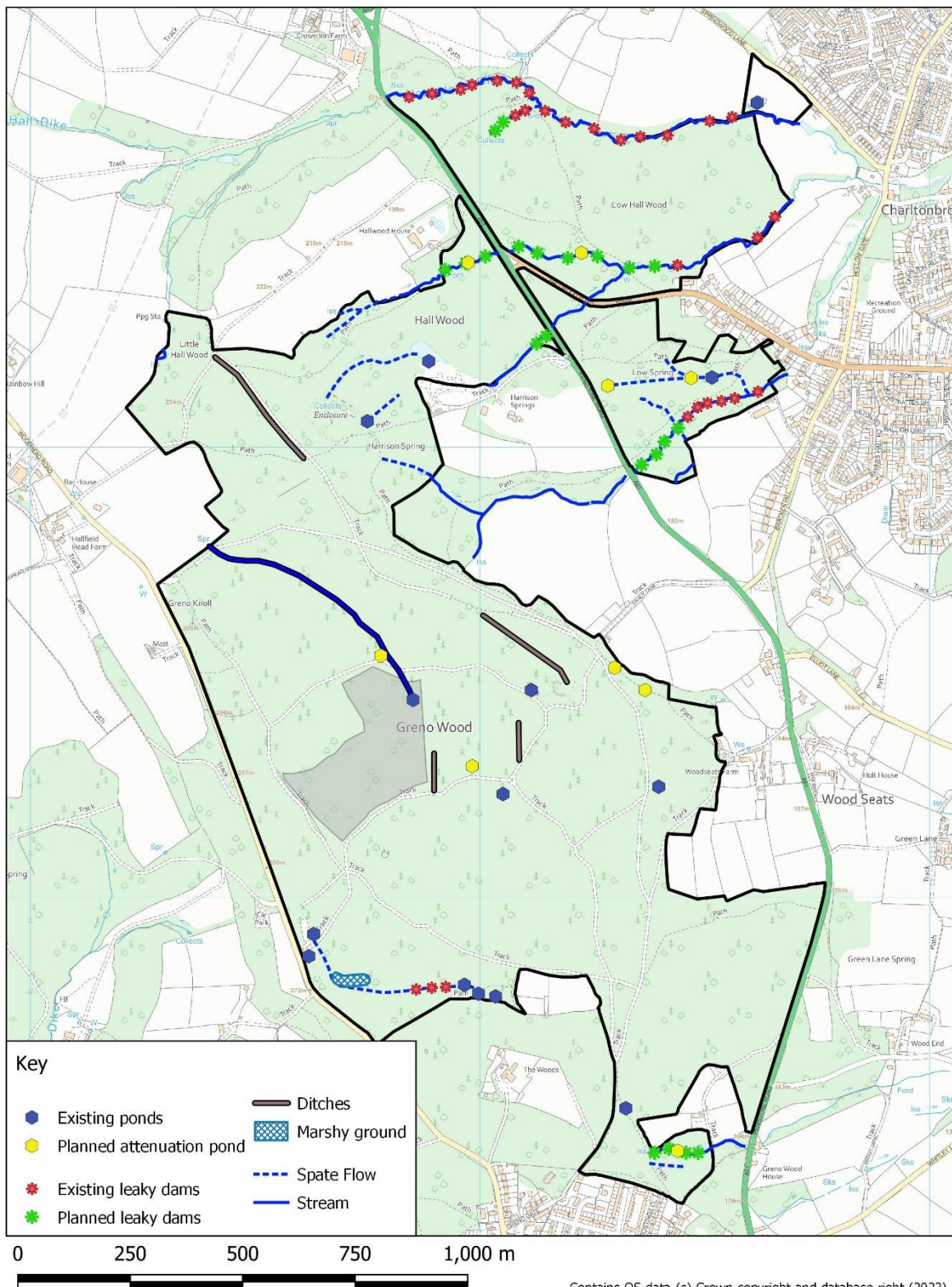








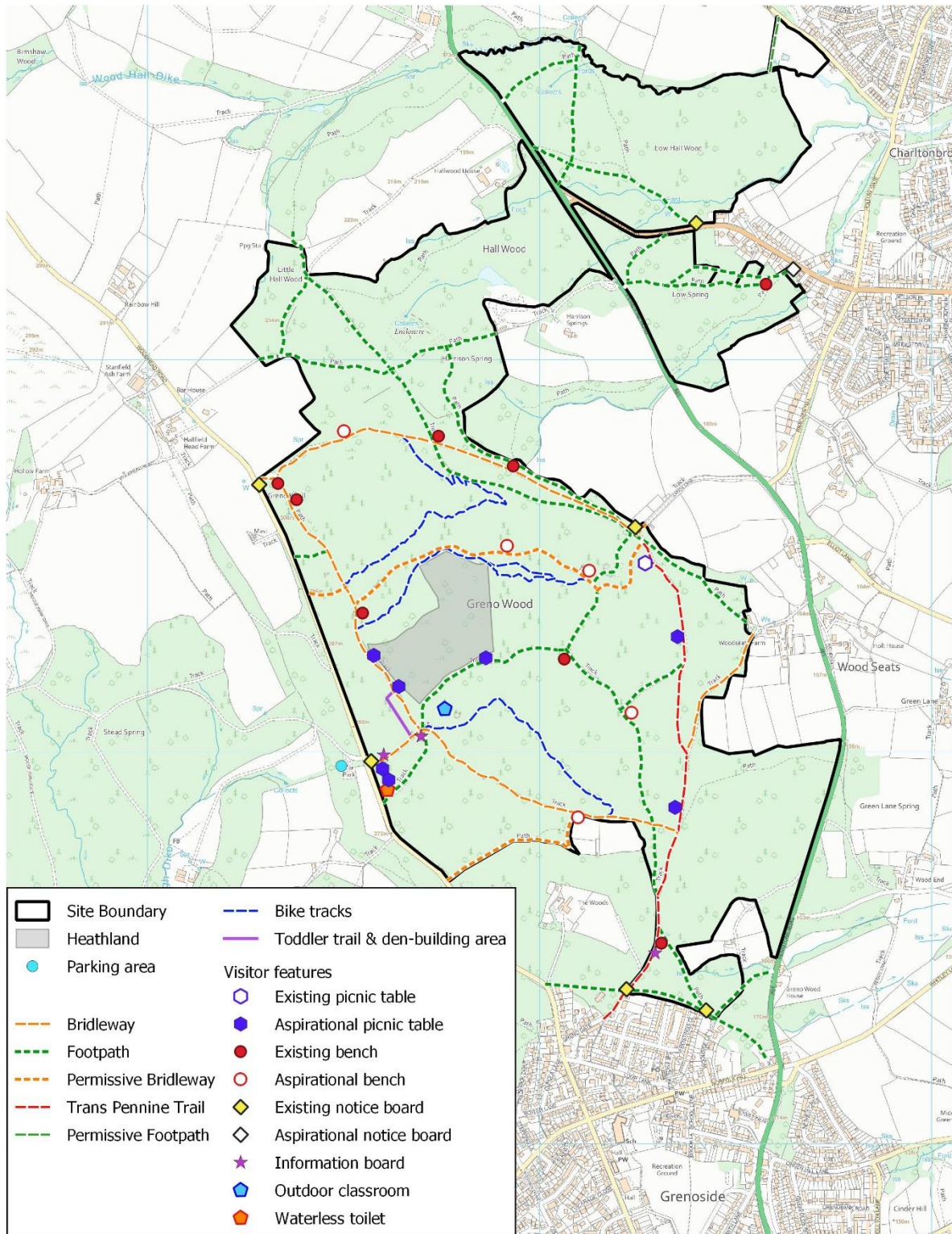






Greno Woods

Figure 17: Visitor Infrastructure



0 100 200 300 400 500 m

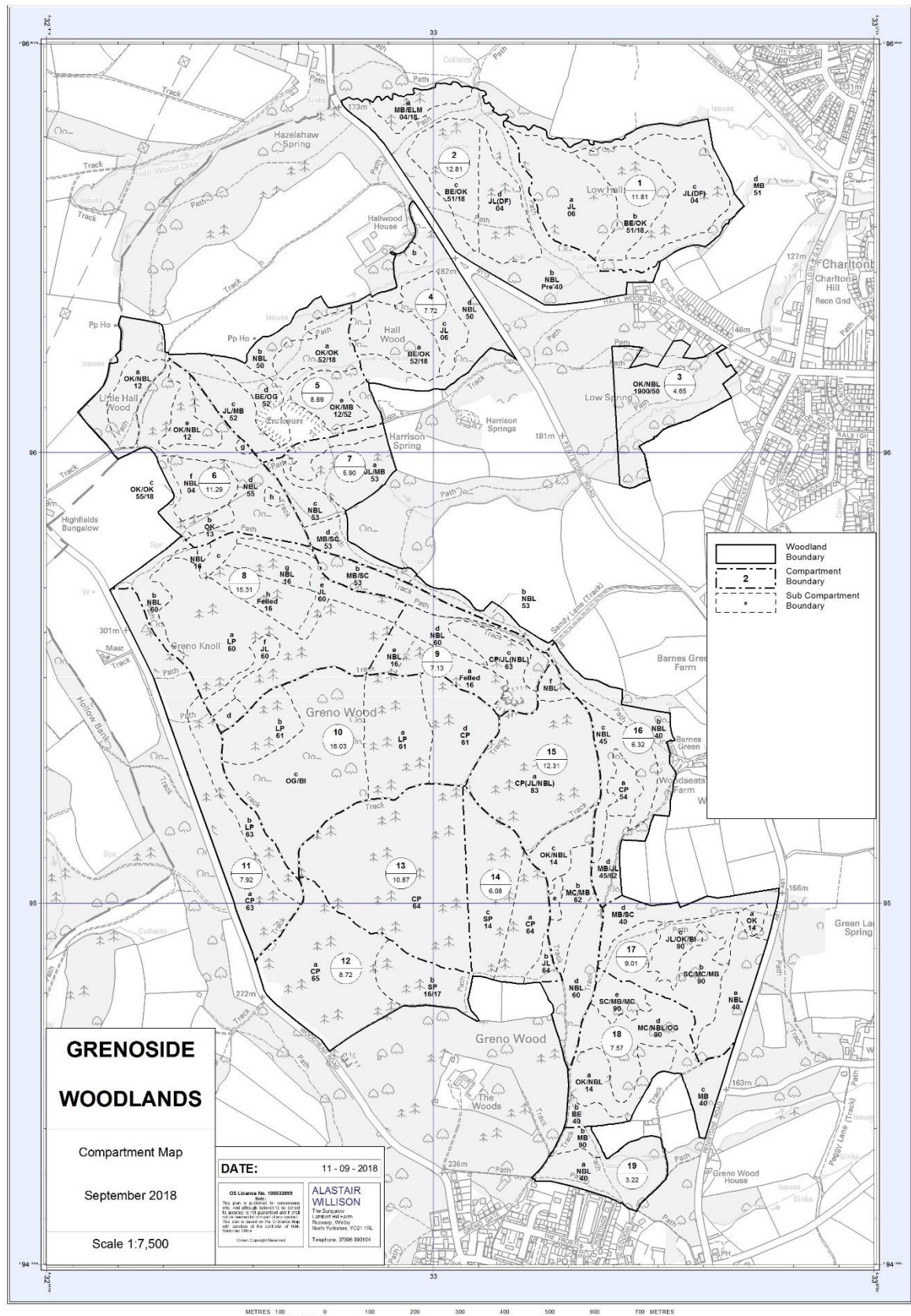


Contains OS data (c) Crown copyright and database right (2022)

Appendix I: Glossary

ASNW	Ancient semi-natural woodland: semi-natural woodland that has been in existence since 1600
AWIS	Ancient woodland Indicator species: animals and plants species typically associated only with semi-natural ancient woodland
CCF	Continuous cover forestry: a system of forest management where timber is harvested by thinning operations and the woodland canopy remains intact.
Clear fell	A system of forest management where timber is harvested by felling all trees in a given area
Ecosystem Services	The many and varied benefits to humans provided by the natural environment and from healthy ecosystems.
EIA	Environmental Impact Assessment: the assessment of the environmental consequences of a plan, policy, program, or actual projects prior to the decision to move forward with the proposed action.
GCS	Grenoside Conservation Society
INNS	Invasive non-native species
Keystone species	Species which play critical roles in the structure of their ecological community, thus affecting many other organisms belonging to different trophic levels in the food web.
NFM	Natural flood management: the use of natural processes to reduce the risk of flooding or coastal erosion.
PAWS	Plantation on ancient woodland sites: ASNW areas that have been overplanted with non-locally native species eg conifers, generally for forestry purposes.
SCC	Sheffield City Council
SRWT	Sheffield and Rotherham Wildlife Trust
UKWAS	UK Woodland Assurance Scheme: an independent certification standard for verifying sustainable woodland management in the UK that is used for both Forest Stewardship Council® (FSC®) and the Programme for the Endorsement of Forest Certification (PEFC) certification.
W10 woodland	NVC community W10 (<i>oak-bracken-bramble</i> woodland) is one of the woodland communities in the British National Vegetation Classification system. It is one of the six communities falling in the "mixed deciduous and oak/birch woodlands" group.
W16 woodland	NVC community W16 (lowland oak-birch woodland with bilberry) is one of the woodland communities in the British National Vegetation Classification system. It is one of the six communities falling in the "mixed deciduous and oak/birch woodlands" group.

APPENDIX II: WOODLAND COMPARTMENT MAP



APPENDIX III: OPERATIONAL STANDARDS AND TECHNIQUES

Protection and control

All clear-felling operations will be designed to minimise the risk of damage from wind, fire, pests and diseases through individual coupe sizes not exceeding 5h and the appropriate treatment of waste (lop and top) from thinning and felling operations.

Minimising wind damage

All restructuring will make use of wind firm edges, where available, to minimise the risk of damage from wind. Assessment using the ForestGALES modelling system may be used to further limit the risk from wind damage if required.

Minimising fire risk

A fire plan is in place and is reviewed periodically. Although there are several vehicular access points for local emergency services, most are gated to prevent motorbike and quad bike access. Local emergency services will be issued with a combination lock number. Due to the generally dry ground conditions, age class distribution and the location of the site, the fire risk is moderately high. During periods of high risk (early spring and late summer), restrictions are not put on public access through the wood, as it is accepted that public access leads to better reporting of fire.

Pests and diseases

There are no rabbits present in the woodland. There is a healthy population of grey squirrel and roe deer. Browsing damage will be monitored during Woodland Condition Assessments.

Phytophthora ramorum (and a similar but distantly related disease *Phytophthora kernoviae*) is a fungus-like water mould first recorded in the UK in 2002. Since 2009 *Phytophthora ramorum* has been affecting Japanese Larch in the west of England, and can be hosted by European and hybrid larch. The affected foliage is visible as wilted, withered shoot tips with blackened needles which are shed prematurely. Trees with branch dieback may have numerous cankers on their branches and upper trunk that can bleed resin. In some cases the FC has enforced the felling of infected stands to control the spread of the disease. Rhododendron exhibits wilting and dieback to the same disease and acts as an indicator to its presence and Douglas Fir, Sitka spruce, beech and sweet chestnut can also be infected.

The Common Leaf Weevil *Phyllobius pomaceas* and *P. argentatus* may attack broadleaved restock sites during early May and June. A site, approximately 6km to the south, owned by Sheffield City Council was decimated by the insect in 2005, necessitating an additional 4,000 beat ups. The insect requires adjacent grassland during the larval stages and little can be done to prevent the attacks without the use of insecticides.

Chalara (ash dieback) is a windborne disease of ash trees that is now widespread throughout Sheffield. Ash are not common in Greno Woods with the majority of specimens occurring along the A61 and Hallwood Road. It is anticipated that all ash trees on the reserve will be lost to this disease during the course of this management plan.

Tree health will be monitored through an annual inspection by the forest manager and the results recorded. Where necessary, foliar samples, etc, may be sent to Forest Research for analysis.

Biosecurity

Procedures and measures designed to protect the environment against harmful biological agents e.g. fungal pathogens, are laid out in the Trust's Biosecurity procedure, which will be adhered to during the delivery of this management plan.

Archaeology

Features on the area known as Handlands, Sharp's Wood 'Oyl and other features from the medieval period will be marked and protected if heavy machinery is to be used in the area.

Protected species

All forestry operations will be carried out between August and end January to avoid disturbance to breeding birds.

Where raptors are known to favour certain trees as nesting sites these will be identified and retained during forestry operations.

Badger setts will be excluded from operational areas, as required.

Veteran and Notable Trees

Trees identified as veteran or notable during the 2016 survey will be marked and retained during forestry operations.

Water Management

The natural and man-made watercourses/features can be seen in Figure 7. Planning for operations in the vicinity of water features is in accordance with the Forestry Commission (UKFS) Forest and Water Guidelines (<https://www.confor.org.uk/media/246145/forest-and-water-guidelines.pdf>).

The following UKFS buffer widths apply at Greno Woods from forest edge to watercourse/body:

Buffer Width	Situation
10m	Along permanent watercourses with a channel less than 2m wide.
20m	Along watercourses with a channel more than 2m wide and along the edge of large ponds.

The largest stream in Greno Woods Nature Reserve is the Hall Wood Dike at around 1-2m wide.

All water features within the vicinity of harvest operations will be highlighted within the Hazard Assessment with regard to fuel storage and possible spillage. Only minimal intervention of forest operations will take place within the above to further reduce any impact of soil erosion, sedimentation and harvest pollution.

The Environment Agency are to be alerted to any possible contamination of watercourses.

There are no plans to use fertilizers or herbicides within the above buffer areas.

Domestic stock and fencing

The condition of boundary fences and walls will be inspected annually. Where fence repair is required, negotiation will begin with the neighbouring landowner, to contribute either partially or fully towards the cost of fence repair to ensure exclusion of stock. There have been no incidents of stock incursion during the last eight years.

Use of pesticides and fertilisers

The range of pesticide use on the reserve has been kept to a minimum, with only two chemicals, glyphosate and asulox, in use since at least 2000. Electrodyne treatment of Scots Pine seedlings with alpha cypermethrin has been applied off site.

No fertiliser has been applied.

Work will be carried out in accordance with SRWT policies and procedures, which undertakes to reduce the use of all synthetic chemicals where possible either by use of less harmful products or where appropriate, the use of an integrated pest management system.

COSHH assessments and completed pesticide reports are held on file for the woodland.

All pesticide applications will be carried out in accordance with Forestry Commission Field Book 8 - The Use of Herbicides in the Forest. All operators will be competent to apply pesticides. Warning signs will be erected on treated sites and site visitors informed of the operations in advance.

Pesticide report forms are completed on a daily basis by operators and held on file.

Assessments will be made as to whether pesticide treatments are required. An environmental appraisal will be carried out to select methods of application that minimise the risk of detrimental effects of pesticides and fertilisers.

Waste disposal and pollution

No significant waste from forest operations has been identified.

The Environment Agency and SCC Environmental Enforcement Officer will be informed of all illegal activities as appropriate.

Fly-tipped waste and garden refuse will be removed and deposited by a licensed waste carrier. The reserve will be litter-picked on a regular basis.

Fuel and chemical containers will be removed from the site by operators and disposed of through a licensed tip or a specialist waste disposal contractor.

Surplus fuels and chemicals will be returned to the SRWT store before safe disposal in line with environmental requirements.

Procedures and equipment will be in place during operations for control of any oil or chemical spill in the woodland, see section Emergency Procedures below.

Control of harvesting operations

Varied ground conditions and silvicultural treatments require a range of harvesting methods. Conifer operations in more accessible areas can be completed with mechanised harvesters and forwarders. Broadleaved and steeper areas mostly require felling by chainsaw, either to waste or for extraction by forwarders.

Most of the woodland will be thinned by both line and selective thinning. Control of the thinning yields will be undertaken through sample marking and management tables from appropriate yield models. Records of thinning yields will be maintained to help with future monitoring.

Stands that are designated to be treated under CCF systems will be thinned on a more selective basis, in order to enable regeneration. It is anticipated that later thinning operations during the stand re-initiation stage will be fully marked in order to ensure a sustainable cut from each management unit.

The presumption in the plan is that all timber will be sold on a standing sale basis. The buyer of the standing timber will be selected not only for the price offered for the timber, but also for their quality of work and safe working practices.

Harvesting operations will be limited to periods outside of bird nesting times when the ground conditions are suitable to support, without significant damage, the machinery and level of activity expected for the operation. Harvesting sites will be organised and will employ the use of brash mats.

Emergency procedures

Chemical and oil spill

A chemical and oil spill emergency plan will be in place for all operations. Where a third party is taking the responsibility of Forest Works Manager (FWM), such as in a standing sale, they will be required to have a robust procedure in place.

Fire plan

See above.

Accident plan

All harvesting operations will have a harvesting plan providing emergency procedure details in case of accident or injury, including nearest A & E hospital, main access grid reference and details of mobile telephone signal. Other work operations will include emergency details on the risk assessment for the work.

The SRWT telephone number is clearly indicated on site signage to allow members of the public to make contact in case of accident and emergency. The forest manager and/or SRWT personnel will attend as quickly as possible when an accident or injury occurs, unless very minor.

Road, track and ride maintenance

The reserves track network are all PRow and special care is required, especially following harvesting, to ensure there is no hazard to the public. These tracks are not used as extraction routes, although extraction routes may cross them.

Routine side drain and culvert road maintenance will be carried out during periods of dry weather to avoid run-off. Post harvesting maintenance will be required to be completed soon after harvesting so as to avoid ponding in wheel ruts and run off of suspended solids.

Management of health and safety

The management of health and safety underpins all operational activities. A framework of responsibility as set out in 'Managing Health and Safety in Forestry Operations' (HSE, 1999) will be established in all operations. When standing timber is sold, SRWT will mostly take on the role of the Landowner, with the purchaser taking on the role of Forest Works Manager (FMW).

Vendors and sub-contractors will be selected after being audited for health and safety compliance.

The reserve's woodlands will be surveyed and managed in line with the Trust's Tree Risk Management Procedure.

APPENDIX IV: OPERATIONAL STANDARDS AND TECHNIQUES CHECKLIST

To be completed before management operations undertaken

	Yes/No/ Applicable	Not
Protection and control Clear-felling operations designed to minimise the risk of damage from wind, fire, pests and disease. Coupe sizes does not exceed 5h		
Wind damage and fire risk Forestry operations designed to make use of wind firm edges, where available Up to date fire risk plan in place for the reserve		
Tree pests and diseases Tree diseases currently active in work area (please list): Appropriate biosecurity measures in place		
Other Protected Species Harvesting operations will be limited to periods outside of bird nesting season Ground conditions suitable to support machinery and level of activity expected for the operation without risk significant damage (Y/N) If no, list mitigations below: All/any badger setts excluded from operational areas. All/any raptor nesting sites within operational areas identified and marked for retention. Ground based/aerial PRF bat roost assessment has been undertaken and the risk to roosting bats managed by an appropriate risk assessment.		
Archaeology All/any prehistoric archaeological features excluded from operational areas.		
Veteran and notable trees All/any veteran and notable trees in operational areas identified and marked for retention.		

<p>Water management</p> <p>Buffer areas in place along all watercourses in operational area.</p> <p>All water features within the vicinity of harvest operations highlighted within the Hazard Assessment with regard to fuel storage and possible spillage.</p> <p>Use of fertilizers and pesticides excluded from buffer areas.</p> <p>Procedures and equipment for control of any oil/ fuel spill in the woodland in place.</p>	
<p>Pesticides use</p> <p>Assessments made to determine if pesticide treatment required.</p> <p>If yes:</p> <p>Least harmful pesticide and delivery mechanism selected for use.</p> <p>Necessary COSHH assessments and completed pesticide reports completed and held on file.</p> <p>Copies of competency certificates for all operators on file.</p> <p>Pesticide report forms to be completed on a daily basis by operators and held on file.</p> <p>Warning signage to be erected on treated sites and visitors informed of the operations in advance.</p> <p>Fuel and chemical containers to be removed from the site by operators and disposed of through a licensed tip or a specialist waste disposal contractor.</p> <p>Surplus fuels and chemicals will be returned to the SRWT store before safe disposal in line with environmental requirements.</p> <p>Procedures and equipment for control of any oil or chemical spill in the woodland in place.</p> <p>All pesticide applications to be carried out in accordance with Forestry Commission Field Book 8 - The Use of Herbicides in the Forest and with SRWT pesticide policies and procedures.</p>	
<p>Management of Health and Safety</p> <p>Risk assessment for works has been produced, signed off and placed on file.</p> <p>Chemical and oil spill emergency plan in place.</p> <p>Site fire plan shared with all contractors (if fire risk high)</p> <p>Warning signage agreed and in place. Responsibility for maintenance of signage has been allocated.</p> <p>Contact details for all parties (contract manager, principle contractor, site manager etc) shared and placed on file.</p>	

