



**Sheffield &
Rotherham**
Wildlife Trust

Carbrook Ravine

Management Plan

April 2024 - March 2034

For nature, for everyone

Acknowledgements

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Consultation

Report by: Marta Alfaro Tirado
Sheffield and Rotherham Wildlife Trust
37 Stafford Road
Sheffield
S2 2SF

Tel: 0114 263 4335
Email: nature.reserves@wildsheffield.com
Website: www.wildsheffield.com

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Summary

Carbrook Ravine is an urban nature reserve situated to the east of Sheffield, between the wards of Manor Castle and Richmond. It covers an area of 13.3 hectares (nearly 33 acres). The reserve is the property of Sheffield City Council and has been managed by the Sheffield and Rotherham Wildlife Trust (SRWT) since 2000.

The edge of Carbrook Ravine was once the boundary of the Sheffield Deer Park and now has become an oasis of nature among the surrounding housing estates. It is designated as a Local Nature Reserve (LNR), providing protection against development, and it is part of Sheffield's Green Belt.

There are several habitats within Carbrook Ravine, which include wet woodland, semi-natural deciduous woodland, scrub, neutral unimproved grassland, modified grassland, acid grassland/heathland mosaic, tall ruderal vegetation and hedges. All these habitats provide a number of opportunities for different wildlife to thrive. Notable species found here are skylarks, hedgehogs and bluebells. The wildflower meadows, located at the top of a hill with excellent views of Sheffield, create a peaceful environment for visitors to enjoy nature.

This nature reserve offers a recreational open space where visitors can increase their physical and mental well-being by walking, wildlife watching or by joining the monthly work days or the ecological surveying team.

Despite its obvious value and importance to both wildlife and visitors, the appearance and character of the reserve suffer as a result of regular fly-tipping, including domestic and garden waste. SRWT continues to remove fly-tipping on a regular basis.

This management plan covers the period from April 2024 to March 2034. Physical works contained in the plan are aimed at conserving and improving the priority habitats on the site and maintaining features of interest. Works to maintain and improve recreational infrastructure are also included. The survey and monitoring programme will provide data on ecological conditions, which will inform future management works.

In addition to these physical works, the Trust engages the public in the management of the reserve through the Reserve Mailing List. On-site information provision will be limited, rather the site will be promoted through the Trust's website. An annual programme of volunteer work days with occasional guided walks will be held to promote public understanding of its wildlife and history and offer opportunities to participate in its management.

1. Introduction

Sheffield & Rotherham Wildlife Trust 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. Sheffield & Rotherham Wildlife Trust aims to promote nature conservation, advance education in environmental matters and improve the quality of life in Sheffield and Rotherham, through the development and promotion of sustainable land management practices, linked directly to both rural and urban regeneration.

1.1 Purposes and formulation of the 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 key long-term aims and the associated objectives that form the framework of management.
- To outline the rationale for management so as to give a clear and comprehensive explanation of why aspects need management and in what form that management will take place.
- To provide a key document from which projects are developed and associated funding sought.
- The plan allows consistency and continuity so that if or when changes of staff take place, or changes in ownership or disposal of the land occurs, then management aims, objectives and prescriptions 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. Therefore the full annual work programmes are kept and updated electronically at the Sheffield and Rotherham Wildlife Trust 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** are 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 which 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 is 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.

2. Site description

2.1 General information

Location and context

Carbrook Ravine comprises a strip of land running along either side of the Car Brook, at the eastern edge of the Manor Estate, in south-east Sheffield. It has a total area of 13.3 hectares, centred on grid reference SK 395 860. The site is divided into two parts by Spinkhill Avenue, 11.6 ha to the north and 1.7 ha to the south (see Figure 1).

For management purposes the site has been divided into the following compartments (see Figure 2):

Compartment 1 is Spring Wood at the south of the reserve. It contains a mixture of wet woodland around the Car Brook, semi-natural deciduous woodland and small areas of neutral and modified grassland.

Compartment 2 is Carbrook, containing the Car Brook. It runs from Spinkhill Avenue to the north boundary of the reserve. It consists mainly of wet woodland and semi-natural deciduous woodland. There is a small amount of damp acid grassland/heathland mosaic.

Compartment 3 is Scrubby Meadow at the north of the reserve. It comprises dampish neutral grassland with areas of scrub around the margins.

Compartment 4 is Hay Meadow which consists of neutral grassland and some scrub.

Compartment 5 is Restoration Meadow, consisting of grassland which was re-seeded with a native seed mix in 2015. It also contains some scrub.

See Figure 3 for full Phase 1 habitat information.

Landscape value and context

Carbrook Ravine lies at the eastern end of the Manor Estate, to the north of Woodthorpe and west of Handsworth, in urban east Sheffield. Together with Pipworth Recreation Ground and Bowden Housteads Wood, the reserve forms an area of green belt land, extending through the surrounding housing and creating an important green link to the countryside beyond. The site has a long history of human usage, and its proximity to a large housing estate makes it valuable for leisure and recreation.

The site is an important open space, much used by people for informal leisure and recreation. The wooded character of the ravine adds significantly to the environmental quality of this part of the Manor housing estate, adding variety and visual interest to a predominantly man-made urban location. The woodland and scrub helps to screen Mosborough Parkway (A57) to the east of the reserve from the houses to the west – reducing visual intrusion and acting as a buffer against both noise and air pollution.

Despite the encroachment of housing and new roads during the 20th century, the ravine is one of the few remaining elements of the rural Sheffield landscape that existed before the current housing estates were built in the 1930s, and as such is a very significant feature in the present day landscape of eastern Sheffield.

As the Car Brook acted as the boundary to the Sheffield Deer Park in years past, it now provides a visual and atmospheric divide, marking the boundary between the modern housing estates of Manor and Woodthorpe. With housing located on the high ground to either side of the Carbrook Ravine, and immediately surrounding Spring Wood, the reserve can be seen from a large number of properties, and as a result contributes greatly to the views experienced by those householders. Newer housing developments at the former site of Stradbroke College also overlook the reserve, increasing the significance of its role in the landscape still further.

Despite its obvious value and importance, the appearance and character of the reserve suffer as a result of regular fly-tipping, including domestic and garden waste. During the period of 2000 to 2006, various vehicle barriers and A-frame pedestrian gateways were installed to reduce incidences of fly-tipping, and regular clearance days have been undertaken since SRWT took on management of the reserve.

Site ownership and tenure

Carbrook Ravine is owned by Sheffield City Council (SCC). Over the twenty five years prior to 2000, several management plans were developed for the site. None of these plans were fully implemented, because insufficient resources had been available. From 2000 the site has been managed by SRWT, with a 30-year lease signed in April 2002.

The current lease will finish in 2032, before the end of this management plan (2034). Lease renewal is being developed at the time of writing this management plan. It is expected that the lease will be extended beyond 2032.

Designations and policy context

The majority of the Carbrook Ravine reserve was identified as a Site of Scientific Interest in the **Sheffield Nature Conservation Strategy (1990)**, indicating it to be of city-wide importance for nature conservation. As a result of this, it was designated in the **Sheffield Unitary Development Plan (1998)** - UDP as an Area of Natural History Interest, and given protection from development by Policy GE 13, which states that:

'Development which would damage Areas of Natural History Interest will normally not be permitted'.

It has been declared as part of a statutory **Local Nature Reserve** covering Spring Wood, Carbrook Ravine & Bowden Housteads Wood. With this designation it will receive additional protection, under UDP Policy GE12:

'Development which would damage Sites of Special Scientific Interest or Local Nature Reserves will not be permitted'.

On the current draft Sheffield Local Plan, the southern section of the reserve (Spring Wood) is also designated as **Urban Green Space Zone**, to which policy GS1 applies:

'Open space or sports and recreational facilities of regional or national importance will be safeguarded and development or redevelopment will be permitted only where it would improve the quality of facilities provided in the city.'

The northern part of the reserve (from Spinkhill Avenue to the south western boundary of Bowden Housteads Wood) falls within **Sheffield's Green Belt**, which is covered by several UDP policies, of which Policy GE2 is the most significant for the nature reserve:

'In the Green Belt, measures will be taken to: (a) maintain and enhance those areas with a generally high landscape value; and (b) improve poor landscapes in priority areas'.

The whole reserve forms part of a wider network of designated Green Links running towards Fairleigh in the south, Darnall in the north, Wybourn in the west and Woodhouse in the east. Sheffield's network of Green Corridors and Green Links is designated under the UDP, to protect and enhance its function in enabling the movement of people and wildlife through a pleasant green environment. Policy GE10, which deals with the Green Network, states (amongst other things) that:

'A Network of Green Corridors and Green Links will be: (a) protected from development which would detract from their mainly green and open character or which would cause serious ecological damage; and (b) enhanced by encouraging development which increases their value for wildlife and recreation'.

Several of the habitats and species found on the reserve are listed either as key habitats and priority species in the **UK Biodiversity Action Plan**, or as priority habitats and species in the **Sheffield Local Biodiversity Action Plan**. This places particular emphasis on conservation action intended to contribute to the sustainable management of these habitats and species.

Adjacent land ownership and use

Spring Wood is largely surrounded by housing and domestic gardens. It also has Spinkhill Avenue to the north, Fishponds Road to the south and Hastilar Road South, to the west.

The main part of Carbrook Ravine is bounded by housing, roads (Castlebeck Avenue, Spinkhill Avenue and the A57 Mosborough Parkway), playing fields and public open space. Bowden Housteads Wood lies immediately to the north of the site. Pipworth Recreation Ground lies immediately to the north west of the site. Recent housing has been constructed on the former site of Stradbroke College to the east.

Past, recent and present land use

During the mediaeval period, the Car Brook appears to have formed the south-eastern boundary of Sheffield Deer Park, the site of which is now covered by the housing developments of Park Hill, Norfolk Park, the Manor estate and Arbourthorne. The Park was originally a very extensive deer park dating to before 1281, covering some 2,500 acres (roughly 1000 ha) at its greatest extent, and was associated with the Lords of Sheffield. 1000 fallow deer (*Dama dama*) were present in the park in 1637 (Jones, M., 1993). The Car Brook also formed the Parliamentary and Municipal boundary, as well as the township boundary between Handsworth and Sheffield.

The Carbrook Ravine nature reserve falls into two distinct areas; Spring Wood, to the south and the Carbrook Ravine itself, to the north. The names given to each suggest some clue to their past management. Spring is an Old English word for a coppice wood, suggesting that there has been coppice management at some point in the wood's history. This is supported by the presence of old coppice stools in Spring Wood. The word Car is derived from Carr, which is an Old Norse woodland name that describes low lying woods bordering streams and rivers in which alders (*Alnus glutinosa*) and willows (*Salix* sp.) predominate (Jones, 1993). This is currently the predominant woodland type along much of Carbrook Ravine, and is likely to have been little changed since the brook was first named.

The available cartographic evidence suggests that both parts of the reserve were part of a 'Spring Wood', which ran along the valley of the Car Brook. It was physically separate from the mediaeval Bowden Housteads Wood and it is believed that the north edge of the reserve represents the southern boundary of that wood. The modern Spring Wood to the south of Spinkhill Avenue still retains the outline of what may have been an internal compartment of this larger Spring Wood, as recorded by Ed Dennison Archaeological Services in 2000 (see Figure 4).

The southern two thirds of the area have been shown as woodland, with the northern part as open ground, at least since a survey carried out in 1835. The survey area has remained much the same until the present day.

O.S. maps show that the surrounding area was entirely rural until the 1930s, when a large housing estate was built to the south-west. The construction of Spinkhill Avenue, as part of the Manor housing estate in the 1930s, divided Spring Wood from the northern section of Carbrook Ravine. More recently, increased housing capacity, with its associated hard surfacing and drainage works, has resulted in flooding and

pollution problems in the brook. To combat this, a storm water storage lagoon has been constructed at the northern end of the reserve, just outside its boundary.

There had been limited management work within the reserve in the last twenty years prior to 2000, apart from the mowing of the amenity grass areas along the edge of the reserve at Spinkhill and Castlebeck Avenues, and occasional tree safety works. The main path through Carbrook Ravine was surfaced during the 1980s.

Bowden Housteads Wood, which lies directly to the north of Carbrook Ravine, is a descendent of an ancient sessile oak (*Quercus petraea*) wood. It was used as a wood pasture in the fourteenth century. By the end of the sixteenth century, Bowden Housteads had become a coppice wood, until, by the middle of the nineteenth century, coppicing had declined, after which the wood was systematically planted and managed to a canopy wood or high forest. From this time, some plantation forestry was also practised, with coniferous species being planted as 'nurse' trees for the slower growing deciduous species. For example, oak (*Quercus sp.*), ash (*Fraxinus excelsior*), birch (*Betula sp.*), sycamore (*Acer pseudoplatanus*), sweet chestnut (*Castanea sativa*) and lime (*Tilia sp.*) were planted with larch (*Larix decidua*) as a nurse in the late nineteenth century. In the last thirty years, Bowden Housteads Wood has been divided into three parts by the construction of the Sheffield Parkway in 1970, and the Mosborough Parkway in 1990. Since the late 1980s, the wood has been managed to improve its value for wildlife, employing such techniques as irregular thinning and the creation of glades. None of this conservation management has taken place within the area of the Carbrook Ravine nature reserve.

In 2014 part of the former Stradbroke College site, immediately to the south-east of Compartment 5, underwent a change in management. Having previously been managed as grassland by SRWT, the land was put into Sheffield City Council's EWGS woodland creation scheme. The area was planted with native broadleaved tree whips as part of the city-wide Urban Nature Parks initiative.

Services and site access

Several Yorkshire Water combined and surface water sewers cross the site. One electricity cable enters the reserve by Danewood Avenue, but only extends a short distance. There are no gas pipes within the reserve and General Cable does not have any equipment there. There are no BT cables within the site (see Figure 5). The services for the meadows have not been investigated. It is suspected that old drainage systems occur in the reserve but are not included in current services maps. Any digging work requires a services check and a ground scan.

A storm water storage facility (which is intended to buffer surface drainage entering the Brook from nearby housing and prevent flash-flooding downstream) has been constructed at the northern end of the site (by Pipworth Recreation Ground), immediately downstream of the reserve boundary.

If excavation works or similar ground-disturbing works are to take place, the original utilities maps must be referred to as well as on-the-ground checks.

Access protocols

The site has vehicular access (keyed padlock) through the end of Spinkhill Avenue, which is shared with Sheffield City Council; on Castlebeck Avenue, however this gate is not accessible at the moment as a boulder is blocking access. This is the response to vandalism that left the gate unlockable; and on Spinkhill Avenue to access Spring Wood.

Pedestrian access is comprehensive across the nature reserve, with connections to all roads and surrounding green spaces. In response to antisocial behaviour, all entrances have a motorbike barrier to restrict unauthorised access. A more detailed description of pedestrian access can be found in the section below 2.2 Infrastructure.

2.2 Infrastructure

Footpaths, bridleways and trackways

The extensive path network includes **Public Rights of Way** and numerous desire lines (some of which are surfaced). In previous management plans, substantial improvements to the paths took place and they are accessible throughout the year. Vegetation is managed to ensure open 'rides' along paths which benefit users who enjoy better views and also create an improved habitat for bats.

The Sustrans National Cycle Route runs along the north of the main part of the site. Sheffield and Rotherham Wildlife Trust does not take responsibility for the route.

Numerous footpaths (both informal and Public Rights of Way) cross the site (see Figure 6). Access is limited on much of the reserve for people with restricted mobility and pushchairs due to the rough nature of some of the routes. However, the main path leading from the entrance off Danewood Avenue and the main route through Spring Wood were both resurfaced in 2014. The steps at Spring Wood leading up to the enclosed grassland, have deteriorated and would benefit from replacement.

Access furniture

Two metal benches were installed on the reserve in 2015, in Compartments 3 and 4, to increase ease of access by elderly people and other users of the reserve who require frequent resting points, or simply to enjoy time in nature (see Figure 7). They were sensitively installed away from housing (where potential conflicts could occur between households and people using the bench as a meeting point) and taken into consideration the excellent views across the reserve.

Three wooden notice boards were installed at entrances to the reserve in 2015, although one was removed shortly afterwards due to repeated vandalism.

The reserve has several steps and they are monitored and replaced when funding allows. Crossing points on the reserve are in good condition, but monitoring is required as increase in rainwater levels could promote bank erosion, making them unsafe.

Waymarker signs, gates, A-frames and stiles are all made of metal to withstand vandalism. It is expected that they will not require replacement during the length of this management plan, but monitoring during reserve patrols will highlight if required.

Interpretation Structures

There are two new wooden SRWT noticeboard-type signs at entrances to the reserve on Danewood Avenue and Castlebeck Avenue. A third sign at Spinkhill Avenue entrance was removed following repeated vandalism.

A stainless steel interpretive panel and decorative fencing are installed at Fishponds Road entrance. There is a sculptural gate at the main entrance off Castlebeck Avenue. In 2021, at the junction of Castlebeck Avenue and Spinkhill Avenue, decorative fencing was installed on Castlebeck Avenue and a green mesh fencing on Spinkhill Avenue (see Figure 7).

People who currently use the site might benefit from the provision of further interpretation about the ecology, history and archaeology of the area. However, given the vandalism suffered by previous attempts at on-site interpretation, printed leaflets or metal signage might provide a better option.

Boundaries and fencing

The majority of the reserve boundary is marked by a number of short individual boundaries (most of which are fences, some associated with a privet or similar hedge), each associated with a separate garden plot neighbouring the reserve. Some of these boundaries are in better condition than others, and some are in a dilapidated state. The properties to the west of Spring Wood have almost all had new metal fencing erected along the reserve boundary.

The boundary to the northeast is marked by a hedge that runs along the top of a grass bank running parallel to, and above, the Mosborough Parkway. This is in good condition, as it is continuous with no gaps and serves to screen people walking on the path from the highway. Bowden Housteads Wood and Pipworth Recreation ground are immediately adjacent to the reserve's northern boundary, although there are no physical structures marking this boundary. A tarmac path marks the boundary to the east of the reserve, adjacent to the former Stradbroke College recreation fields, which is maintained by Sheffield City Council.

A hawthorn hedge marks the boundary to the east of the reserve, between the reserve and the former Stradbroke College recreation fields. The easternmost part of this hedge was laid in 2015, but the remainder is mature/over-mature and some of the older hedge trees are declining. The unmanaged section of the hedgerow would benefit from restoration. Post and rail fences have been erected at the south end of the reserve, at the top of Spring Wood, and along part of the western boundary, adjacent to Castlebeck Avenue.

The pavements running alongside Castlebeck Avenue and Spinkhill Avenue form the boundaries to the west and south. These are made more secure by the wooden barriers, and the presence of large boulders. A significant slope from Spinkhill Avenue into the reserve also restricts access by vehicles, which was secured with green mesh fencing.

The main entrance of the site at Castlebeck Avenue has benefited from the addition of an interpretive gate, though a boulder obscures it partially as the gate was often vandalised and opened, allowing access for unauthorised vehicles. This management plan suggests the re-situation of the boulder in front of the gate to the right of the gate to prevent vehicles from accessing through a small gap and the welding back into place of the gate.

Improvements have been made to the reserve boundaries with boulders, A-frame access points, gallow gates and knee rails to prevent access by cars. Developers of the former Stradbroke College site have also installed A-frames and other anti-motorbike access points at the reserve's boundaries.

There is no need for any boundary structure to be erected between Carbrook Ravine and Bowden Housteads Wood to the north, as the two parcels of land form one continuous unit.

The open boundary with Pipworth Recreation Ground to the north-west and the Richmond Heights open space to the north-east presents more of a management issue, as it allows more points of access for off-road vehicles in land not managed by SRWT. We are working together with Sheffield City Council to minimise motorbike entry points.

2.3 Site safety, security and maintenance

Site safety

A site specific risk assessment has been written for the Carbrook Ravine 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 and procedures covering environmental management and health & safety. These are amended and updated at regular intervals or to reflect legislative changes.

The reserve is regularly patrolled by SRWT staff and volunteers, a minimum of every 4 weeks. Any litter, fly-tipping and graffiti are removed, and other problems are logged and addressed as soon as possible. Problems and incidents reported by members of the public are also logged and dealt with as necessary. Any known accidents or incidents that occur on the reserve are recorded on the relevant accident forms at SRWT headquarters.

Tree inspections for the entire site are carried out by in-house staff every two years, with a full QTRA survey undertaken at six-year intervals. In addition, ash dieback monitoring is carried out on a yearly basis. Associated remedial work is undertaken as recommended.

Site security

Carbrook Ravine suffers from elevated numbers of antisocial behaviour incidents, including theft of power tools during work days, vehicle break-ins and occasional remains of burn out motor bikes are found on-site.

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.

Littering and fire-lighting with associated littering can be a problem, in particular in Spring Wood (Compartment 1). Waste is cleared regularly when reported. To combat this problem, the relevant Council officer is kept informed of any significant fly-tipping incidents, signage is maintained at entrances, and the Council officer is encouraged to write to local residents as and when upsurges in fly-tipping occur.

2.4 Community

Community profile

Carbrook Ravine nature reserve is situated in the Sheffield City wards of Manor Castle and Richmond. The border line for the boundaries of the wards goes straight through Carbrook Ravine. The following information is drawn from the 2021 National Census (sheffield.localinsight.org). The total population of Manor Castle is 22,706 and Richmond ward is 18,792.

The **table 1** below shows Census Data for both, Manor Castle and Richmond wards and it compares it to Sheffield's average.

	Manor Castle	Richmond	Sheffield's average
% of population aged 65 and above	11.78%	21.47%	17.04%
% of population aged under 16	21.43%	17.89%	18.02%
Community Needs Index*	84.92	166.57	92.80

*Measures of deprivation focus on the "presence of bad stuff". The Community Needs Index was created to focus on the "absence of good stuff". A higher score on the Community Needs Index indicates that an area has higher levels of community need.

The Community Needs Index covers 3 domains:

- Civic Assets: the presence of key community, civic, educational, and cultural assets
- Connectedness: assesses the connectivity to essential services, digital infrastructure, isolation, and the strength of the local job market
- Active and Engaged Community: levels of third-sector civic and community activity and barriers to participation and engagement

The data on table 1 shows that Richmond ward has an extremely high Community Need Index compared to Sheffield's average.

Community services

Local schools in the area include Pipworth Community Primary School, St Theresa's Catholic VA Primary School, Norfolk Park School, Sheffield Park Academy, Woodthorpe Primary School and Sunshine pre school.

There are a number of youth community groups and forums active within the area around Carbrook Ravine nature reserve. Significant ones include Community Youth Teams, the Manor and Castle Development Trust and Manor Assembly, MASKK (Manor After School Kids Klub), Sheffield Manor Parish, Manor Church and Community Project.

Green Estate Company is a social enterprise based nearby Carbrook Ravine which has transformed and manages Manor Fields Park and has restored heritage buildings such as Manor Lodge and its grounds. They offer support to a collective of community enterprises and run family and educational sessions around Manor Lodge and Manor Fields.

There are local litter picking groups including Manor Knights and the Sheffield Litter Pickers who litter pick the surrounding area.

Educational Resource: Carbrook Ravine has the potential to play host to a wide range of environmental and educational activities, due to its relatively large size and variety of different habitats.

The widely recognised benefits of using natural green spaces as "outdoor classrooms" may be of particular benefit to some of the local schools which are walkable distance away. Sessions could also be developed that allow pupils to compare the surrounding areas of amenity grassland to the more diverse habitats in the reserve.

The main barriers to the widespread use of Carbrook Ravine as a formal and informal educational resource may be the lack of facilities and there is still the physical deterrent posed by the large scale of rubbish tipping on the site at certain spots. It will be important to support teachers and encourage them to use open spaces. This should enable them to develop the skills and confidence needed to use sites (including Carbrook Ravine) independently.

Community engagement

SRWT recognises the importance of community involvement in the Carbrook Ravine nature reserve in both the formulation of the management plan and in its delivery. Active participation is encouraged through events such as guided walks and regular volunteer work days on-site.

Other means of engagement with the community are the volunteer eco-monitoring teams that form part of the site monitoring programme and the reserve mailing list used to inform of any updates or important work carried out in the reserves. A volunteer ranger programme will be developed at the beginning of this management plan.

SRWT events in Carbrook Ravine are advertised in several locations. Temporary posters are put up at reserve entrances and are also published in the Wildlife Trust e-newsletter and on the Trust's website, Facebook page and/or other social media accounts.

Unfortunately fly tipping is a huge problem at this site, which was highlighted by the majority of people in the visitor survey as the number one concern for this site. In addition, fly tipping is a major deterrent to the educational use of Carbrook Ravine, mainly affecting the events aimed at the younger generations. Nonetheless, events such as wildflower guided walks are organised at this site.

2.5 Recreation

The site is used by local people on foot as a cut through, for dog walking and for well-being purposes. There is also occasional use on mountain bikes and motorbikes. A section of the Trans Pennine Trail runs along the north-eastern boundary of the reserve. Motorbike use is a particular problem in Compartments 4 and 5, where the sloping terrain is favoured. Anti-social activities such as the setting of fires and felling of trees are also serious problems on the reserve. SRWT staff encourage complainants to log their concerns with the Police on the 101 non-urgent phone number.

Based on the results of the visitor survey in 2023, nearly half of the people questioned spend less than half an hour in the reserve, and a quarter spend one to two hours at Carbrook Ravine. This would be consistent with the staff observation data that suggest that the reserve is being used as a cut through or as a dog walking site.

2.6 Economic context

Funding schemes, income and grants

Carbrook Ravine is primarily funded through receipt of a Higher Level Stewardship (HLS) grant which brings in annual payments in return for the environmentally

sustainable management of the hay meadows, including the maintenance of successional areas and scrub; restoration of species-rich, semi-natural grassland and the restoration and maintenance of grassland for target features.

Additionally, grants from the Landfill Tax scheme, Lotteries, Charitable Trusts and private institutions are applied for to fund management and improvement works.

Membership recruitment

Carbrook Ravine nature reserve is mostly surrounded by housing estates. This site provides a connection to nature, which after the lockdowns of the Covid-19 pandemic, has become an essential need for many people to maintain mental and physical well-being. Carbrook Ravine has the potential to raise the Trust's profile and to showcase its work in the local area and to its members.

Employment and training

The reserve currently provides part-employment to five people directly through the Trust and also contributes indirectly to others e.g. forestry contractors, local suppliers. The capacity to increase employment opportunities is not great, rather the challenge will be to sustain the current level of activity as the number of people employed depends directly on the revenue available to carry out work on-site.

Additionally, the woods and meadows provide a variety of opportunities for skills development, in terms of practical conservation techniques, habitat management, ecological identification and forest management and the Trust's practical conservation work teams, which include trainees and volunteers, work regularly in the area.

Communication and training

At the current time, welcome signage, in the form of the Trust's standard wooden and metal 'Welcome to Carbrook Ravine' sign, are present at three of the entrances to the site. Minor entrances are marked with small welcome signs showing the Trust logo and contact details or not marked, with the intention to have all entrances marked by the end of this management plan.

A webpage about the reserve is present on the Trust's website giving general information about the reserve.

www.wildsheffield.com/reserves/carbrook-ravine

2.7 Environmental information

Topography

Carbrook Ravine is a small but fairly steep-sided valley, sloping from 130 metres above ordnance datum at the highest point (immediately above the former Stradbroke College housing development), to 95 metres above ordnance datum at the lowest point (at the point where the Car Brook crosses the northern reserve boundary).

Geology and pedology

The underlying geology of the wider area consists of the Westphalian B Series (Middle Coal Measures), part of the Silesian (Upper Carboniferous) period. This series comprises successive layers of sandstone, coal seams and intermediate rocks such as shale, siltstones and mudstones. The strata through the area dips towards the northeast at an angle of between 5 and 10 degrees. The geology is overlain by brown earth and acid brown earth soils.

Hydrology

The main watercourse through the site is the Car Brook, which flows in a northerly direction (see Figure 8). The inundation of ground adjacent to the stream, resulting in significant areas of wet woodland, is a significant feature of the site.

Evidence of oil pollution in the stream has been noted in the past, possibly from the surrounding highways. The Environment Agency had advised that the water quality of the Car Brook was being adversely affected by several combined sewer outflows. The storm water storage facility on the Car Brook at the northern end of the reserve is intended to help address this. In recent years, although water testing has not been carried out, the water looks clear, suggesting the oil pollution has been addressed.

Climate

Data is available for the thirty-year average (1991-2020) from www.metoffice.gov.uk/research/climate/maps-and-data/uk-climate-averages

Location	Average temperature (°C)		Mean Annual Rainfall (mm)	Mean Annual Sunshine (hours)	Mean monthly wind speed at 10m (knots)
	Max	Min			
Average data (1991-2020)	13.71	6.92	831.55	1485.15	6.89
Variation to average data (1981-2010)	+0.31	+0.29	-3.04	+40.21	+0.6

Table 2. Local climate table at Sheffield Station (131m above mean sea level)

2.8 Biodiversity

UK Biodiversity Framework / Biodiversity Action Plan (BAP)

The wooded areas of Carbrook Ravine (the main habitat) are dense, often impenetrable, mixed deciduous woodland, and consist of three different NVC communities– oak dominated (W10), crack willow dominated (W6b) and ash dominated (W8). There is a wide range of species found in the canopy throughout all the woodland types, including oak, ash, sycamore, lime, birch and beech (*Fagus sylvatica*). Hawthorn (*Crataegus monogyna*), hazel (*Corylus avellana*), oak, blackthorn (*Prunus spinosa*) and birch are found in the shrub layer. The woodland links into a mosaic of other habitats, including large areas of semi-improved neutral grassland, dry acid grassland, modified grassland (near to the reserve edges), tall ruderal vegetation (mostly in the wet soil at the stream edge), heather dominated patch, areas of dense bramble (*Rubus fruticosus agg.*) and bracken (*Pteridium aquilinum*), scrub and hedgerows, each of which individually supports its own community of plants, animals and fungi, and which together represent a very valuable natural heritage resource. Further detailed information is available in Section 2.9 - Habitats and 2.10 - Species.

Several of the habitats and species found in the reserve are of national or local significance, being listed as conservation priorities in either the UK Biodiversity Action Plan or the Sheffield Local Biodiversity Action Plan (LBAP). These action plans are now replaced with the UK Biodiversity Framework, but the habitat and species importance remains unchanged, as shown in section 41 of the Natural Environment and Rural Communities (NERC) Act.

Table 3a. Biodiversity Action Plan (BAP) and section 41 Priority habitats and species at Carbrook Ravine

UK BAP Priorities (Short and Medium List only)	
<i>Habitats</i>	Wet woodland Lowland heath Lowland dry acid grassland Neutral grassland Deciduous woodland Hedgerows
<i>Species</i>	skylark (<i>Alaudia arvensis</i>) song thrush (<i>Turdus philomelos</i>) bullfinch (<i>Pyrrhula pyrrhula</i>) hedgehog (<i>Erinaceus europaeus</i>)
Sheffield BAP priorities	
<i>Habitats</i>	Grassland Woodland Heathland Wetland

Table 3b. Species listed on Schedules 1, 5 & 8 of the Wildlife & Countryside Act 1981 (as amended), which are present at Carbrook Ravine nature reserve.

Carbrook Ravine	
Mammals	Pipistrelle bat.
Flora	Bluebells

Of the 85 invertebrate species recorded at Carbrook Ravine in Sorby records, 18 are Local or Notable/Nb. A third of the hoverfly species recorded are rare, or have restricted distributions. Four of the species of *Hymenoptera* (ants, bees and wasps) recorded are of Local status.

2.9 Habitats

There are several habitats within Carbrook Ravine, which can be categorised into the following broad types: wet woodland; semi-natural deciduous woodland; scrub; neutral unimproved grassland; modified grassland; acid grassland/heathland mosaic; tall ruderal vegetation and hedges. Figure 3 illustrates the habitats mapped in the Phase One Habitat Survey of 2010.

Woodlands

Wet Woodland

The woodland along the brook in the main ravine and in parts of Spring Wood is broad-leaved semi-natural woodland dominated by crack willow (*Salix fragilis*) and alder (*Alnus glutinosa*). The shrub layer has frequent sycamore (*Acer pseudoplatanus*), hazel (*Corylus avellana*), with occasional grey willow (*Salix cinerea*), hawthorn (*Crataegus monogyna*), elder (*Sambucus nigra*), elm (*Ulmus* sp.), wych elm (*Ulmus glabra*) and oak (*Quercus* sp.) saplings. The canopy is closed, casting a dense shade, and the soil is damp because of the stream. The ground flora includes bluebells (*Hyacinthoides non-scriptus*), a species protected by the Wildlife and Countryside Act 1981, with other woodland species such as enchanter's-nightshade (*Circaea lutetiana*), celandine (*Ranunculus ficaria*), common valerian (*Valeriana officinalis*), and remote sedge (*Carex remota*). Growing in this damp habitat there is also some yellow pimpernel (*Lysimachia nemorum*), common figwort (*Scrophularia nodosa*), broad buckler fern (*Dryopteris dilatata*) and royal fern (*Osmunda regalis*). Where the canopy is dense, the ground cover is dominated by brambles and ivy (*Hedera helix*). Nettles (*Urtica dioica*) become abundant in places near the stream, indicating areas of increased nutrient enrichment.

A small area of acidic *Sphagnum* bog, reported briefly (with no accompanying species list) by Roger Shaw, in a survey of the reserve in 1992, was at the time reported to be in danger of drying out. Subsequently, no sign of acid bog vegetation was found in surveys undertaken by Milego & Hobson in 1996, or the Sheffield Wildlife Trust in both 1998 and 2001. However, following a visit to the reserve in 2001, Jean Glasscock of the City Ecology Unit reported that there were still a few *Sphagnum* mounds present.

There is developing willow scrub on one of the terraces to the east of the restoration meadow. This is developing naturally and is managed as scrub.

Semi-natural deciduous woodland

Up the banks of the ravine on the drier soils, the woodland canopy is dominated by sessile oak (*Quercus petraea*) and ash (*Fraxinus excelsior*), with occasional birch (*Betula pendula*), and lime (*Tilia* sp.). The understorey contains frequent hazel, oak and blackthorn. The ground flora consists of large areas of bluebells, and abundant creeping soft grass (*Holcus mollis*) and bramble, with frequent bracken.

A small area to the north west of the site has an even more mixed, species rich canopy, with dense ash, field maple (*Acer campestre*), aspen (*Populus tremula*), sycamore (*Acer pseudoplatanus*) and hazel (*Corylus avellana*). Other woody species include oak, birch, hawthorn, guelder rose (*Viburnum opulus*), elder and some impenetrable blackthorn. The ground flora is species poor, with an abundance of cow parsley (*Anthriscus sylvestris*) and bramble.

On the eastern edge of the site, adjacent to the Mosborough Parkway, there is an area of planted woodland, the edge of which forms the boundary to the reserve. This is made up of hawthorn, elder, blackthorn and a variety of other small trees and shrubs.

Scrub

There are several areas of dense bramble scrub with a ground flora of stinging nettle, creeping thistle (*Cirsium arvense*), couch (*Elymus repens*), goldenrod (*Solidago virgaurea*), tall fescue (*Festuca arundinacea*) and cleavers (*Galium aparine*).

Other areas have been planted in recent years, such as the bank to the west of the playing field at the former Stradbroke College, so the scrub is more diverse, containing hawthorn, guelder rose, hazel and willow and trees of oak, ash, sycamore and lime. Beneath this dense scrub are tussocks of cocksfoot (*Dactylis glomerata*), horseradish (*Amoracia rusticana*) and rosebay willowherb. In several places the shrubs become less dense, allowing tussocks of grass to dominate.

Grasslands

Neutral grassland

The reserve contains three areas of neutral grassland, all of which are managed as hay meadows under the HLS agreement. These meadows are located in the Compartments 3, 4 and 5, known as Scrubby Meadow, Hay Meadow and Restoration Meadow, respectively.

The areas of neutral grassland are dominated by a range of grasses including cocksfoot, false oat grass (*Arrhenatherum elatius*), couch, tall fescue, Yorkshire fog (*Holcus lanatus*), timothy (*Phleum pratense*) and tufted hair-grass (*Deschampsia cespitosa*).

The long-established Hay Meadow (Comp 4), located on a south-west facing slope, was enhanced with species-rich green hay from Carr House Meadows nature reserve

in the early 2000s. It supports a good diversity of wild flower species including yellow rattle (*Rhinanthus minor*), black knapweed (*Centaurea nigra*), meadow vetchling (*Lathyrus pratensis*), bird's-foot trefoil (*Lotus corniculatus*) and goatsbeard (*Tragopogon pratensis*). There is a small section near the cycle path where undesirable species such as brambles and rosebay willow herbs (*Chamerion angustifolium*) are spreading. Remedial work started in 2022 and it will be continued until restored.

Restoration Meadow was seeded with a native hay meadow mix in Spring 2015, comprising the following: oxeye daisy (*Leucanthemum vulgare*), lady's bedstraw (*Galium verum*), agrimony (*Agrimonia eupatoria*), black knapweed, salad burnet (*Sanguisorba minor*), common sorrel (*Rumex acetosa*), meadow buttercup (*Ranunculus acris*), common birdsfoot trefoil, meadow vetchling, red clover (*Trifolium pratense*), rough hawkbit (*Leontodon hispidus*), yarrow (*Achillea millefolium*), wild carrot (*Daucus carota*) and yellow rattle.

Scrubby Meadow is damper in character than the other two meadows, supporting species such as marsh thistle (*Cirsium palustre*) and wild angelica (*Angelica sylvestris*). Encroaching hawthorn and rose scrub were removed in 2015, but further scrub removal is required to prevent loss of grassland due to scrub encroachment from the western margin. Since 2021, this field has seen a rise in the number and the type of species of orchids. First, Common spotted orchid (*Dactylorhiza fuchsii*) started to increase in numbers, then Southern marsh orchid (*Dactylorhiza praetermissa*) appeared in large numbers. These two species tend to hybridise. Lastly, in 2023, one bee orchid (*Ophrys apifera*) was found near the cycle path, which was resurfaced early in the year. The ground disturbance created by the works is likely to be the source of his unique bloom.

A number of species recorded in previous surveys were not found in the 2010 survey, including dyer's greenweed (*Genista tinctoria*), lady's bedstraw, smooth stalked sedge (*Carex laevigata*), wood sedge (*Carex sylvatica*), heath grass and spiked sedge (*Carex spicata*).

Other neutral grassland (woodland glades)

These are the small areas of neutral grassland in the glades of Spring Wood (comp 1):

A small woodland glade supporting species-poor grassland. The main grasses are cocksfoot, meadow-grass sp., Yorkshire fog and red fescue. Herbs are limited to small amounts of broadleaved dock, ribwort plantain, ragwort, nettle, white clover and rosebay willowherb. One edge of the glade consists of blackthorn, bramble and bracken, which are spreading into the grassland. There has been some recent clearance work that has reduced the scrub encroachment.

An area of grassland at the southern edge of the woodland, adjacent to Fishponds Road. The grassland comprises Yorkshire fog, cocksfoot, perennial rye-grass, false oat-grass and meadow-grass sp. Meadow buttercup is frequent and other species include cranesbill sp., dandelion, clover sp. and small amounts of knapweed. Cow parsley is locally abundant in some parts of the compartment and there are large patches of nettle and cleavers close to Fishponds Road.

One area of Japanese knotweed (*Reynoutria japonica*) present near Fishponds Road in Spring Wood, and one area in Carbrook, near Castlebeck Avenue have received chemical control, but will need to be monitored, and further controlled over the period of this management plan.

Modified grassland

Modified grassland is adjacent to Spring Wood at Spinkhill Avenue/Hastilar Road. The majority of the grassland is regularly mown by the local authority and managed as a grass verge.

It is supporting abundant perennial rye-grass, dandelion and daisy, occasional white clover, creeping buttercup, ribwort plantain and common mouse-ear. A short section is left to grow taller and includes grass species such as cocksfoot, meadow foxtail and meadow-grass sp., with few herbs other than docks and nettle.

Acid grassland/heathland mosaic

A very small area of acid grassland/wet heathland mosaic occurs on the reserve, in the south-west of the Carbrook compartment (Comp 2). This habitat is under threat from encroachment by birch and willow scrub and bracken, and therefore encroaching vegetation should be cleared from the grassland on a regular basis. The cleared material can be useful for blocking off unwanted desire lines through the reserve.

In addition to the vegetation clearance and due to the loss of heather plants, a small heather spreading exercise is required to restore this habitat. The likely donor for the heather is Fox Hagg nature reserve.

The small area of acid grassland is dominated by wavy hair-grass (*Deschampsia flexuosa*), with some tormentil (*Potentilla erecta*) and common cat's-ear (*Hypochaeris radicata*). Acid grassland is associated with the wet heathland, containing heather (*Calluna vulgaris*) and bracken (*Pteridium aquilinum*).

In this mosaic of vegetation, and scattered across the site, we find other tall ruderal vegetation such as rosebay willow herb, brambles, nettles and creeping thistles. These species have a tendency to spread to other habitats, and although this should be monitored, tall ruderal vegetation it's beneficial to many species such as the peacock butterfly (*Aglais io*) or bullfinches.

Hedgerows

The site has two hedgerows, both of which are of local value to birds. One is a mature species-rich hedge containing elder, hawthorn and ash, located within the hay meadows. The other hedgerow is adjacent to the houses on Danewood Avenue, and originally it was a species-rich hedge containing rose, hazel, hawthorn, blackthorn, dogwood (*Cornus sanguinea*) and hedge bindweed (*Calystegia sepium*), but in recent years it has heavily been overgrown by scrub, mainly bramble. According to previous management plans, this hedge is privately owned and was never nor will be managed by the Trust.

The hedgerow on the southern boundary of Hay Meadow (Compartment 4) is in variable condition along its length. The easternmost section of the hedge was laid in 2015. The majority of the hedge is mature and unmanaged, and in parts it is declining as bramble proliferates and some of the older hedgerow trees deteriorate. It is proposed to restore the hedgerow during the period of this management plan.

2.10 Species

Fungi

The most recent fungal records for Carbrook Ravine were collected in the October 2015 survey (S.Clements). 77 species of fungi were recorded in this comprehensive report with a total of 160 individual fungi recorded. Among the species recorded were Honey Fungus (*Armillaria mellea*), Yellow Fieldcap (*Bolbitius titubans*), Butter Cap (*Collybia butyracea/Rhodocollybia*) and a range of Waxcaps including Scarlet Waxcap (*Hygrocybe coccinea*), Parrot Waxcap (*Hygrocybe psittacina*) and Snowy Waxcap (*Hygrocybe virginea*).

Overall, this survey found the site to be disappointing for fungi, identifying the high levels of disturbance and pollution from domestic waste as likely damaging issues. However, 9 species of wax cap fungi were recorded, which means that the reserve qualified at the time as of regional importance for this group.

It is worth noting that previous records of fungi found on the site were not present in the 2015 survey. The following fungi were found during the 2000 survey of the reserve and Bowden Housteads Wood, when 16 species were recorded: fly agaric (*Amanita muscaria*), penny bun (*Boletus edulis*) and common brown roll-rim (*Paxillus involutus*). Several species of russula fungi, including the black-purple russula (*Russula atropurea*), the fragile russula (*Russula fragilis*) and the yellow swamp russula (*Russula claroflava*) were also present.

During surveying in 2001, levels of deadwood, particularly in the brook were considered suitable, with examples of birch polypore (*Piptoporus betulinus*), hairy sterium (*Stereum hirsutum*) and blushing bracket (*Daedaleopsis confragosa*) being found.

Invertebrates

Carbrook Ravine is of importance for invertebrates because it supports such a variety of habitats and plant species. The vegetation structure is also important and the diversity presents a mosaic of closed and open habitats with a large amount of scrub and woodland edge that is suitable to a wide range of invertebrates. The Car Brook, willow carr, open tall ruderal herb areas, neutral grassland areas, hedgerows, bramble scrub, mixed deciduous woodland (where the canopy is not too dense) and the areas of inundation with reed mace and soft rush are all important habitats for invertebrates. The footpath provides edge habitat and bare ground in some places.

The data we hold comes from an invertebrate desktop study, interpreting the existing records from Sorby Natural History Society (Flanagan, 2001). Of the 85 species recorded, 18 are Local or Notable. The data set covers a number of invertebrate groups, although it is biased towards the Insecta. The existing records include 1 species of mollusc, 1 dragonfly species of Local status, 12 species of beetles, 9 species of butterflies, 31 species of hoverfly (9 of Local status and 1 Notable), 14 species of Hymenoptera (4 of Local status) and 3 species of spider (1 of Local status).

The hoverfly (*Syrphidae* family) fauna is of some interest; a third of the species recorded are rare, and one is a high-grade ancient woodland indicator. *Orthonerva brevicornis* is a Notable species, and is locally and nationally uncommon. It is a wetland specialist of fens and marshes, and has semi-aquatic larvae, which occur in muddy pools and wet decaying vegetation.

The crane fly (*Tipulidae* family) fauna present on the reserve are inhabitants of wetland habitats, including streams, wet woodlands and wet pasture. The limited beetle fauna is not so specialised. All the rove and ground beetles are widespread. The lacewings are typical of deciduous woodland.

There are a wide variety of bees and wasps, four of which have Local status. This variety might reflect recorder bias. The flowering plants, particularly hawthorn flowers, are a good source of pollen for *Andrena* bees. *Nomada* appear to be an important group as they are kleptoparasitic on *Andrena* bees. There are two Local status bee-killing flies present (*Conops quadrifasciatus* and *Sicus ferrugineus*).

The one local spider species is *Tegenaria agrestis* – a species found in low, open, vegetated areas.

A butterfly survey was carried out in the reserve, and a report subsequently produced in 2001. However, the weather conditions were poor, with the result that only two species were seen on the day in the main ravine: green-veined white (*Artogeia napi*) and comma (*Polygonia c-album*). No butterflies were seen in Spring Wood. The following butterflies seen on the invertebrate survey mentioned above: comma, red admiral (*Vanessa atalanta*), small tortoiseshell (*Aglais urticae*) and speckled wood (*Pararge aegeria*). Purple hairstreaks have been recorded in Smelter Wood just under a mile to the east of the reserve. They tend to inhabit the canopy of mature oak trees around sunny clearings – conditions which are found on the reserve – so it is possible that they may also be found on the reserve.

Fish, amphibian and reptiles

A species of stickleback (*Gasterosteidae* family) is the only fish recorded on the reserve.

Birds

A breeding bird survey was carried out in 2001. Twenty six species of birds were seen in the reserve. Of these, eleven species held territories: chiffchaff (*Phylloscopus collybita*), mistle thrush (*Turdus viscivorus*), greenfinch (*Carduelis chloris*), jay (*Garrulus glandarius*), blue tit (*Parus caeruleus*), great tit (*P. major*), wren (*Troglodytes troglodytes*), blackbird (*Turdus merula*), robin (*Erithacus rubecula*) and dunnock (*Prunella modularis*), there being forty-four territories in total. Blackbirds, robins and

wrens held over half the territories between them. Wrens were the most abundant species, both in terms of territories held (ten) and of numbers of birds seen or heard.

The following species were also recorded on the reserve in 2020, all of some conservation concern: skylark and song thrush are priority species in the UK BAP, and sparrowhawk, blue tit, great tit, chiffchaff, blackcap, dunnock, and wren are listed in the Sheffield BAP. Bullfinch, song thrush, starling, swift and skylark appear on the Red list and dunnock and whitethroat are on the Amber list in the RSPB publication 'Birds of Conservation Concern'.

Most of the birds seen are typical woodland and garden birds, such as great spotted woodpecker, although skylark is usually associated with moorland and heathland. This species was recorded in the open grassland in the north east of the site.

Mammals

Longworth trapping of small mammals was undertaken on the reserve in 2001. Twenty traps were set in an area of neutral grassland adjacent to the former Stradbroke College site, then visited approximately every 12 hours for five visits. The species recorded through trapping were: common shrew (*Sorex araneus*), bank vole (*Clethrionomys glareolus*) and wood mouse (*Apodemus sylvaticus*). Further small mammal trapping was undertaken in 2007, and resulted in high trapping rates.

Hedgehog, brown rat (*Rattus norvegicus*), grey squirrel (*Sciurus carolinensis*) and fox (*Vulpes vulpes*) have all been recorded on the reserve.

Bats

Pipistrelle bats (common and soprano) have been recorded around the reserve, although no comprehensive survey of potential and/or actual roost sites has been undertaken. Wetlands and wildflower-rich areas supporting abundant populations of flying invertebrates will be an important source of food, while trees with cracks and rot-holes, and possibly local housing provide roost sites.

Ten bat boxes were installed in the Carbrook compartment (Comp 2) in 2014 and during the 2022 tree safety work, bat-specific holes were created on some trees.

Surveying and monitoring

Author	Date	Survey	Summary of surveys at Carbrook Ravine & Spring Wood
Roger Shaw	1992	Ecological Survey	Inner City Habitat Survey Phase II. An ecological assessment of the site. The majority of the site is willow carr; the small acidic bog has contracted through drying out in recent years. Extension of the site northwards is proposed to enhance its biodiversity value.

Author	Date	Survey	Summary of surveys at Carbrook Ravine & Spring Wood
Author unknown	1998	Ecological Survey	A detailed phase 2 survey into the ecological value of the site. The wetland areas in the south are particularly important, especially as wetlands are rare in the Manor Castle area.
Matty Levan	2001	Summary of existing records	Various maps and species lists of the site and surrounding areas from 1996.
Page	2000	Ecological survey	An ecological survey of Bowden Housteads Wood and Carbrook Ravine.
Sheffield City Museums	unknown	Ecological Survey	Examination of the site was based on a request for information about the present ecological interest of the site with suggestions as to how areas of high ecological value should be improved or protected. A site map was formulated to distinguish the various existing habitat types. Only 1 section ('Area G') was in need of protection, as the most vulnerable habitat on the site.
Henna Tanskanen	2001	Visitor Survey Report	The aim was to find out who uses the reserve, for what purpose, where they come from and how they would like to see the reserve managed for use with the management plan. Most visitors use Carbrook Ravine for short walks either around or as a shortcut through the reserve. The main threats are the danger of motorcyclists and litter.
Ed Dennison Archaeological Services	2001	Archaeological Desk-Top Survey	The survey was required to gather sufficient information to identify the extent, nature, character, condition and quality and probable date of any archaeological and historic features within the survey area. Only 4 archaeological sites were recorded within the survey area, with a further 8 sites lying within a 500m wide buffer zone.
Belinda Wiggs & Susan Shorter	2001	Phase 1 Habitat Survey	Detailed description of habitats in compartments, habitats map and species list. The mosaic of habitats present include, wet willow carr woodland, broad leaved semi natural woodland, scrub, bracken, unimproved neutral grassland, small areas of acid grassland and areas of tall ruderal herbs. The site is important for its location, providing a large area of species rich green space in a densely residential area.
Jim Flanagan	2001	Invertebrate survey	A list of 20 species found on 3rd October.
Sorby Natural History Society	2001	Desk-top invertebrate survey	A summary and assessment of all Sorby invertebrate records. There are 85 species, including 18 that are Local or Notable/Nb. The wide diversity of habitats on-site encourages a high number of different species.

Author	Date	Survey	Summary of surveys at Carbrook Ravine & Spring Wood
Matt Shaw	2001	Small Mammal survey	Methodology & map. Bank voles, common shrews and wood mice caught in Longworth traps.
Susan Shorter & Thomas Simcock	2001	Bird survey	Maps and species lists. 24 species present during 10 visits during the spring, 11 species holding territories. Songthrush, bullfinch and skylark were seen, these are on the RSPB red list in the "Birds of Conservation Concern."
Michael Senkans	2001	Fungi survey	About 20 species of fungi were found. The site has potential as a good site for fungi as there is a lot of dead wood adjacent to the stream. Future surveys recommended.
Liz Giles	2003	Bat Survey	Bat survey using bat detectors carried out over 3 nights in August and September. 2 types of pipistrelle bat were seen. The most frequently used flight paths correlated with the woodland along the stream.
Liz Giles & Ceiri Osman	2004	Water Vole survey	Some burrows were found, but with a lack of any other evidence it was difficult to say whether these were water voles or brown rat burrows. The lack of other evidence suggests that there may not be any water voles. This may be due to the lack of grasses on the bank side, as water voles require grasses on the bank for food and cover.
Anderson Tree Care	2004	Tree safety survey	Recommendations for removal of trees and limbs outlined.
Ruth Snelson	2007	Small mammal survey	Of reserve 'extension' only
Steven Sylvester	2007	Phase 1 survey	Of reserve 'extension' only
Alistair Campbell	2010	Phase 1 Survey throughout site	Detailed description of habitats in compartments, habitats map and species list.
Matthew Duffy	2011	Visitor survey	To gather information on the people that use Carbrook Ravine and why they visit the area as well as their opinions on how they think the site can be improved or managed differently.
Belinda Wiggs	2011	Ecological Survey	Species lists for all plants were recorded across 7 compartments of the reserve and habitat maps compiled using this data.
Steve Clements	2015	Fungi report	77 species identified. The report highlights the abundance of rubbish on the site as a possible cause of pollution causing detrimental effects to fungi growth. It also comments on the grass length, noting that it is a little too long for waxcaps

Author	Date	Survey	Summary of surveys at Carbrook Ravine & Spring Wood
Various	2018 onwards	Nature Counts	Online sightings and recording system that feeds into NBN database - open to all for data input
SRWT	2021 onwards	Ecological Monitoring Programme	Ecological Monitoring Programme aims to generate regular surveys (every 3 years) of the hay meadows to monitor the ecological condition
Hannah Wittram	2023	Visitor Survey	To gather information on the people that use Carbrook Ravine and why they visit the area as well as their opinions on how they think the site can be improved or managed differently.

2.11 Site archaeology

The majority of the reserve is shown as woodland on the 1855 Ordnance Survey map of the area. There are no records of any significant archaeological features within Carbrook Ravine. Apart from the mediaeval deer park boundary, which roughly follows the Car Brook (on the west side), there may have been a flood mill in the north of the site, dating back to the eighteenth century, to the east of the brook. These are detailed in a preliminary walk-over survey by Ed Dennison in 2001. Alternatively, this site may represent former iron or coal workings. There is a bridge across the Car Brook in the north of the site, which was shown as being stepping stones on the OS 1855 six inch map, but had become a footbridge by the OS 1890 25 inch map. There was formerly a terrace of houses in the north west of the site fronting onto the junction of Danewood Avenue and Castlebeck Avenue, which was shown on the OS 1924 six inch map and formed part of the Manor Estate, which was subsequently demolished.

3. Reserve vision and features of interest

3.1 Vision statement

Our vision for Carbrook Ravine by 2070 is:

Carbrook Ravine offers access to the countryside whilst located in an urban-dominated environment. The nature reserve is welcoming and clean, providing a peaceful and safe place for local people to enjoy, improving their physical and mental health.

The site has a range of habitats, including ancient semi-natural woodland, hedgerow, wetland and meadow. These meadows are traditionally managed, and boast a diverse array of wildflowers and invertebrates.

The site holds a small but diverse population of birds, including skylark and song thrush, with populations of small mammals providing food for the local owl and sparrowhawk populations.

Well-behaved dogs are welcome on the nature reserve; with responsible dog owners keeping them under control, picking up after them and removing their waste from site.

Consultation

3.2 Feature 1: Species-rich grasslands

Objective: 5.6ha of unimproved neutral grassland in good condition

Attributes of species-rich grassland

Attributes are the characteristics, qualities or properties of a feature which are inherent to, and inseparable from, the feature. Indicators of the general condition of the feature. (*Management Planning for Nature Conservation. Mike Alexander*)

Attribute	Performance Indicator	Monitoring
Species composition	<p>Neutral grassland (meadows): At least 2 positive indicators (see table 4a) occurring frequently (occurring in at least 40-60% of 50x50m grids)</p> <p>Neutral grassland (meadows): At least 2 additional positive indicators (see table 4a) occurring occasionally (occurring in 20-40% of 50x50m grids)</p> <p>Neutral grassland (meadows): Negative indicators (see table 4b) should not occur more than occasionally (occurring in <20-40% of 50x50m grids)</p> <p>A diverse grassland bird community is recorded</p> <p>Invasive/encroaching species controlled</p> <p>A diverse neutral grassland (woodland glade) is recorded</p> <p>Acid grassland/heathland mosaic retained</p>	<p>Meadow condition assessment</p> <p>Wildlife records</p> <p>Casual observation</p>
Vegetation structure	<p>Bare ground should occur no more than rarely</p> <p>Sward height should be between 5-10 cm in November</p>	Meadow condition assessment

Table 4a. Positive indicators	Table 4b. Negative indicators
<p><i>Ajuga reptans</i></p> <p><i>Alchemilla mollis</i></p> <p><i>Centaurea nigra</i></p> <p><i>Conopodium majus</i></p> <p><i>Dactylorhiza praetermissa</i></p> <p><i>Dactylorhiza fuchsii</i></p> <p><i>Galium verum</i></p> <p><i>Lathyrus pratensis</i></p> <p><i>Lathyrus linifolius</i></p> <p><i>Leucanthemum vulgare</i></p> <p><i>Lotus corniculatus</i></p> <p><i>Lotus pedunculatus</i></p> <p><i>Silene flos-cuculi</i></p> <p><i>Oenathe crocata</i></p> <p><i>Potentilla erecta</i></p> <p><i>Rhinanthus minor</i></p> <p><i>Stachys officinalis</i></p> <p><i>Succisa pratensis</i></p>	<p><i>Cirsium arvense</i></p> <p><i>Cirsium vulgare</i></p> <p><i>Jacobaea vulgaris</i></p> <p><i>Rumex crispus</i></p> <p><i>Rumex obtusifolius</i></p> <p><i>Urtica dioica</i></p>

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. (*Management Planning for Nature Conservation. Mike Alexander*)

Factor	Rationale	Management required (yes/no/monitor)	Technical Indicator of Control	Monitoring
Invasive species	<p>Brambles are present in the grassland, in particular along the field edges. Common ragwort is also present. Years of uprooting management has rendered it sparse and scattered</p> <p>Unmanaged, these species will displace the species-rich grassland. Hay meadows require ragwort free crops for livestock safety</p>	Yes	Populations of these species remain sparse and scattered across the grassland area.	<p>Casual observation</p> <p>Meadow condition assessment</p>
Shading	Many of the flowering species found in the grasslands are shade intolerant and will be lost if a canopy is allowed to develop. The formation of a canopy will also lead to soil enrichment which again will lead to the loss of these species through competition with shade-tolerant, vigorous bracken and bramble	Yes	5.6ha of open grasslands	Casual observation
Cutting & grazing regime	<p>Vegetation sward at the end of the growing season is to be kept short to minimise the amount of nutrients coming back into the soil</p> <p>Grazing is not practicable on this urban site Cutting with machinery is affected by wet ground conditions and historic vandalism to hay windrows</p>	Yes	Vegetation sward is between 5 - 10 cm in November	<p>Casual observation</p> <p>Meadow condition & sward height assessment</p>
Climate change	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 an increase in climatic variability, with extremes in temperature, wind speed and rainfall becoming more common. Plants that are sensitive to humidity levels would be adversely affected by periods of drought or under water conditions	No, Monitor	N/A	Casual observation

Evaluation

The reserve's neutral grasslands are managed as 3 hay meadows. They are compartments 3 (Scrubby Meadow), 4 (Hay Meadow) and 5 (Restoration Meadow).

The long-established Hay Meadow (Comp 4), located on a south-west facing slope, was enhanced with species-rich green hay in the early 2000s and a small area has undergone restoration since 2022 due to the spread of undesirable species. The meadow supports a good diversity of wild flower species including yellow rattle, common knapweed and meadow vetchling. In 2015, a proportion of Compartment 4 (Hay Meadow) was cut for green hay to be used for a restoration project at Tinsley and in 2023, a small proportion of this field was used to increase species diversity in a restoration project at Canklow and to improve poorer areas within the field.

The results of the meadow condition assessments (undertaken in 2021 and 2023) show that this meadow has met and exceeded the target for frequently occurring positive indicator species, although four negative indicator species occurred more than occasionally: common ragwort, creeping thistle, curled and broad-leaved dock. Bare ground has increased between 2021 and 2023 due to footpaths being widened, increase in illegal motorbike use that greatly disturbs the ground and a general increase in ground wetness that exacerbates the damage caused to the ground.

Restoration Meadow (Comp 5) was seeded with a native hay meadow mix in Spring 2015. The results of the meadow condition assessments show that positive species richness in this meadow has increased in some survey squares between 2021 and 2023. As with compartment 4, the same four negative indicator species occurred more than occasionally in this meadow, and bare ground has increased.

This meadow is regularly used by reserve visitors. Although only one right of way (footpath) crosses the meadow diagonally, it is noted that several desire lines exist in this meadow, increasing the bare ground in the compartment. An increase in bramble cover has been identified on the edges of the field.

It has also been noted that an underground land drain has failed and water is pooling in this field (see Figure 8), expecting an increase of the amount of bare ground as many of the wildflowers do not thrive under such wet conditions. However, this wetter ground brings an exciting opportunity for the development of new species in the nature reserve. Further investigation is required, and if favourable, this area will be turned into a permanent, shallow wildlife pond with the added benefit of becoming a **flood storage area**.

Scrubby Meadow (Comp 3) is damper in character than the other two meadows, supporting species such as marsh thistle and wild angelica. Since 2021, there has been a surge in the number and extent of orchids in this compartment.

The results of the meadow condition assessments show that this compartment has a similar trend as the other compartments for positive indicator species, but as opposed to the other two meadows, the frequency of negative indicator species has decreased from the 2021 surveys, with common ragwort and broad-leaved dock no longer

recorded in two survey squares in 2023. It is important to note that the meadow assessments do not record the bramble increase in this field, which is an important factor in this meadow.

Given the scarcity of unimproved grassland in this urban area, the retention of this habitat is a conservation priority.

Cutting grass (as opposed to grazing it) can have an adverse effect on the invertebrate populations of the grassland, due to the resulting lack of structural diversity and disturbed ground, and the uniform species composition that results. Grazing, however, is not practicable at this site because the danger to the livestock from public interference would be too great.

The recent management of the grassland has included annual hay cut and removal in September and spot restoration on areas that were found to be of sub-optimal quality. It is proposed that an **annual hay cut** is maintained as a priority to achieve the objective of the vegetation sward height of 5-10 cm in November. It is important to mention that in order to allow access for the machines that cut and collect the hay, tree felling operations may be required along the cycle path.

It has been highlighted that Hoary ragwort (*Senecio erucifolius*) is present on-site, growing alongside Common ragwort (*Senecio jacobaea*). In the meadows producing hay, Common ragwort has to be removed every season as it is a poisonous plant for livestock when dried in the hay. This activity is done with the help of volunteers. Unfortunately, both flowers are similar in appearance, and although a briefing will be provided to all involved in helping with the uprooting of Common ragwort, a margin of error is to be expected where some Hoary ragwort may be pulled out by mistake.

Funds are to be sought to **reduce the bramble growth along the edges** of the fields to retain the neutral grassland. Regular visits to the meadows will indicate where **undesirable species** are concentrating and the management will focus on the **reduction** of these species, including species such as common ragwort that cannot be present in hay due to the risk to livestock health. It is expected that the restoration of a sub-optimal patch in the Hay meadow (comp 4) will be completed by the summer of 2025. During the writing of this management plan, an invasive species of honeysuckle has been found on the edge of the Restoration Meadow escaping from one of the gardens. Work is planned to eradicate this plant in the next winter season, but it is unknown yet if the work will be successful in one session or if a regular work schedule will be required.

In the southern compartment of Spring Wood (comp 1) there are two **smaller neutral grasslands** in woodland glades. The management of these grasslands require an **annual cut & collect** in July. Areas of undesirable species such as nettles and cow parsley have been found to be dominant. A spring cut & collect is advised to reduce their vigour. The southernmost meadow suffers regular fly tipping and maintenance may need to be reviewed in future years to address this issue. It is also noted that there is an encroachment of scrub on the western side of this meadow.

The small area of **acid grassland/wet heathland** mosaic is under threat from scrub encroachment and a loss of abundance of heather. The **encroaching vegetation** should be cleared from the grassland on a regular basis and **heather will be spread** from a donor site to restore this habitat. Bare soil areas should be kept for solitary/mining bees and wasps.

Areas of open grassland and the mosaic of grassland with hedge, scrub or woodland edges are habitats required for a **diverse bird community**. These are all present in the nature reserve. The meadows are open habitats without barriers and it is noted that several desire lines are created by site visitors, sometimes with dogs off leads during bird nesting season, creating disturbance of these habitats. If conditions deteriorate, action will be taken to ensure all these habitats are present and in good condition.

Where habitat/species information is not available through the monitoring scheme and casual observations, funds will be sought to carry out surveys to inform the management of this reserve.

Management objectives

Objective 1: To retain unimproved grassland in good condition

- 1.1 To retain 5.6ha of unimproved neutral grassland in good condition
- 1.2 To retain neutral grassland (woodland glades) in good condition
- 1.3 To retain the acid grassland/heathland mosaic in good condition

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

3.3 Feature 2: Broadleaved semi-natural woodland

Objective: 6.7 ha of woodland in good 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>> 7 native broadleaved tree and shrub species represented in the canopy and understory over at least 50% of the woodland</p> <p>A diverse woodland and scrub bird community is recorded</p> <p>Invasive species controlled</p> <p>A diverse ground flora is recorded</p>	<p>Woodland Condition Monitoring</p> <p>Casual observation</p> <p>Wildlife records</p>
Woodland and scrub 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> <p>Average of 3 different tree size classes present per 100m² across woodland**</p> <p>Average of 3 veteran trees in each ha**</p> <p>Areas of scrub: ≤ 40% scrub cover, and tree species comprise no more than 30% canopy cover</p>	Casual observation
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>	Casual observation
Deadwood	<p>>3 snags (standing dead wood including dead wood in live trees) per 100m² across woodland</p> <p>>50% of woodland area contains large* fallen dead wood (including large branches, stems, excluding stumps)</p>	Casual observation

* 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)

** >20cm diameter & >50cm long.

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

Factors

Factor	Rationale	Management required (yes/no/monitor)	Technical Indicator of Control	Monitoring
Invasive non-native species	Japanese knotweed is present in the reserve's woodlands. Although currently not present, Himalayan balsam seeds could easily be deposited along the brook from upstream infected areas. 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	Casual observation
Antisocial behaviour	Fly tipping and vandalism (e.g. fires or damage to trees) are common occurrences and management needs to be adaptive e.g. piled deadwood can only occur in inaccessible areas. This will affect the amount of deadwood in the reserve	Yes	Reduction in reports of fly tipping or vandalism	Casual observation and ranger patrols
Proximity to housing	Trees may need to be felled or cut back to maintain the safety of the adjacent housing. This will affect the amount of standing dead wood available in the reserve	N/A	N/A	N/A
Tree disease	Many species of native broadleaved trees are vulnerable to pathogens, several of which are active in the area. Species known to be at imminent risk – ash – are present on the reserve in large numbers. Diseases of oak are also active in the UK and may pose a significant threat to the woodland in the future	No, Monitor	Persistence of ash and oak as dominant species in the woodland canopy, with at least 5 other native broadleaved species present on the reserve	Casual observation
Climate change	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 an increase in climatic variability, with extreme temperatures, wind speeds and rainfall becoming more common. Consequently, increasing the reserve's resilience to drought, fire events and gales should be a priority when management decisions are made. 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	No, Monitor	N/A	Casual observation

Evaluation

There are areas of **successional scrub** in compartments 3, 4 and 5. The maintenance of these areas requires rotational management to ensure scrub does not encroach on other areas. In compartment 5, an area of scrub to the east requires occasional **thinning** as there is a dense canopy being developed, but at the same time, this area has been a target for antisocial behaviour in the past and several trees have been set on fire. Any future management will need to include actions to minimise the fire risk. Species such as hawthorn, holly, guelder rose, rowan and elder should be encouraged, as these produce berries which are valuable as a food source for birds such as song thrush, as well as providing cover for a wide range of animals.

Scrub forms an important component of the woodland across the reserve, but is also an important habitat in its own right. Species such as hawthorn, holly, guelder rose, rowan and elder should be encouraged, as these produce berries which are valuable as a food source for birds such as song thrush, as well as providing cover for a wide range of animals. Areas of scrub identified in the HLS agreement will be managed to maintain this transitional habitat, in compliance with the HLS indicators of success.

Wet woodland is a key habitat that we need to retain and enhance where possible. The willow carr along the meandering brook is in good condition and it is **allowed to collapse and regenerate naturally**, with the exception of trees near public footpaths where visitor's safety may be compromised. By allowing natural tree collapse across the brook without clearing it, we are encouraging more water to be stored in the nature reserve during periods of **peak flooding**. Small areas where dense willow is growing in compartments 1 and 2 need management to **prevent over-shading** of the ground flora.

The monitoring of **sycamore** development in compartment 2 shows that near Spinkhill Avenue, several sycamores are developing, which may lead to the **drying out**, and eventual loss of the wet woodland. It is expected that a reduction in the number of sycamores will prevent this loss and will help with the over-shading of ground flora. Where possible, natural flood management (NFM) techniques will be used to increase the water retention in the woodland, for example felling trees across a slope, to slow down rain water. This increase in moisture in the soil will favour species such as alder and willow over sycamore.

Semi-natural deciduous woodland is found in drier soils across the reserve. A species-rich area at the back of Danewood Avenue needs to be monitored during the period of this management plan to assess the need for selective thinning to promote the growth of new saplings or the establishment of existing trees.

Ash trees are particularly abundant in the nature reserve. Unfortunately this species is being affected by **ash dieback** (chalara or *Hymenoscyphus fraxineus*), a pathogen that is likely to kill a large proportion of all the ash trees. Preventive work has occurred in 2022 where diseased trees were removed or made into monoliths that will allow for a safer removal if required.

Assuming ash dieback fungus will infect the majority of the ash trees, and due to the close proximity of public rights of way or housing, most of the critically infected trees would need to be removed. This would impact the structure of the woodland and the levels of sunlight reaching the ground flora, which could be detrimental to shade-tolerant species such as bluebells. For this reason, thinning of other species that are not ash in areas dominated by ash trees, will be put on hold for the duration of this management plan unless it's required for the improvement of a habitat or for health and safety reasons. This 'low intervention' approach to general thinning will maintain a fairly dense canopy in certain parts of the woodland, which provides a local **cooling effect** during periods of high temperatures, helping to combat urban heat island effects on the adjacent suburbs.

It is expected that the full extent of damage to ash trees will be noticeable by the end of this management plan, allowing for the monitoring of the effects of this disease in the conditions of the wider woodland structure. The predicted new gaps in the canopy of the woodland caused by the diseased and failing ash trees will promote the growth of new trees as sunlight will reach the ground more easily. This will promote tree regeneration and also contribute to **carbon storage** as new trees have a greater carbon sequestration rate than well established trees.

Old hazel coppice stools can still be seen in the semi-natural deciduous woodland in Spring Wood, reflecting past woodland management. These are historic features and trial re-coppicing has been undertaken. However, the stools are vulnerable to vandalism and damage from motorbikes, so successful regrowth has been sporadic and in places has become damaged. The option of further coppicing and replanting has been discounted, given the anti-social behaviour at this small site. However, coppicing and subsequent re-growth will take place as trees highlighted in tree safety surveys are felled.

Dead wood, both standing and fallen, would be of benefit to a wide range of wildlife, such as fungi and saprophytic invertebrates. Many trees had been vandalised to such an extent that their entire removal was required early on during the Wildlife Trust's management of the site. This reserve's historic antisocial behaviour, including starting fires, would pose a risk to wildlife if adequate levels of deadwood were present in the woodlands. For this reason, when tree work is planned, the smaller branches need to be chipped to deter fire-making, or piled inconspicuously in difficult to access and/or very wet areas. Currently, there is a limited amount of **standing deadwood**, this should be increased where possible through tree works in areas at a safe distance from rights of way or housing.

Rubbish should be cleared from the woodland on a regular basis, as it is unsightly and a danger to wildlife. This will continue to be dealt with through SRWT's patrols and regular site clean up days. A "Monster Clean Up" day is booked annually in January or early February to pick up larger fly tipped items. This time of year allows for better access to bramble dominated areas without damaging emerging bluebells.

Sensible woodland management, aligned with the current best practice will support a diverse woodland and scrub **bird community**. The condition of the existing woodland and scrub habitats support species that require an abundant understorey of shrubby vegetation and cavity dependent species. A third group specialises in woodland edges

of mixed grassland, heath, scrub and small trees – often including dense hedges or hedges with occasional trees as song-posts. As described in feature 3, hedgerows are a valuable feature protected throughout this plan. If conditions deteriorate, action will be taken to ensure all these habitats are present and in good condition.

SRWT is working towards enrolling Carbrook Ravine in the Woodland Condition monitoring scheme to inform the land management.

Where habitat/species information is not available through the monitoring scheme and casual observations, funds will be sought to carry out surveys to inform the management of this reserve.

Management objectives

Objective 2: To retain 6.7 hectares of woodlands in good ecological condition

2.1 To retain and improve wet woodland

2.2 To retain and improve ancient semi-natural broadleaf woodland

2.3 To maintain successional areas of scrub in favourable condition

2.4 To monitor the health of the tree stock across the reserve.

3.4 Feature 3: Hedgerows

Objective: 330m of hedgerows in good condition

Attributes of hedgerows in good ecological condition

Attribute	Performance Indicator	Monitoring
Species composition	Diverse shrub species, with at least 7 native species	Casual observation
Vegetation structure	<p>Hedgerow contains deadwood and a mixture of tall (standards) and short trees</p> <p>Hedgerow is wide and has no gaps</p> <p>Dense vegetation is growing at the base of a hedge</p> <p>Hedgerow has connectivity to the wider landscape</p> <p>There is a margin between the base of the hedge and the mowed area to limit root disturbance</p>	Casual observation

Factors

Factor	Rationale	Management required (yes/no/monitor)	Technical Indicator of Control	Monitoring
Shading	Shading can thin the vegetation at the base of hedgerows, reducing the effectiveness of these wildlife corridors. Grazing and agricultural pesticides also affect the base of hedgerows, but this is not expected to happen at this reserve	Yes	Base of hedgerow is dense	Casual observation
Antisocial behaviour	Fly tipping and vandalism (e.g. fires or damage to trees) are common occurrences	Yes	Reduction in reports of fly tipping or vandalism	Casual observation and ranger patrols
Climate change	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 an increase in climatic variability, with extremes in temperature, wind speed and rainfall becoming more common. Consequently, increasing the reserve's resilience to drought, fire events and gales should be a priority when management decisions are made. Changes in climate may also affect the	No, Monitor	N/A	Casual observation

	species which the reserve is able to support long-term. Conservation plans will need to take this into account			
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Evaluation

Hedgerows provide food and shelter to many species and they also act as wildlife corridors, allowing species to connect with other landscapes. Unfortunately, there has been a large reduction in the number of hedgerows across the country since the 1950s. Hedgerows have been included in the Biodiversity Action Plan and section 41 of the Natural Environment and Rural Communities (NERC) Act as an important habitat to which conservation efforts should focus on. To show the conservation importance of this habitat, an addition to the Hedgerows Regulations 1997 is currently being proposed to protect hedgerows even further, including a two metre 'buffer strip' from the centre of hedgerows, and a hedge cutting ban between 1 March and 31 August to protect nesting birds.

Carbrook Ravine has a long hedgerow separating fields used for hay making. It is in variable condition along its length. The easternmost section of the hedge was laid in 2015. The majority of the hedge is mature and unmanaged, and in parts it is declining as bramble proliferates and some of the older hedgerow trees deteriorate. It is proposed to **restore the hedgerow** during the period of this management plan.

Hedgerows are habitats that require regular maintenance. This could be re-shaping every 4-5 years to maintain height, re-laying to maintain tree health when they are too overgrown or gapping up (shrub planting to close the gaps) when hedgerows have been lost.

Regular **monitoring** of the condition of the hedgerow will be needed to assess when management action is required, including the **control of brambles** and **hedge bindweed** overshadowing the base of the hedgerow.

Where habitat/species information is not available through the monitoring scheme and casual observations, funds will be sought to carry out surveys to inform the management of this reserve.

Management objectives

Objective 3: 330m of hedgerows in good condition

3.1 To retain and improve 330m of hedgerows

3.5 Feature 4: Public access

Objective: reserve is safe, welcoming, tranquil and well-maintained

Attributes of a safe and well-maintained reserve

Attribute	Performance Indicator	Monitoring
Path network	Footpaths and permissive footpaths maintained in line with Public Right of Way (PRoW) standards Trans Pennine Trail (TPT) & cycle path is accessible to those with limited mobility, both on foot and by mobility scooter	Through routine patrols
Cleanliness	Reserve has low levels of litter and dog waste Fly tipping on reserve is occasional and cleared promptly	Through routine patrols
Safety	≥ 90% of visitors feel that the reserve is safe and well-cared for	Feedback from visitor surveys / incident reports

Factors

Factor	Rationale	Management required (yes/no/monitor)	Technical Indicator of Control	Monitoring
Antisocial behaviour	Vandalism of artificial structures (fences, benches...) or natural assets (planted trees) are constant occurrences Fires are regularly reported Fly tipping of small and large items is a regular occurrence, including occasional hazardous materials such as asbestos Vehicle break-ins and tool theft reported in recent years	Yes	Vandalism reports cease and fly tipping drops to average levels	Through routine patrols Monitoring of incident reports
Incursion by off-road motor vehicles	Motorbikes regularly ride through the reserve, causing erosion of the ground and of unsurfaced paths, becoming dangerous to other reserve users	Yes	No motorbikes reported on the reserve	Through routine patrols Monitoring of incident reports
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	Casual observation Through routine patrols

Evaluation

A visitor survey carried out during 2023 collated feedback to support the writing of this management plan. The reserve views, the mixture of habitats and the quietness of the site were positively ranked. On the other hand, fly tipping and antisocial behaviour were the main concerns from our visitors. Disabled access was highlighted as one of the areas of improvement. The boundary of the nature reserve and the organisation responsible for the management of the site was the response with more varied responses, many incorrect, clearly showing that signage is a key area to focus on.

Carbrook Ravine is infamous for the fly tipping problems, which overshadow the incredibly good qualities of the nature reserve, that include 3 stunning wildflower meadows full of buzzing insects in the summer, wonderful views of the city of Sheffield and gnarly wet woodland trees growing along the sinuous Car Brook.

Although barriers have been erected to impede fly tipping, there is a constant influx of large items being dumped at the reserve entrances, from sofas and mattresses to paint cans or children's toys. One of the most worrisome fly tipped materials is asbestos, which is hazardous to health. Asbestos elimination requires expensive specialist waste removal companies.

Fly tipping is a significant negative element in people's enjoyment and use of the site for leisure and recreation. A key task will be to **remove rubbish** from the site to bring about a marked improvement in the visual amenity of the site, and to increase both its safety and the local perception of the site.

Fly tipping has occurred for many years in this area and although we work together with the Sheffield City Council to address this issue, a solution has not been found yet. It is important that during the period of this management plan further work is carried out in partnership with the council to minimise this problem, for example through educational campaigns.

The **tarmac cycle route** that joins Spinkhill Drive with the Trans Pennine Trail along the top of the hay meadows is the only **route accessible** to people with less mobility. Other routes would not be suitable, even if the surfacing was improved to allow mobility scooters or wheelchairs. The reason being that path gradients are too great, making it unsafe for the user.

When asked about the organisation responsible for the management of this nature reserve, the visitor surveys revealed that 40% of the people know that the reserve is managed by a Wildlife Trust (only 30% narrowed it down to Sheffield and Rotherham Wildlife Trust). This leaves 60% of the visitors responding 'I don't know' or misidentifying the land manager.

From the open-ended questions, where people can freely type a response, we have noticed that the boundary of the reserve is not clear, as many concerns highlighted by visitors occur in neighbouring land not managed by the Sheffield & Rotherham Wildlife Trust. These results are somewhat expected because the northern boundary of the

reserve does not have any physical features to aid in the identification of a different land manager. From a visitor's perspective, it could be perceived as simply another field in an extensive green space.

These responses clearly demonstrate that we need to focus on **advertising who we are** and **where** we are doing the work. This could be done by increasing the welcome signage in the reserve at the entrances. Unfortunately antisocial behaviour will constrain how this is achieved, for example having to use metal signage rather than the natural looking timber used at other nature reserves. During the period of this management plan, funds will be sought to **increase the signage** on-site and the general awareness of the SRWT presence in the area, making the site more welcoming.

Surfacing of certain routes will be needed during the length of this plan. Two sections have been identified as paths that will require attention due to ground damage exacerbated by the increased wetness of recent years, combined with motorbike erosion damage and a surge in footfall from the Covid-19 pandemic. This damage not only makes an unpleasant, muddy walk for our visitors, it is also widening the paths, losing an important habitat along the edges of these routes.

One of the paths is a Public Right of Way which connects Restoration Meadow (Comp 5) with Hay Meadow (Comp 4) at the grid reference SK 39546 86113. Although PROW maintenance is the responsibility of the local authority of the area, SRWT will work together with SCC to seek the funds required for this improvement. It is important to include in any plans the requirement for tractor access for the annual management of the meadows.

The other path that requires attention during the length of this plan is the desire line that runs parallel to Castlebeck Avenue. As it occurs with the path mentioned above, the widening of this route is affecting the herbal layer of this woodland ride. Funds will be sought to improve the surfacing of this route.

Repair and rectification to signage, way-markers and other **infrastructure** will be carried out as soon as possible following notification. Where possible, access to illegal off-road vehicles such as motorbikes or quad bikes will be deterred by installation of barriers.

Management objectives

Objective 4: reserve is safe, welcoming, tranquil and well-maintained

4.1 Maintain and improve access to the reserve

4.2 Discourage negative and damaging use of the site

4.3 Improve cleanliness and welcoming aspect of the reserve

4. Work programme

Objective 1: To retain 5.6 hectares of unimproved grassland in good condition

Objective 2: To retain 6.7 hectares of woodlands in good ecological condition

Objective 3: 330m of hedgerows in good condition

Objective 4: reserve is safe, welcoming, tranquil and well-maintained

Feature	Objective number	Objective with prescriptions	24/ 25	25/ 26	26/ 27	27/ 28	28/ 29	29/ 30	30/ 31	31/ 32	32/ 33	32/ 34
Species rich grassland	1.1	To retain 5.6ha of unimproved neutral grassland in good condition										
	1.1.1	Sward height should be between 5-10cm in November: late summer cut & collect across the 3 meadows (comp 3, 4 & 5)	X	X	X	X	X	X	X	X	X	X
	1.1.2	Annual common ragwort removal is required prior to the hay cut in comp 3, 4 & 5. Control as required other negative indicator species such as dock and thistle.	X	X	X	X	X	X	X	X	X	X
	1.1.3	Monitor grasslands health through Meadow Condition Assessment			X			X			X	

Feature	Objective number	Objective with prescriptions	24/ 25	25/ 26	26/ 27	27/ 28	28/ 29	29/ 30	30/ 31	31/ 32	32/ 33	32/ 34
	1.1.4	Bramble and scrub encroachment to be controlled as required. Focus on western margin of Scrubby meadow (comp 3) and south-eastern margin of Restoration meadow (comp 5)		X			X			X		
	1.1.5	Restoration of a sub-optimal patch in the Hay meadow (comp 4)	X	X								
	1.1.6	Invasive honeysuckle to be eradicated from the reserve and area monitored for new sightings - <i>cross reference with 2.3</i>	X	X		X		X		X		X
	1.1.7	When required, cut back overhanging vegetation to allow machinery access to the meadows - <i>cross reference with 2.3</i>	X	X	X	X	X	X	X	X	X	X
	1.1.8	Investigate feasibility of pond creation at failed land drain location in comp 5. If feasible, secure funds for pond creation.		X	X							
	1.2	To retain neutral grassland (woodland glades) in good condition										
	1.2.1	Annual July cut & collect of two neutral grassland areas in Spring Wood	X	X	X	X	X	X	X	X	X	X

Feature	Objective number	Objective with prescriptions	24/ 25	25/ 26	26/ 27	27/ 28	28/ 29	29/ 30	30/ 31	31/ 32	32/ 33	32/ 34
	1.2.2	Control as required of scrub encroachment on the western side of the meadow adjacent to Fishponds Road - <i>cross reference with 2.3</i>	X			X			X			X
	1.2.3	Spring cut of the woodland glades grasslands to reduce the vigour of nettles and other undesirable species as required	X	X			X	X			X	X
	1.3	To retain the acid grassland/heathland mosaic in good condition										
	1.3.1	Scrub and bracken control required in the small acid grassland/heathland mosaic, retaining small areas of bare ground for solitary/mining bees and wasps	X		X		X		X		X	
	1.3.2	Spread of heather to restore the heathland mosaic - <i>cross reference with 2.3</i>	X					X				
Broadleaf woodland	2.1	To retain and improve wet woodland										
	2.1.1	Remove young sycamore in wet woodland in Comp 2				X				X		
	2.1.2	Coppice dense willow along Car Brook as required in Comp 1 (north of larger neutral grassland) & Comp 2 (north of the heathland area)			X				X			
	2.1.3	Monitor across the site, in particular in wet woodland, for colonisation by Japanese knotweed and Himalayan balsam, and remove as required.	X	X	X	X	X	X	X	X	X	X

Feature	Objective number	Objective with prescriptions	24/ 25	25/ 26	26/ 27	27/ 28	28/ 29	29/ 30	30/ 31	31/ 32	32/ 33	32/ 34
	2.1.4	Use NFM techniques where appropriate to increase ground wetness										
	2.2	To retain and improve ancient semi-natural broadleaf woodland										
	2.2.1	Maintain rides by cutting back & coppicing pathside trees in Comps 1 & 2	X	X	X	X	X	X	X	X	X	X
	2.2.2	Retain standing and fallen deadwood where safe to do so	X	X	X	X	X	X	X	X	X	X
	2.2.3	Selective thinning of species-rich broadleaf woodland at the back of Danewood Avenue if required						X				
	2.3	To maintain successional areas of scrub in favourable condition										
	2.3.1	Undertake rotational scrub management (Comps 3, 4, 5) to ensure no more than 40% scrub cover, and tree species comprise no more than 30% canopy cover, in compliance with the HLS agreement.	X		X		X		X		X	
	2.3.2	Manage open areas within scrub to ensure no more than 5% undesirable weeds and no more than 10% tussocks		X		X		X		X		X

Feature	Objective number	Objective with prescriptions	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	32/34
	2.4	To monitor health of tree stock across the reserve										
	2.4.1	Carry out an annual assessment of the progression of ash dieback on the reserve, with tree safety works carried out as necessary	X	X	X	X	X	X	X	X	X	X
	2.4.2	Manage tree safety on the reserve in line with SRWT policy and procedures	X	X	X	X	X	X	X	X	X	X
	2.4.3	Rubbish to be cleared from the woodland on a regular basis. Larger items to be picked up in January/February (Monster Clean Up day)	X	X	X	X	X	X	X	X	X	X
Hedgerows	3.1	To retain and improve 330m of hedgerow										
	3.1.1	Strim back encroaching vegetation along most recently-laid eastern section of hedgerow in Comp. 4 - cross reference with 2.3		X					X			
	3.1.2	Work to retain and improve the structure and density of hedgerows through re-shaping or hedge-laying and gapping up, to create a range of structures, heights, species and profiles		X					X			
	3.1.3	Maintain a buffer zone of 2m-from-centre of hedgerows during annual hay cut	X	X	X	X	X	X	X	X	X	X

Feature	Objective number	Objective with prescriptions	24/25	25/26	26/27	27/28	28/29	29/30	30/31	31/32	32/33	32/34
Public access	4.1	Maintain and improve access to the reserve										
	4.1.1	Improve and maintain paths through regular removal of encroaching vegetation to improve sight-lines and increase feeling of safety for users	X	X	X	X	X	X	X	X	X	X
	4.1.2	Monitor infrastructure and maintain bridges and steps in good state of repair	X	X	X	X	X	X	X	X	X	X
	4.1.3	Manage tree safety on the reserve in line with SRWT policy and procedures <i>Cross reference with 2.4</i>	X	X	X	X	X	X	X	X	X	X
	4.1.4	Maintain the network of paths and concessionary bridleway route in line with national and local standards.	X	X	X	X	X	X	X	X	X	X
	4.1.5	Work with SCC to seek funds to improve surfacing of PROW at SK 39546 86113 (between Restoration and Hay meadows) <i>Cross reference with 1.1</i>				X						
	4.1.6	Seek funds to improve surfacing of desire line parallel to Castlebeck Avenue			X							

Feature	Objective number	Objective with prescriptions	24/ 25	25/ 26	26/ 27	27/ 28	28/ 29	29/ 30	30/ 31	31/ 32	32/ 33	32/ 34
	4.2	Discourage negative and damaging use of the site										
	4.2.1	Prevent unauthorised access onto the reserve by motor vehicles. Report to the police when necessary	X	X	X	X	X	X	X	X	X	X
	4.2.2	Seek funds to repair the gate at Castlebeck Avenue and reposition the boulder to cover a gap to prevent vehicles from accessing the reserve		X								
	4.2.3	Maintain 'no fly tipping' signs and report any incidents of fly tipping promptly to SCC officers and/or ACIS officers, in particular any incidents on boundaries of residential properties. Work together to reduce this problem	X	X	X	X	X	X	X	X	X	X
	4.3	Improve cleanliness and welcoming aspect of the reserve										
	4.3.1	Remove litter from grassland, scrub and woodland areas through regular ranger patrols	X	X	X	X	X	X	X	X	X	X
	4.3.2	Undertake annual removal of large fly-tipped objects each January/early February	X	X	X	X	X	X	X	X	X	X

Feature	Objective number	Objective with prescriptions	24/ 25	25/ 26	26/ 27	27/ 28	28/ 29	29/ 30	30/ 31	31/ 32	32/ 33	32/ 34
	4.3.3	Seek funds to increase welcome signage at the reserve's entrances			X				X			
	4.3.4	Work in partnership with SCC to reduce fly tipping	X	X	X	X	X	X	X	X	X	X

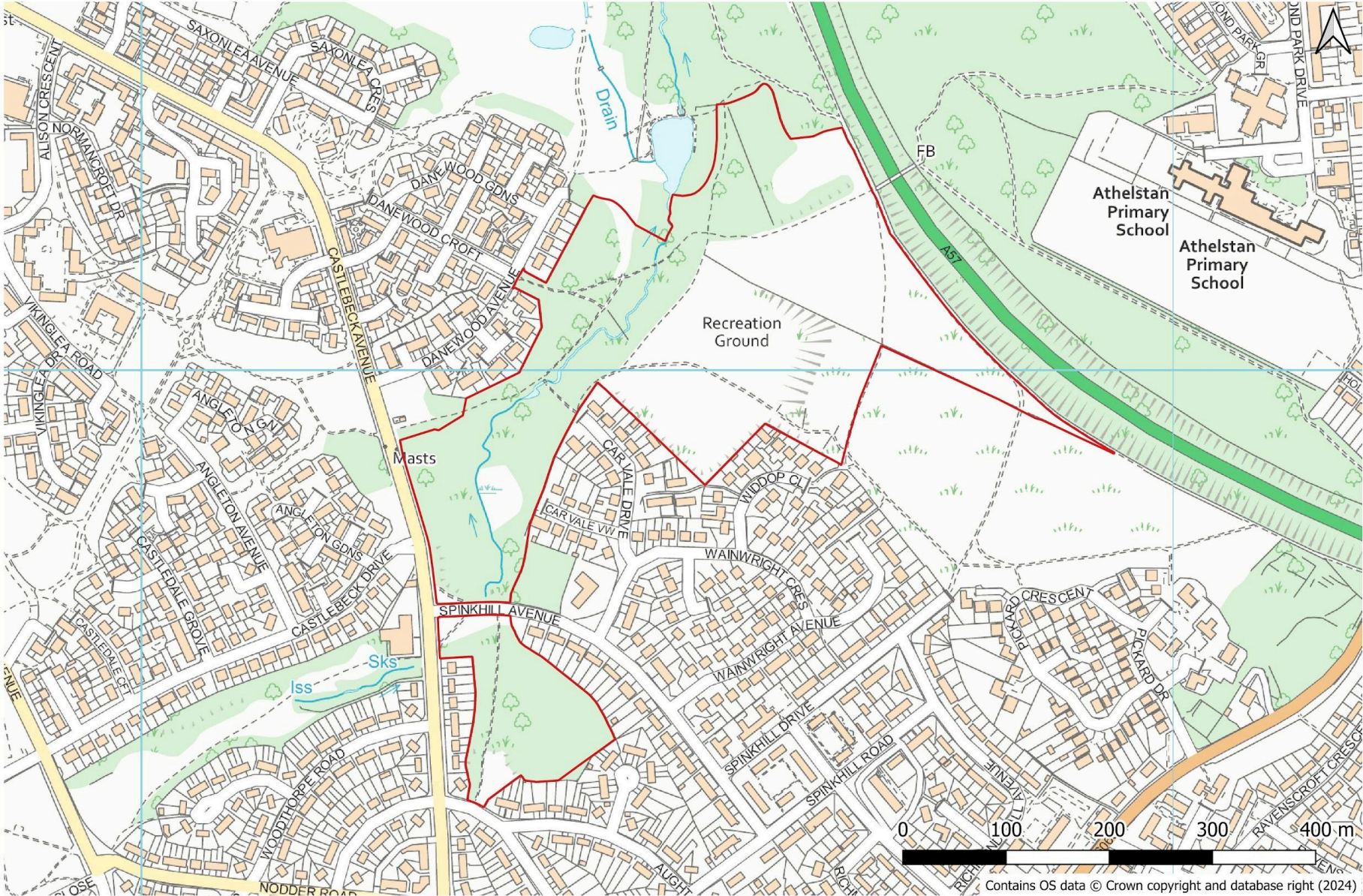
Consultation

5. Figures



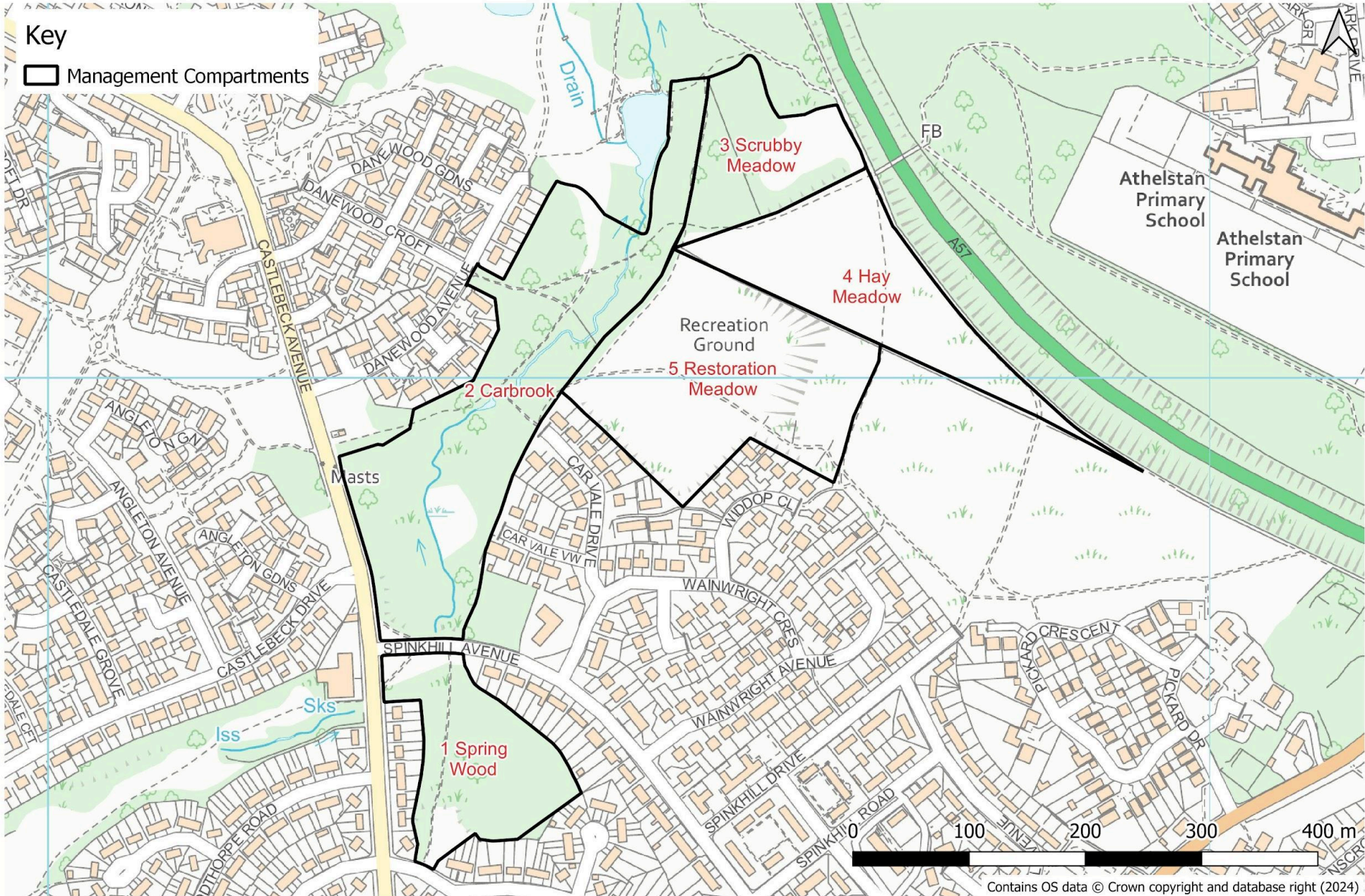
Carbrook Ravine

Figure 1: Location



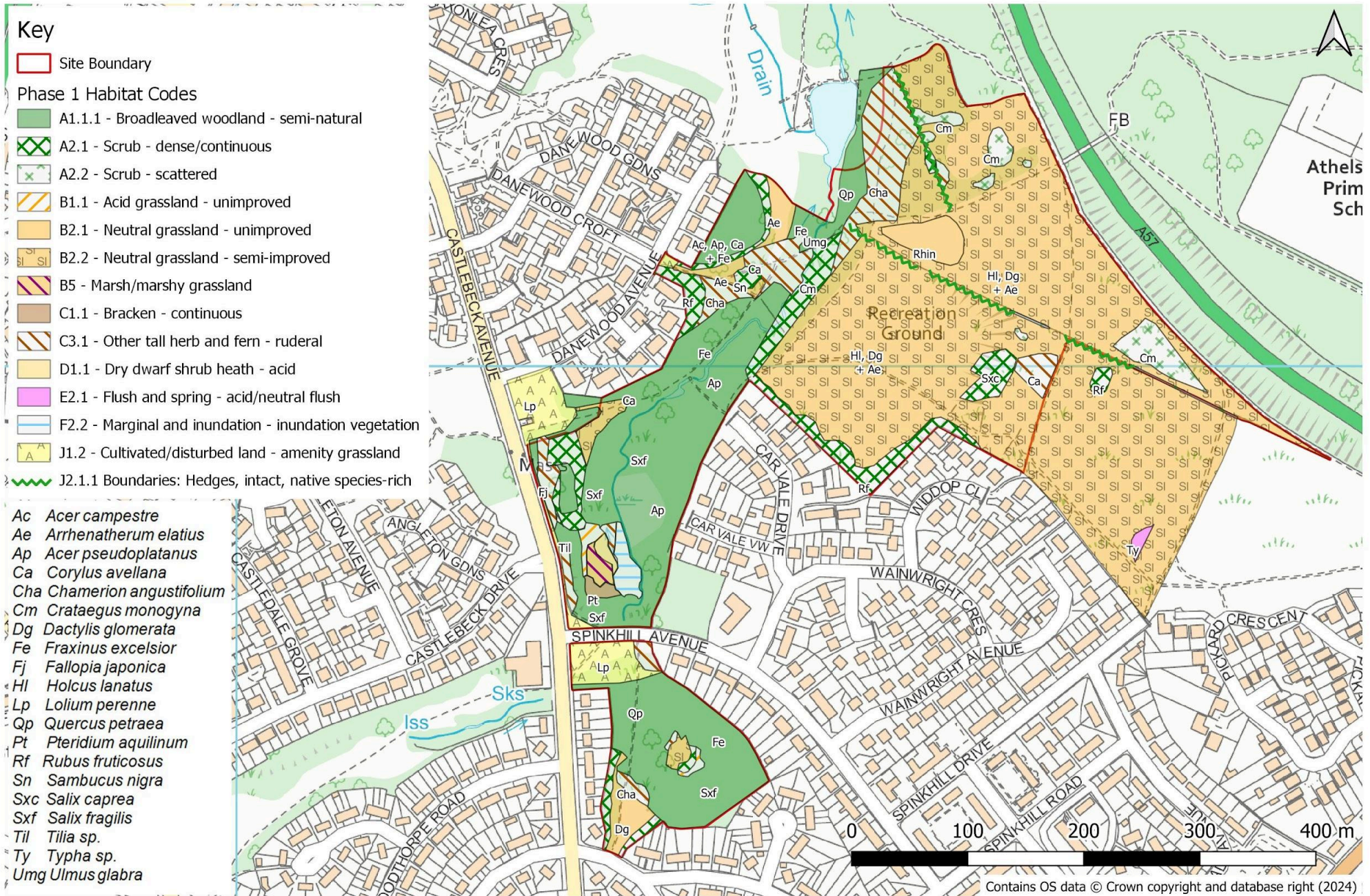
Carbrook Ravine

Figure 2: Management Compartments



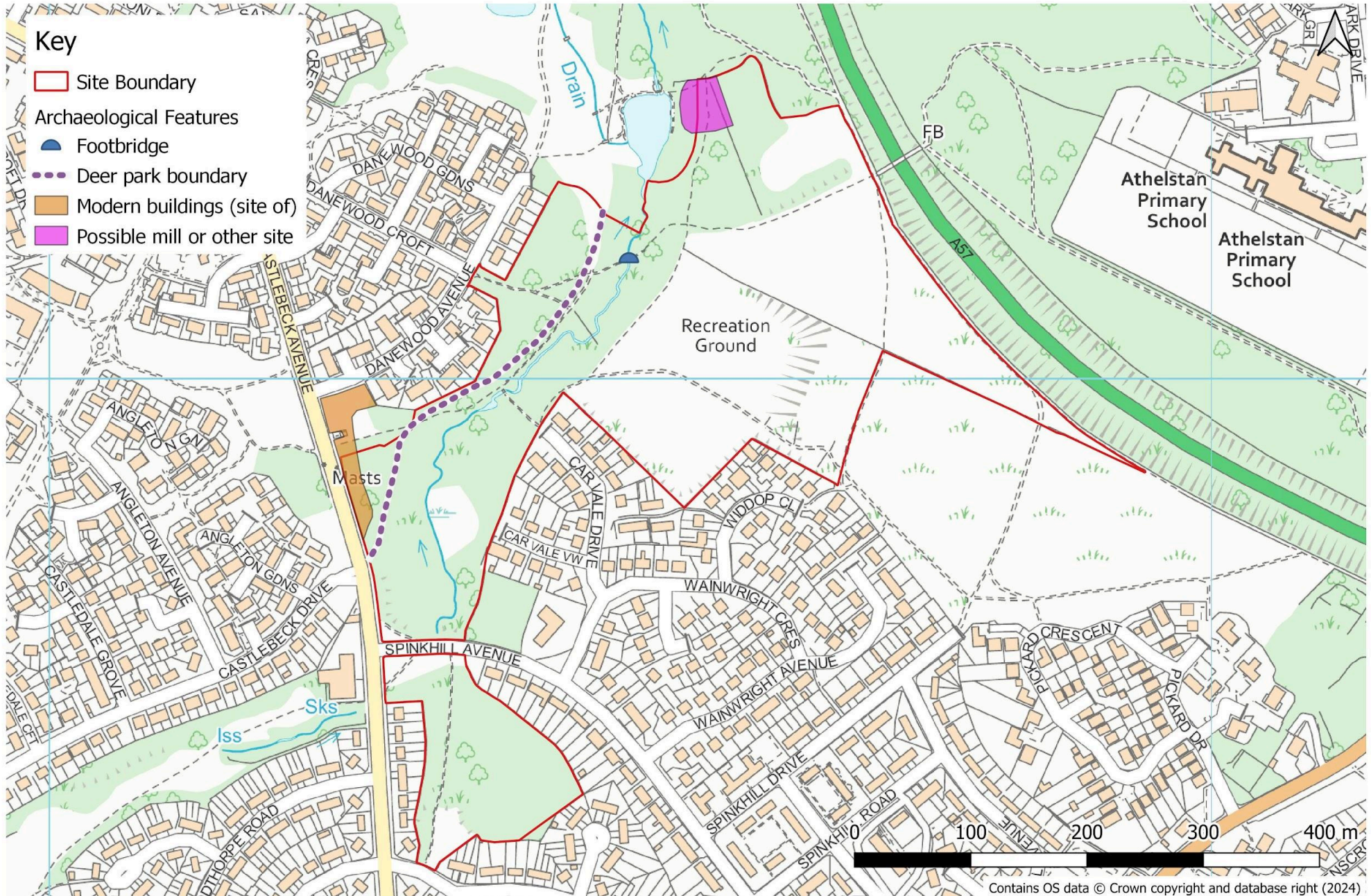
Carbrook Ravine

Figure 3: Phase 1 Habitats 2010



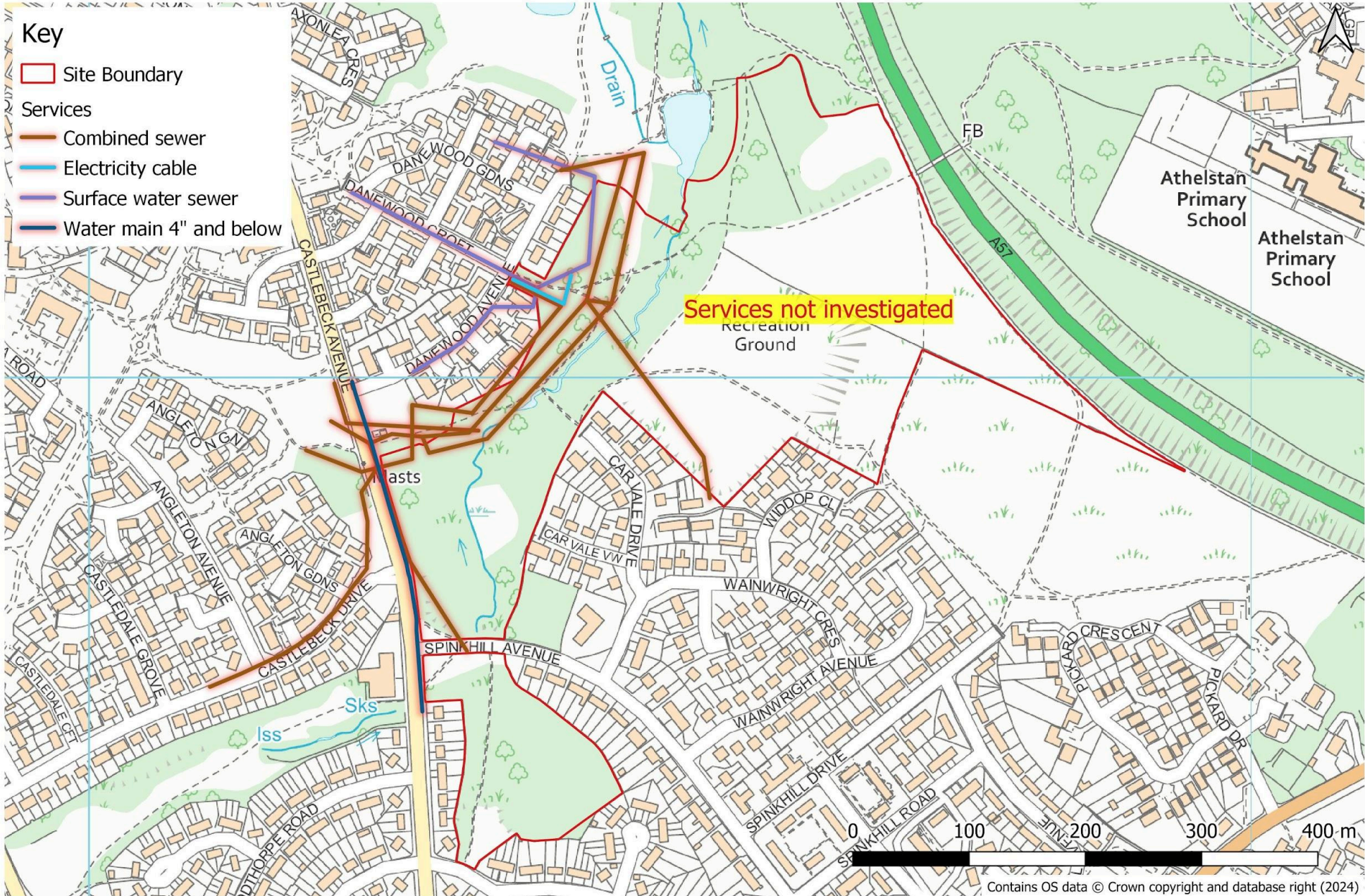
Carbrook Ravine

Figure 4: Archaeology



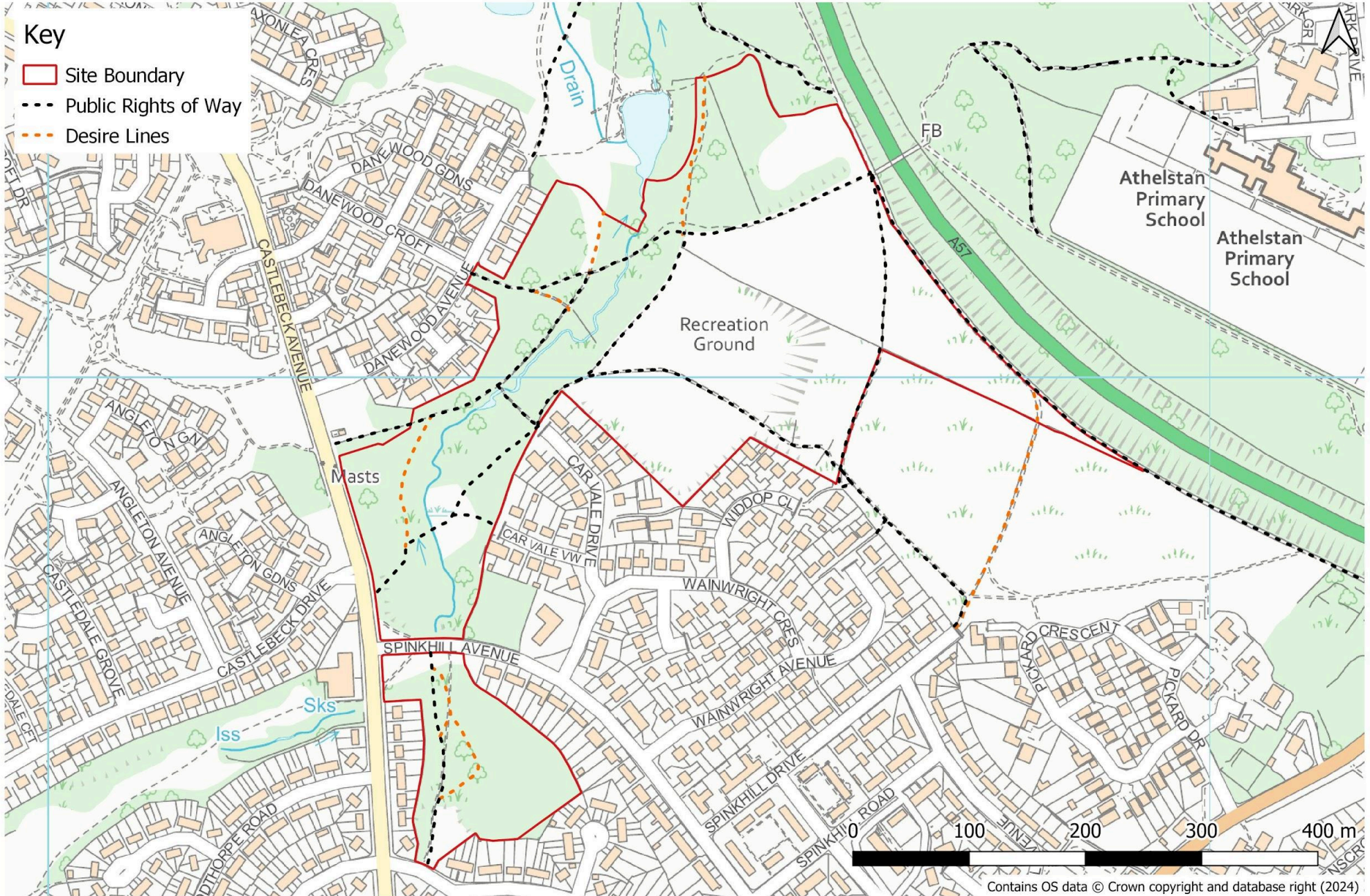
Carbrook Ravine

Figure 5: Services



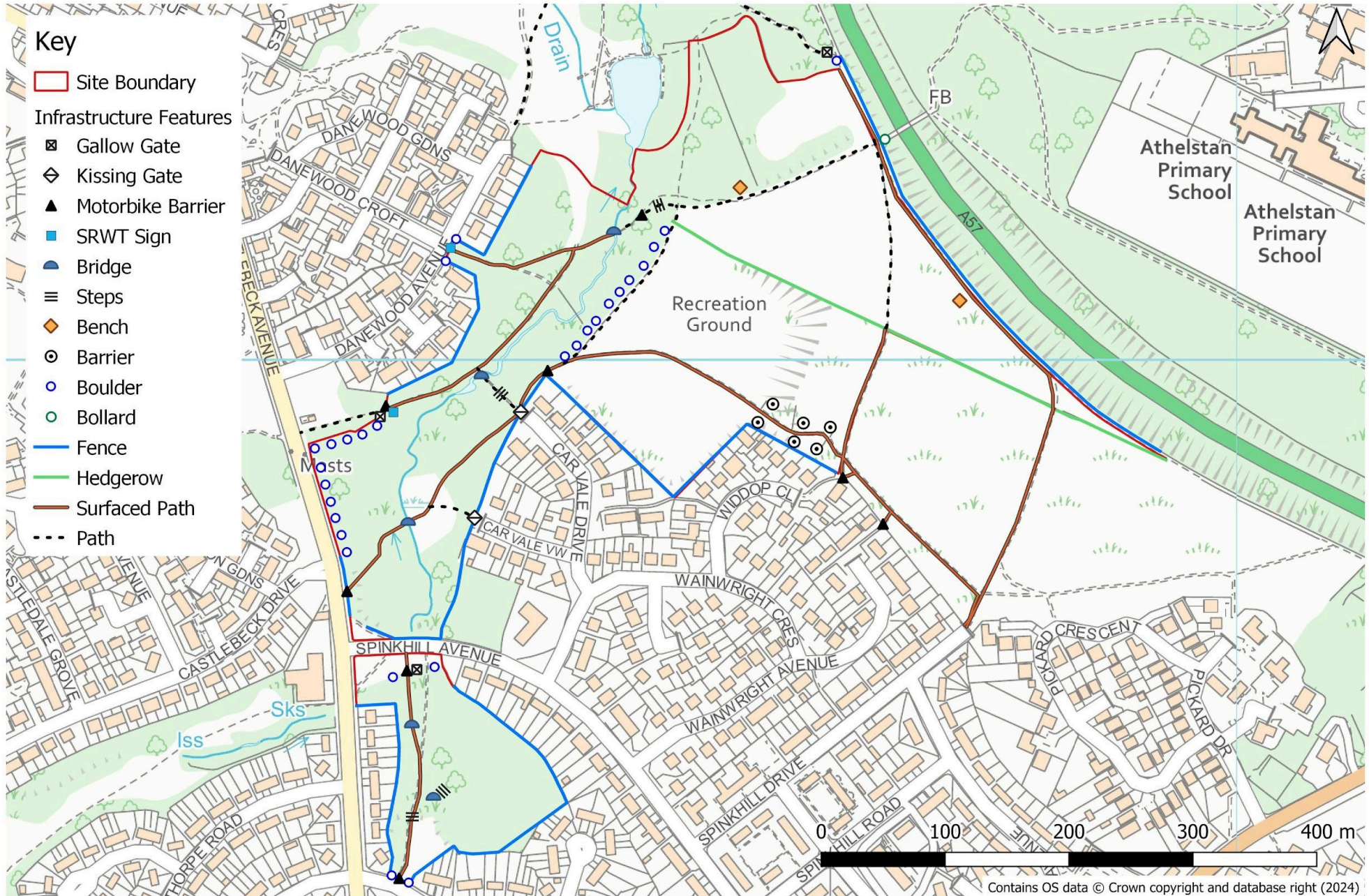
Carbrook Ravine

Figure 6: Public Rights of Way & Desire Lines



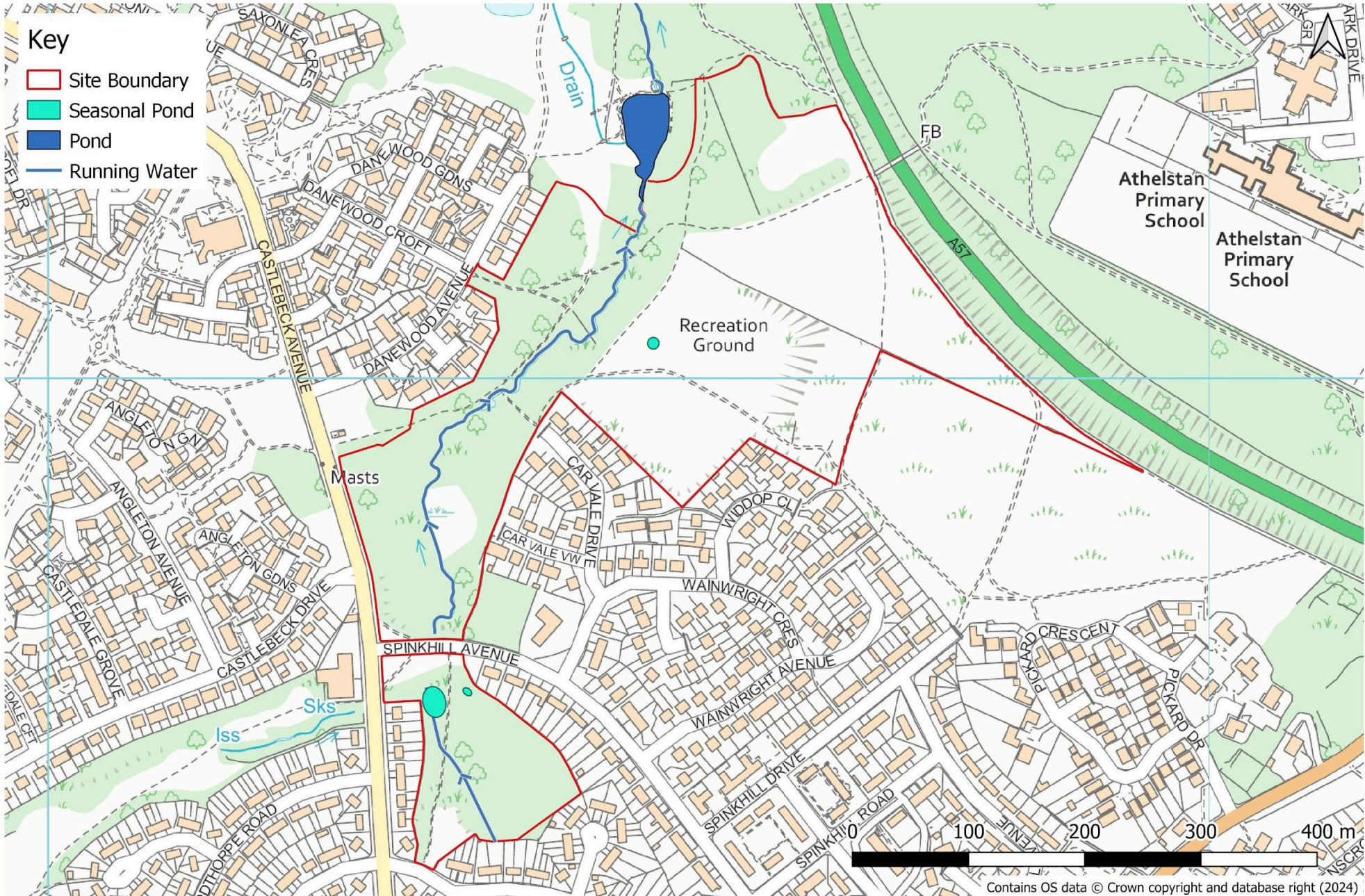
Carbrook Ravine

Figure 7: Infrastructure



Carbrook Ravine

Figure 8: Hydrology



APPENDIX I: Glossary of acronyms and terms

ATTRIBUTE - the characteristics, qualities or properties of a feature which are inherent to, and inseparable from, the feature. Indicators of the general condition of the feature

ACIS - Housing association managing several properties backing Carbrook Ravine

BAP - Biodiversity Action Plan

CCF - Continuous Cover Forestry

Comp - Compartment

COSHH - Control of Substances Hazardous to Health

EWGS - English Woodland Grants Scheme

FACTOR - anything that has the potential to influence or change a feature, or to affect the way in which a feature is managed

FEATURE - the most valued elements of the site, for which it is managed

FWM - Forest Works Manager

HLS - Higher Level Stewardship

HSE - Health and Safety Executive

LBAP - Local Biodiversity Action Plan

LNR - Local Nature Reserve

PRoW - Public Right of Way

NBN - National Biodiversity Network

NFM - Natural Flood Management

TPT - Trans Pennine Trail

SCC - Sheffield City Council

SRWT - Sheffield and Rotherham Wildlife Trust

UDP - Unitary Development Plan

VISION - a statement describing the ideal condition of a site, at a given point in the future

APPENDIX II: 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.

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

Fires are a known vandalism act at Carbrook Ravine. Practical work will be carried out with this risk in mind, for example, creating wood chips instead of piles of tree branches. The annual meadow cut is booked for September after the school holidays.

Pests and diseases

There are no rabbits present in the woodland. There is a healthy population of grey squirrel. Browsing damage will be monitored during patrols.

The Common Leaf Weevil *Phyllobius pomaceus* and *P. argentatus* may attack broadleaved restock sites during early May and June. The insect requires adjacent grassland during the larval stages and little can be done to prevent the attacks without the use of insecticides.

During future restocking of pine sites (if applicable) there is a small risk of infestation by *Hylobius abietis*. Suspected incidents will be reported to the Forestry Commission and also managers of neighbouring forests. Restocking may be delayed by two planting seasons to allow the weevil to complete its life cycle and move on.

Chalara (ash dieback) is a windborne disease of ash trees that is now widespread throughout Sheffield. Ash is very common at Carbrook Ravine and 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/relevant staff and the results recorded. Where necessary, foliar samples, etc, may be sent to Forest Research for analysis. Monitoring for other more serious insect pests will be done during harvesting operations.

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

Known archaeological features 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 end August and end February to avoid disturbance to breeding birds.

Areas rich in ancient woodland ground flora will be protected from vehicular damage during management operations.

Known bat roosts will be excluded from operational areas, as required.

Veteran and notable trees

Trees suspected to be veteran or notable will be marked and retained during forestry operations.

Water management

The natural and artificial watercourses/features can be seen in Figure 8. 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 Carbrook Ravine 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 Carbrook Ravine nature reserve is the Car Brook 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 is to be alerted to any possible contamination of watercourses.

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

Domestic stock and fencing

The condition of boundary fences will be inspected during patrols.

Use of pesticides and fertilisers

The range of pesticide use on the reserve has been kept to a minimum, with glyphosate in use since at least 2000. 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 records are held on file.

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, if required.

Pesticide records 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 disposed of by a licensed waste carrier where appropriate. 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.

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.

Accident plan

All felling 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.

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 subcontractors 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.

Consultation

APPENDIX III: Operational Standards and Techniques - checklist

To be completed before management operations undertaken

Operational Standards and Techniques	Yes/No/ Not Applicable
<p>Protection and control</p> <p>Clear-felling operations designed to minimise the risk of damage from wind, fire, pests and disease.</p>	
<p>Wind damage and fire risk</p> <p>Forestry operations designed to make use of wind firm edges, where available Work will minimise fire risk, taking into account known regular vandalism</p>	
<p>Tree pests and diseases</p> <p>Tree diseases currently active in work area (please list):</p> <p>Appropriate biosecurity measures in place:</p>	
<p>Other Protected Species</p> <p>Harvesting operations will be limited to periods outside of bird nesting season</p> <p>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:</p> <p>Ground based/aerial bat roost assessment has been undertaken and the risk to roosting bats managed by an appropriate risk assessment.</p>	
<p>Archaeology</p> <p>All/any prehistoric archaeological features excluded from operational areas.</p>	
<p>Veteran and notable trees</p> <p>All/any veteran and notable trees in operational areas identified and marked for retention.</p>	

Operational Standards and Techniques	Yes/No/ Not Applicable
<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 fertilisers 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 is required.</p> <p>If yes:</p> <p>Least harmful pesticide and delivery mechanism selected for use.</p> <p>Necessary COSHH assessments and 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 if required.</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>	

Operational Standards and Techniques	Yes/No/ Not Applicable
<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/known risks 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, principal contractor, site manager etc) shared and placed on file.</p>	

Consultation