







Management Plan for Carbrook Ravine Nature Reserve April 2016 – March 2024 (Extended

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# **1 INTRODUCTION**

Sheffield & Rotherham Wildlife Trust (SRWT) is part of a national association of 47 local Wildlife Trusts, which work with communities throughout the UK to protect wildlife in town and country. Sheffield & Rotherham Wildlife Trust aims to promote 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 practises, linked directly to both rural and urban regeneration.

The Nature Reserves Programme aims to establish a suite of high quality, well managed and accessible wildlife reserves, which will reverse the past unsustainable trends in land use on some of Sheffield's finest wildlife sites. The work will also assist in the environmental regeneration of Sheffield by linking the management of land for wildlife, with the creation of jobs and green enterprise initiatives across the city. Ranging in scope from small urban commons, to large moorland areas, these sites act as the core to Sheffield Local Biodiversity Action Plan, and will be managed in partnership with Sheffield City Council, statutory bodies, voluntary organisations and members of the public, for the benefit of people, wildlife and the wider environment of Sheffield.

# **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 SRWT offices.
- The first SRWT management plan covered the period from 2002-2006, followed by a second plan in 2006-2011. Due to capacity issues, a reviewed plan for the next 5 years was not written. Therefore the plan was extended to cover the period from 2006 to 2015. The current plan sets out a detailed work programme for the period of 2016 2021, and aims to continue with a programme of management for the continued benefit of wildlife and local people who use the site. Due to a change in the reserve manager and capacity constraints, the plan has been extended until 2024.

# **1.2 Vision Statement**

Carbrook Ravine is a valuable area for its biodiversity, history and amenity usage, being one of the few areas of semi-natural habitat in the locality, and a remnant of the Sheffield Deer Park. Its location in one of the most socially and economically deprived parts of Sheffield increases its importance as an oasis of green space and offers both opportunities and challenges for local engagement.

# 2 MANAGEMENT AIMS & OBJECTIVES

	Aims Objectives					
2.1 BIODIVERSITY						
Aim 1	Maintain the grassland areas of the reserve in favourable condition	<ul> <li>1.1 Continue traditional hay meadow management on the three haymeadows (Compartments 3, 4 &amp; 5)</li> <li>1.2 Maintain two open grassland areas in Compartment 1 for amenity use</li> <li>1.3 Remove litter &amp; fly-tipped material from grasslands</li> <li>1.4 Restore and maintain hedgerow on southern boundary of Compartment 4</li> </ul>				
Aim 2	Maintain successional areas of scrub in favourable condition	<ul> <li>2.1 Maintain areas of scrub in Comps 3, 4,5 in line with HLS prescription to maintain a mosaic of scrub and wildflower-rich grassland with: <ul> <li>20-40% scrub cover, with diverse age &amp; height structure</li> <li>No more than 50% of scrub mature/over-mature</li> <li>Tree species at irregular spacing, canopy comprising 10-30% of area</li> <li>Undesirable weed species &lt;5%</li> <li>20-50% grassland cover, with tussocks &amp; sedge 5-10%</li> </ul> </li> <li>2.2 Remove litter &amp; fly-tipped material from areas of scrub</li> </ul>				
Aim 3	Maintain the woodland areas of the reserve in favourable condition	<ul><li>3.1 Remove litter &amp; fly tipped material from woodlands</li><li>3.2 Prevent colonisation of wet woodland by invasive species</li><li>3.3 Maintain and enhance structural diversity of woodland</li></ul>				

Aim 4	Maintain and wet heathland and wetland areas in favourable condition	<ul><li>4.1 Reverse the encroachment on scrub on wet heathland area in south of Comp 2</li><li>4.2 Reduce shading of wetland habitat along the course of Car Brook in Comp 1 and southern end of Comp 2</li></ul>
Aim 5	Monitor and record the ecological features on the reserve	<ul> <li>5.1 Maintain an up-to-date record of biological information from surveying and by encouraging the reporting of observations from SRWT staff, members of the public and local groups.</li> <li>5.2 Monitor condition and composition of hay meadows</li> <li>5.3 Monitor use of site by HLS target bird species</li> <li>5.4 Undertake Phase 1 habitat survey to inform next management plan</li> <li>5.5 Undertake breeding bird survey during management plan period if resources allow</li> </ul>
2.2 INFRASTRUCTURE		
Aim 6	Maintain and improve access to the reserve	<ul> <li>6.1 Improve and maintain paths through regular removal of encroaching vegetation to improve sight-lines and increase feeling of safety for users</li> <li>6.2 Monitor infrastructure and maintain bridges and steps in good state of repair</li> <li>6.3 Undertake in-house tree surveys every 2 years, and full QTRA survey every 6 years</li> </ul>
Aim 7	Discourage negative and damaging use of the site	7.1 Prevent unauthorised access onto the reserve by motor vehicles 7.2 Deter fly-tipping on reserve and other anti-social behaviour around entrances

2.3 CULTURAL		
Aim 8	Promote and encourage local participation in the management of the reserve	8.1 Promote and encourage positive use of the site
2.4 ECONOMIC		
Aim 9	Develop ongoing sources of grant aid and other income to support the management of the reserve	<ul><li>9.1 Obtain additional financial grant aid for the management of Carbrook, as opportunities arise</li><li>9.2 Raise the profile of the reserve and generate positive publicity wherever possible</li></ul>

# **3 SITE DETAILS**

# 3.1 Location and site boundary (Figure 1)

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 13.4 hectares, centred on grid reference SK 395 860. The site is divided into two parts by Spinkhill Avenue, 11.7 ha to the north and 1.7 ha to the south.

For management purposes the site has been divided into the following compartments (see Figure 8):

**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 amenity 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 4 for full Phase 1 habitat information.

## 3.2 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. It has a total area of 13.4 hectares, including significant areas of woodland and grassland, some heath and wetland. 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 amenity 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 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 20<sup>th</sup> 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 time of the 2002-2006 management plan, 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.

# 3.3 Site tenure and occupancy

Carbrook Ravine is owned by Sheffield City Council. Over the twenty five years prior to 2002, several management plans were developed for the site. None of these plans have ever been fully implemented, because insufficient resources have been available. From April 2002, the site was leased to SRWT for a period of 30 years.

# **3.4 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)** 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."

The southern section of the reserve (Spring Wood) is also designated as Open Space in the Unitary Development Plan (UDP), to which Policy LR4 applies:

"Open space will be protected from built development where it is needed for outdoor recreation, or where it makes a valuable contribution to the natural environment, urban heritage or quality of life. As opportunities arise, open space will be: (a) improved, where it is of poor quality; and (b) created, where there is a shortage."

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.

# 3.5 Adjacent land ownership

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

## 3.6 Site history and past management

During the medieval 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 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 give 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 medieval 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.

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.

There had been limited management work within the reserve in the last twenty years prior to 2002, 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 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.

# 3.7 Services (Figure 6)

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. The services for the extension to the reserve have not been investigated.

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.

## **3.8 Infrastructure** (Figure 5)

## **3.8.1 Public Rights of Way and Informal Paths (Figure 2)**

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 generally 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 Wildlife Trust does not take responsibility for the route.

#### 3.8.2 Boundaries

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 road. 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, this 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.

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. Developers of the former Stradbroke College site have also installed A-frames and other anti-motorbike access points at the reserve's boundaries.

#### **3.8.3 Interpretation Features and Other 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 Rd entrance, and there is a sculptural gate the main entrance off Castlebeck Avenue. Two metal benches were installed in 2015 at the edge of the meadows in Comps 3 and 4.

# **3.9 Archaeological Interest and Existing Features** (Figure 7)

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 medieval 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 6 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.

# 3.10 Current funding schemes and grants

Current funding schemes are in place from Higher Level Stewardship (HLS), England Woodland Grants Scheme (EWGS), Viridor Credits Environmental Company and Awards for All.

The HLS agreement runs from 2013 to 2023 and details the following management of the reserve: the maintenance of successional areas and scrub; restoration of species-rich, semi-natural grassland and the restoration and maintenance of grassland for target features.

The EWGS runs from 2012 to 2017 and details the following management should take place to meet funding specifications: a Woodland Welcome sign shall be erected and maintained at access off Castlebeck Avenue; main footpaths will be strimmed to a distance of 1m on either side of the path; gates, bridges, benches and welcome boards will be maintained to ensure that all are clean and safe to use; litter will be collected and removed from all areas in an appropriate manner and collections will be carried out on a regular (at least once a month) basis; clearance of fly tipping shall be carried out as soon as possible following identification of such acts; repair and rectification to signage, way-markers and other infrastructure will be carried out as soon as possible following notification.

The Viridor "Carbrook Meadow Restoration" project runs from 2014 to 2016 and covers the restoration of the hay meadow in Compartment 5, with hay cutting, ground preparation, reseeding and weed control.

The HLF Awards for All "Stradbroke Community Meadow" project runs from 2015 to 2016 and includes the installation of two benches, laying 85m of hedgerow, scrub removal, tools & PPE and hay cutting.

# 3.11 Pipworth Rec SUDS scheme

In 2016/17 Sheffield City Council are proposing to install a Sustainable Urban Drainage Scheme (SUDS) in Pipworth Recreation Ground, which borders the reserve to the north-west. The proposed scheme will be downstream of the nature reserve and will not therefore have a direct impact on the site.

However SCC officers have committed to work closely with SRWT to improve security along the boundaries of the site as part of the scheme. These works will address illicit motorbike access, which is a regular problem on the reserve and the adjoining open spaces. In particular the gates and barriers at the end of Danewood Avenue need to be improved.

# **4 ENVIRONMENTAL INFORMATION**

# 4.1 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).

# 4.2 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.

# 4.3 Climate

Data is available for the thirty-year average (1981 - 2010) from the following local weather station.

#### Table 1. Local climate data

Location	Mean Annual Rainfall (mm)	Mean Annual Sunshine (hrs)	Average Te	mperature (°C)
			Max	Min
Sheffield (131m)	834.6	1444.9	13.4	6.6

# 4.4 Hydrology (Figure 3)

The main watercourse through the site is the Car Brook, which flows in a northerly direction. 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 recent 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.

The current state of the water quality seems good on appearance.

# 4.5 Biodiversity and Biodiversity Action Plan overview

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, amenity grassland (near to the reserve edges), tall ruderal vegetation (mostly in the wet soil at the stream edge), heather dominated patches, areas of dense bramble 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 5 – Biodiversity.

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.

 Table 2. Biodiversity Action Plan (BAP) Priority habitats and species at Carbrook

 Ravine Nature Reserve

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

# Table 3. 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.

# 4.6 Biodiversity List of surveys, monitoring schemes and reports

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 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 site and surrounding areas from 1996.
Page	2000	Ecological survey	An ecological survey of Bowden Housteads Wood and Carbrook Ravine.
Sheffield City Museums	unkn own	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 short cut through the reserve. The main threats are 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, un-improved 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	2001	Desk top invertebrate survey	A summary and assessment of all Sorby invertebrate records. There are 85 species, including 18 that are Local

Society			or Notable/Nb. The wide diversity if habitats on site
Society			encourage a high number of different species.
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 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 pipestrelle 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 effect to fungi growth. It also comments on the grass length, noting that it is a little too long for waxcaps

# **5 BIODIVERSITY**

# 5.1 Overview

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; amenity grassland; acid grassland/heathland mosaic; tall ruderal vegetation and hedges. Figure 4 illustrates the habitats mapped in the Phase One Habitat Survey of 2010.

# 5.2 Woodland

## 5.2.1 Wet Woodland

The woodland along the brook in the main ravine and in parts of Spring Wood is broad-leaved seminatural 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 Biodiversity Action Plan priority species, 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 golden male fern (*Dryopteris affinis*), the latter not commonly found in Sheffield. Where the canopy is dense, the ground cover is dominated by brambles (*Rubus fruticosus agg.*) and ivy (*Hedera helix*). Nettles (*Urtica dioca*) 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 will be managed as scrub.

#### Management

Wet woodland is a key habitat in both the Sheffield LBAP and the UK BAP, so maintaining and, if possible, enhancing this habitat is important. The willow carr along the brook is in good condition and does not need much management. The carr should be allowed to collapse and regenerate naturally. Small areas of dense willow scrub will be coppiced along the watercourses in the southern end of Compartment 2 and in Compartment 1, to prevent over-shading of the ground flora.

Sycamores are regenerating within the willow carr in Compartment 2. If this succession is allowed to continue, it may lead to the drying out, and eventual loss of the wet woodland. The spread of sycamore into wet areas should therefore be monitored and controlled.

Japanese knotweed is present in small amounts in the wet woodland in Compartment 1, and should be monitored and controlled.

#### 5.2.2 Semi natural deciduous woodland

Up the banks of the ravine on the drier soils, the woodland canopy is dominated by sessile oak (*Quercus petrea*) 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 pseudoplantus*) 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.

#### Management

Old hazel coppice stools can still be seen 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 safety surveys are felled.

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. Subsequent regrowth has meant that areas of the woodland (especially edges) were effectively coppiced. This has improved the structure of the woodland and no further tree works are planned within the period of this management plan.

When tree safety works have been undertaken, the smaller branches were chipped to deter fire-making. Larger, full-length limbs have been retained to improve on the quality and quantity of deadwood. It is expected that increasing the amount of deadwood would be of benefit to a wide range of wildlife, such as fungi and saprophytic invertebrates. There is a limited amount of standing deadwood, however, and this should be increased where possible through tree safety works.

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.

## 5.2.3 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 qualifies 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 (*Paxilus 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 stereum (*Stereum hirsutum*) and blushing bracket (*Daedaleopsis confragosa*) being found.

## 5.3 Scrub

There are several areas of dense bramble scrub with a ground flora of stinging nettle, creeping thistle, couch (*Elymus repens*), golden rod (*Solidago virgaurea*), tall fescue (*Festuca arundinacea*), cleavers (*Galium aparine*) and shrubs of gorse (*Ulex europeaus*).

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.

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.

#### Management

Areas of scrub identified in the HLS agreement will be managed to maintain this transitional habitat, in compliance with the HLS indicators of success.

# 5.4 Grasslands

#### 5.4.1 Neutral grassland

The reserve contains three areas of neutral grassland, all of which area 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*).

The Restoration Meadow was seeded with a native hay meadow mix in Spring 2015, comprising the following: ox-eye daisy, lady's bedstraw, agrimony, black knapweed, salad burnet, common sorrel, meadow buttercup, common birdsfoot trefoil, meadow vetchling, red clover, rough hawkbit, yarrow, wild carrot and yellow rattle.

The 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.

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

#### Management

Cutting grass (as opposed to grazing it) can have an adverse affect 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. Under the HLS agreement the three hay meadows are given an annual hay cut in September and arisings are removed.

In 2015, a proportion of Compartment 4 (Hay Meadow) was cut for green hay to be used for a restoration project at Tinsley. It is proposed that further green hay cuts are taken in future years to be used at Woodhouse Washlands, amongst other sites.

#### Monitoring

Random quadrat sampling should be undertaken on the Restoration Meadow in the first year of the management plan, and on all three meadows in subsequent years, to assess compliance with HLS targets.

#### 5.4.2 Amenity grassland

The small areas of amenity grassland on the reserve is dominated by perennial rye grass, with some daisies (*Bellis perennis*) and broad leaved plantain (*Plantago major*). These areas are species-poor and located in areas adjacent to paths and roads, are of little wildlife interest and should be managed with their amenity value in mind.

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

#### 5.4.3 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.

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*).

# **5.5 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 is a species-rich hedge containing rose, hazel, hawthorn, blackthorn, dogwood (*Cornus sanguinea*) and hedge bindweed on the reserve boundary, adjacent to houses on Danewood Avenue.

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.

The hedge on the western reserve boundary, next to Danewood Avenue, is privately owned and so will not be managed by the Trust.

# 5.6 **Zoological interest**

#### 5.6.1 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 vegetation with reed mace and soft rush are all important habitats for invertebrates. The footpath provides edge habitat and bare ground in some places.

The reserve is potentially a good site for butterflies. Caterpillar foodplants available in the main ravine include: sessile oak, wych elm, ivy, holly, Yorkshire fog, cocksfoot, Bent sp. (*Agrostis* sp.), Meadow-grass sp. (*Poa* sp.), couch, common nettle and bird's-foot-trefoil. Meadow brown (*Maniola jurtina*), skippers (*Hesperiidae*) and gatekeepers (*Pyronia tithonus*) are found on the reserve using a range of grasses for caterpillar food plants. Holly blues (*Calestrina argiolus*) have two caterpillar foodplants, holly flowers in spring and ivy flowers in autumn, both of which are present.

Some butterflies, such as commas, peacocks, and small tortoiseshells, over winter as adults, and require both a sheltered woodland habitat in which to hibernate and a rich supply of nectar, from sources such as nectar from Michaelmas daisies (*Aster* sp.), ivy flowers, and the juice from blackberries, elderberries and apples, with which to build up fat reserves. In spring, nectar from blackthorn, hawthorn, holly and willow flowers will help to replenish the dwindling reserves of butterflies that have survived the winter months. Therefore, any management work should ensure that these components are maintained or enhanced on the reserve.

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.

The semi-improved neutral grassland in the north east of the site should be managed to provide a variety of sward heights. Scattered young shrubs, such as hawthorn, are encroaching on some areas of grassland, and provide areas for nectar feeding insects. The acid grassland and the heath should be maintained as open areas, with some bare soil areas left for solitary/mining bees and wasps.

Dead and rotting wood should be encouraged and retained to aid the conservation of saproxylic insects.

Further survey would be beneficial, as the records referred to in this report date from 2001. Butterfly transects and moth trapping would help to gain more information on Lepidoptera populations, while Hemiptera, gall insects and mites could be usefully covered in future survey work.

The invertebrate survey was a desk top 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. *Ortnonerva brevicornis* is a Notable species, and is locally and nationally uncommon. It is wetland specialist of fens and marshes, and has semi-aquatic

larvae, which occur in muddy pools and wet decaying vegetation. Wetland hoverflies are fairly well represented on the reserve.

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 recorded might reflect recorder bias. The flowering plants, particularly hawthorn flowers, are a good source of pollen for *Andrena* bees. These bees need bare ground and short turf rough grass for burrowing their nests. *Nomada* appear to be an important group as they are kleptoparasitic on *Adrena* 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*). Further butterfly surveys are required.

## 5.6.2 Fish, amphibians & reptiles

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

There are no records of amphibians or reptiles from within the reserve. A survey would be beneficial to determine whether any herptiles are present on the reserve.

## 5.6.3 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, all of some conservation concern: skylark and song thrush are priority species in the UK BAP, and sparrowhawk, meadow pipit, greenfinch, house martin, blue tit, great tit, chiffchaff, blackcap, willow warbler, dunnock, and wren are listed in the Sheffield BAP. Bullfinch, song thrush and skylark appear on the Red list and dunnock is on the Amber list in the RSPB publication 'Birds of Conservation Concern'.

A follow-on bird survey has not been carried out, and is due during the period of this management plan. There may be opportunities to combine bird surveys of Carbrook Ravine with those undertaken at Bowden Housteads wood.

Most of the birds seen are typical woodland and garden birds, although meadow pipit and skylark are usually associated with moorland and heathland. These two species were recorded in the open grassland in the north east of the site.

The bird community at Carbrook Ravine broadly reflects the habitats and accompanying ecological niches available in the area. While several of the species recorded are of conservation concern, none has conservation management needs that go beyond the sensible management of their habitat(s).

Birds such as blackcap, wren and jay require woodland with an abundant understorey of shrubby vegetation. Coal tit, blue tit and great tit need trees with cracks and rot-holes for nesting. Ten bird boxes were installed in the Carbrook compartment (Comp 2) in 2014.

Other species (such as skylark) require relatively undisturbed open grass areas away from dense scrub and woodland.

A third group specialises in the woodland edges of mixed grassland, heath, scrub and small trees – often including dense hedges or hedges with occasional trees as song-posts. The song thrush is typical of this group.

If the habitats on the reserve are managed to maintain areas of open grassland, (including some near to the woodland edge), scrubby areas, a thick hedgerow and a diverse woodland (with a good range of field, shrub and canopy layers and plenty of standing dead wood), it should cater for the existing bird community, and may also provide opportunities for birds of conservation concern, such as the grey partridge and tree sparrow, which have been recorded within the Bowden Housteads woodland complex.

## 5.6.4 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 mice (*Apodemus sylvaticus*). Further small mammal trapping was undertaken in 2007, and resulted in high trapping rates.

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

# 5.6.5 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 provides roost sites.

Ten bat boxes were installed in the Carbrook compartment (Comp 2) in 2014.

# **6 INFRASTRUCTURE**

# 6.1 General

Experience from previous management plans shows that infrastructure at Carbrook Ravine (and especially Spring Wood) is vulnerable to vandalism, or removal soon after installation. Therefore any infrastructure added to the reserve should be carefully thought out and designed to be extremely robust or easily replaceable. Furthermore, any damage must be remedied as soon as possible, to improve the perceptions of urban green spaces and Sheffield Wildlife Trust.

# 6.2 Footpaths and bridleways (Figure 2)

Numerous footpaths (both informal and Public Rights of Way) cross the site. 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 enclosed grassland, have deteriorated and would benefit from replacement.

The importance of the reserve as part of Sheffield's Green Network could be strengthened by the provision of appropriate signage to indicate the main movement routes to and from selected destinations, including links to the Sustrans Cycle Route (and then onwards to the Trans Pennine Trail) and paths linking through to Bowden Housteads Wood. However, the high risk of vandalism would need to be carefully considered before undertaking any such work.

# 6.3 Boundaries

Improvements have been made to the reserve boundaries with boulders, A-frame access points, gallow gates and knee rails to prevent access by cars. The gate at Castlebeck Avenue, designed and made with an artist and a group of young people, has been slightly vandalised (the lock has been broken) and secured using a large boulder. Motorcycles are still able to access the reserve around the right hand side of the gate. It is recommended that the gate be repaired (welded shut) and the boulder relocated to barricade this access.

In previous years there have been problems with fly-tipping from the houses adjacent to Spring Wood, with boundaries having fallen into disrepair. However, this has generally improved as residents have repaired boundaries and a new section of fencing has been erected along the reserve boundary to the west of Spring Wood. The problem with fencing lies mainly to the eastern boundary of Spring Wood where fences have fallen into a state of disrepair.

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-east presents more of a management issue, as it allows unrestricted vehicular access into the reserve – bringing with it the likelihood of joyriding, motorbike scrambling, vehicle abandonment and large-scale fly-tipping. Sheffield City Council plan to install a SUDS scheme on Pipworth Rec during this period of this management plan, part of which will include boundary improvements to prevent illicit access on to the reserve (Claire Taylor 2015, pers. comm.)

The southern boundary of the Carbrook compartment along Spinkhill Avenue is inaccessible to vehicles due to the slope, although fly tipping in this area is an ongoing problem. It is proposed to seek funding for the installation of high mesh fencing along this boundary to deter fly-tipping.

Local residents on Car Vale View, on the eastern boundary of the reserve have raised the issue of antisocial behaviour behind the high wooden fencing at the reserve entrance. It is proposed to seek funding to replace the current fencing and also install a vehicle barrier in this location, to improve visibility and increase security.

# 6.4 Signage and seating

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. They have been sensitively installed away from housing (where potential conflicts could occur between households and young people using the bench as a meeting point) and take into consideration the excellent views across the reserve.

Three wooden noticeboards were installed at entrances to the reserve in 2015, although one was removed shortly afterwards due to repeated vandalism. No further signage or seating is proposed.

# 7 CULTURAL CONTEXT

# 7.1 Recreational usage

The site is well used by local people on foot to as a cut through, for dog walking and for running. 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 problem in the reserve.

Based on the results of the postal visitor survey in 2001, it would seem that over three quarters of the people questioned didn't visit the reserve for more than thirty minutes, with over half not visiting for more than ten minutes. Half didn't visit more often because they didn't feel safe in the reserve.

Just as fly tipping is a major deterrent to the educational use of Carbrook Ravine, it is also a significant negative element in people's enjoyment and use of the site for leisure and recreation (although some people do still use the site for these purposes). 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.

# 7.2 Information and interpretation

A small engraved metal interpretation panel is located at the southernmost end of the reserve, at the Fishponds Road entrance. 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 leaflet might provide a better option.

# 7.3 Community

Carbrook Ravine Nature Reserve is situated in the Manor ward of Sheffield City, incorporating the manor estate and intake wards. The following information is drawn from the 2011 National Census. The total population of this ward is 21,621.

The Manor ward is the fifth largest in Sheffield City, with 69.3% of residents aged 15-64 years old, compared with a Sheffield average of 67.8%. In the ward, 12.5% are aged 65 and above, whilst Sheffield average is 15.6%. Manor ward has a higher than average population of young people aged up to 25 years at 35% to Sheffield's average of 33.3%.

Results regarding ethnicity are rather different to the 2001 census, with 21.3% of people identifying themselves as non-white. This is above Sheffield average.

Unemployment in the Manor ward is higher than the Sheffield average: 15.3% of the Manor ward population are unemployed compared to the Sheffield figure of 9.8%. 8.2% are long term sick or disabled compared to Sheffield's 4.5%.

51% of households in the Manor ward have no access to private transport, which is much higher than the Sheffield average of 33%. This results in reliance on public transport and access to local services.

Of people aged 16 and over, 36.6% of the manor's population have no formal qualifications compared to the Sheffield average 24.3%. The number of people obtaining a level 1 qualification is above the city average with 14.2% achieving this compared to 12.3% for Sheffield, but for all other levels of qualifications the statistics paint a negative image of the ward.

There were 9063 households recorded during the 2011 census, of which lone occupancy is 34.7%. Only 31.5% of dwellings are owner occupied and 50.2% are social housing, being either Council or Housing Association rented properties. The remainder are in private ownership but rented to tenants.

There are a number of youth community groups and forums active within the area. Significant ones include Community Youth Teams, the Manor and Castle Development Trust and Manor Assembly

Several youth initiatives are also underway in the area surrounding the reserve. The Green Estate

Company runs a successful volunteering scheme for young people excluded from formal education, most participants of which have gone on to find successful employment with the company. Other examples of which include the provision of football pitches on Pipworth Recreation Ground and the temporary provision of a metal cabin on this site, the purpose of which was to give young people a place to congregate, so providing a focal point for positive contact with the Green Estate Team. The purpose of these initiatives is to engage young people in recreational activity on open spaces, and to encourage people to come back onto areas they would not normally think of using. Some projects are staffed, at least in part, by local volunteers, giving parents in the area the chance to get involved.

Community engagement has proved challenging on this nature reserve. Although attempts were made to run a reserve advisory group for Carbrook Ravine, the group failed due to a lack of attendance.

There are occasional complaints from neighbouring residential properties regarding the impact of overhanging branches. These are investigated and treated according the SCC's policy on trees, i.e. that trees will only be taken down where they are dead/dying or dangerous in some way. Occasional complaints are also received as about the impact of motorbikes on the reserve, particularly in Compartment 5. SRWT staff encourage complainants to log their concerns with the Police on the 101 non-urgent phone number.

## 7.4 Education

Local schools in the area include Pipworth Community Primary School, St Theresa's Catholic VA Primary School, Norfolk Park School and Sheffield Park Academy. All four of these school received a rating of 'good' on their last Ofsted inspection.

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. There is considerable evidence to suggest that environmental education can be used as a very effective vehicle for delivering a range of National Curriculum targets at both primary and secondary levels. The opportunity to take pupils out of a formal classroom environment can also be valuable in motivating pupils who would otherwise be uninspired. It can be effective at engaging disaffected pupils and frequent non-attendees - particularly if linked with out of school environmental activities.

The widely recognised benefits of using natural green spaces as "outdoor classrooms" may be of particular benefit to some of the local schools where educational attainment levels are low, and where alternative approaches to an entirely classroom-based approach may be developed as part of a package of measures to enhance performance. The adjoining open space, Pipworth Recreation Ground, may also be used to provide an open area for more active games etc. Sessions could also be developed that allow pupils to compare this area of amenity grassland to the more diverse habitats in the reserve.

Although conditions at the site have improved due to regular patrols and clean ups, and the addition of vehicle restrictions, the main barriers to the widespread use of Carbrook Ravine as a formal and informal educational resource continues to be the level of awareness and confidence amongst teachers at local schools. There are still the physical deterrents posed by the large scale of rubbish tipping on the site and issues concerning safety (including hypodermic needles and potentially undesirable behaviours by members of the public). 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.

# 8 ECONOMIC CONTEXT

# 8.1 **Productive land use**

From 2001 to 2006, yellow rattle seed was collected from the nearby site Carr House Meadows and sown on the meadows of Carbrook Ravine in order to restore the meadows by creating greater diversity within the plant community in the grassland area. Sheffield & Rotherham Wildlife Trust worked with the Green Estate Company to increase the resource at Carbrook Ravine, with a view to harvesting and selling seed. The work was unfortunately not found to be cost effective and this scheme ended.

# 8.2 Grants and Funding

Funding should continue to be sought for various on-site projects. Projects may be eligible for funding from both public and private sources, such as Landfill Tax or Lottery funds, or could be included in funding bids relevant to the larger Living Landscape Programme. Previously funding was secured from the Biodiversity Action Fund (Natural England) in 2006 and 2007, from Viridor Landfill Tax Credits in 2014 and from Big Lottery Awards for All in 2015. There is current funding from HLS and EWGS as detailed in section 3.10.

# 8.3 Employment and Training

Unemployment levels in the Manor and Woodthorpe estates are high and academic achievement below the Sheffield city average. No employment and training initiatives have yet been linked directly to the use and management of the Carbrook Ravine nature reserve, but opportunities should be explored as and when they arise.

# **9 ORGANISATIONAL INFORMATION**

# 9.1 Site safety, security and maintenance

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 polices covering environmental management and health and 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-yearly intervals. Associated remedial work is undertaken as recommended.

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.

# 9.2 Management Structure



# **10 WORK PROGRAMME**

Objective	Prescription	Priority	2016 /17	2017 /18	2018 /19	2019 /20	2020 /21	2021 /22	2022 /23	2023 /24
Aim 1 - Maintain the grassland areas of the reserve in favourable condition										
1.1	Cut and remove hay from 3 hay meadows (Comps 3, 4, 5) annually after 1 <sup>St</sup> September	High	x	x	x	x	x	x	x	x
1.1	Monitor and control (as required) dock, thistle and ragwort in Comps 3, 4, 5	High	x	x		x		x	x	x
1.1	Cut back encroaching bramble scrub along western margin of meadow in Comp. 3	High	x					x		
1.2	Mow and rake off 2 amenity grassland areas in Spring Wood annually in July	Med	x	x	x	x	x	x	x	x
1.3, 2.2, 3.1, 7.2	Remove litter from grassland, scrub and woodland areas through regular ranger patrols	High	x	x	x	x	x	x	x	x
1.3, 2.2, 3.1, 7.2	Undertake annual removal of large fly-tipped objects each November	Med		x	x	x	x	x	x	x
1.4	Strim back encroaching vegetation along recently- laid eastern section of hedgerow in Comp.4	Med	x					x		
1.4	Seek funding for the restoration of the remaining hedgerow in Comp. 4. Restore (relaying & gapping up) during management plan period.	Med		x	x	x	x	x	x	x
Aim 2 - Maintain successional areas of scrub in favourable condition										
2.1	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	High	x	x	x			x		
2.1	Manage open areas within scrub to ensure no more than 5% undesirable weeds and no more than 10% tussocks	High		x	x	x		x		

			2016	2017	2018	2019	2020	2021 /22	2022 /23	2023 /24
Objective	Prescription	Priority	/17	/18	/19	/20	/21			
Aim 3 - Maintain the woodland areas of the reserve in favourable condition										
3.2	Remove young sycamore in wet woodland in Comp 2	Med	x							
3.2	Monitor Japanese Knotweed in Comp 1 and control as required	Low		x		x		x		x
3.3, 6.1	Maintain rides by cutting back & coppicing pathside trees in Comps 1 & 2	Med				x		x		
3.3	Retain standing and fallen deadwood where safe to do so	Med	x	x	x	x	x	x	x	x
Aim 4 - Mainta	ain and wet heathland and wetland areas in favoura	ble conditi	on							
4.1	Cut back bramble and rank vegetation surrounding heathland area in Comp 2	High	x		x		x		x	
4.1	Cut and poison encroaching willow & birch scrub on margins of heathland area in Comp 2	High	x				x		x	
4.2	Coppice dense willow along Car Brook in: Comp 1 (north of larger amenity grassland) Comp 2 (north of the heathland area)	Med	x	х	x					
Aim 5 - Monit	or and record the ecological features on the reserve	)								
5.1	Encourage biological recording by staff, volunteers, local groups and public	High	x	х	x	x	x	x	x	x
5.2	Undertake DAFOR survey of Comp 5 to assess results of meadow restoration	High	x							
5.2	Undertake DAFOR survey of Comps 3,4,5 to assess HLS compliance	High		x						
5.3	Staff and volunteers to record presence of the following HLS indicator species: skylark, bullfinch, linnet, yellowhammer & turtle dove	High	x	x	x	x	x	x	x	x
5.4	Undertake Phase 1 habitat survey to inform new management plan	High				x				
5.5	Undertake Breeding Bird Survey, if resources allow	High				x				

Objective	Prescription	Priority	2016 /17	2017 /18	2018 /19	2019 /20	2020 /21	2021 /22	2022 /23	2023 /24
Aim 6 - Maintain and improve access to the reserve										
6.1	Strim back overgrown paths (annual cut in July, and by ranger patrols as required)	High	x	x	x	x	x	x	x	x
6.2	Monitor condition of infrastructure through regular ranger patrols	High	x	x	x	x	x	x	x	x
6.2	Remove defunct steps to west of Car Vale View entrance	Med		x						
6.2	Replace rotten steps on path north-west of Car Vale Drive entrance	Med		x						
6.2	Replace steps and sleeper bridge to southwest of small meadow in Comp 1	Med			x					
6.3	Undertake in-house tree safety survey	High	x		x				x	
6.3	Undertake QTRA tree safety survey	High					x			
Aim 7 - Discourage negative and damaging use of the site										
7.1, 7.2	Undertake regular ranger patrols to monitor illicit access, fly-tipping and damaging use of the site, and deal with any incidences ASAP	High	x	x	x	x	x	x	x	x
7.1	Block desire line/motorbike access to west of wet heathland using brash	Low	x							
7.1	Install boulders at Spinkhill Avenue and Castlebeck Avenue entrances, if resources allow	Low			x					
7.1	Install motorbike barrier at Car Vale View entrance, if resources allow	Med			x					
7.1	Work with SCC officers to ensure that improved barriers are provided as part of Pipworth Rec SUDS scheme	High	x	x	x					
7.2	Replace opaque fencing at Car Vale View entrance with transparent high mesh fencing, if resources allow	Med			x					
7.2	Erect high transparent mesh fencing along Spinkhill Avenue on southern boundary of Comp 2, if resources allow	Med			x					
7.2	Maintain "no flytipping signs" and report any incidences of fly tipping promptly to SCC officer, in particular any incidents on boundaries of residential properties	Med	x	x	x	x	x	x	x	x

Objective	Prescription	Priority	2016 /17	2017 /18	2018 /19	2019 /20	2020 /21	2021 /22	2022 /23	2023 /24	
Aim 8 - Promote and encourage local participation in the management of the reserve											
8.1	Seek opportunities to engage with the local community to encourage positive use of the site	Med	x	x	x	x	x	x	x	x	
8.1	Maintain up-to-date information on noticeboards at Danewood Ave and Castlebeck Ave entrances	Med	x	x	x	x	x	x	x	x	
Aim 9 - Develop ongoing sources of grant aid and other income to support the management of the reserve											
9.1	Seek grant funding to help deliver management plan (Landfill tax, etc.)	High	x	x	x	x	x	x	x	x	
9.1	Investigate Countryside Stewardship funding to replace EWGS	Med		x					x		
9.2	Promote the reserve through press releases, SRWT e-newsletter and social media	Med	x	x	x	x	x	x	x	x	