

# Urban



## Headlines

- **Sheffield has a substantial amount of semi-natural and managed green space within the urban zone. This includes 1,685ha of woodland – covering 11% of the area – and 2,724ha of amenity grasslands.**
- **Sheffield has 4,290ha of urban gardens. These are important sites for biodiversity – particularly invertebrates.**
- **Built features in the urban landscape support key protected urban species such as peregrine falcons, hedgehogs, and numerous bat species by providing foraging, shelter and breeding opportunities.**
- **Sheffield has a diverse range of urban conservation, management and landscape improvement programmes working to protect nature and improve public access to green spaces. These include Urban Nature Parks and urban Local Nature Reserves (LNRs).**
- **Nearly half of Sheffield's Local Wildlife Sites (LWSs) and over half of LNR land is found within the central urban zone.**
- **Many non-native species are found in Sheffield and some are likely to be negatively impacting local species. Gardens are often the source of non-native species introductions to the wider environment.**
- **Current threats to urban habitats and wildlife include habitat loss through development and redevelopment, litter, pollution, and changes in gardening practice and design, for example, paving and decking.**

Introduction

Far from being a concrete jungle, Sheffield boasts an impressive amount of green space within its urban districts. Along with the buildings and roads, the urban environment also includes parks, gardens and other green spaces such as allotments and woodlands. Above all, Sheffield’s extensive spread of urban gardens provides essential habitat for wildlife in a challenging environment. As a city built on the confluence of five rivers, Sheffield’s urban zone has an unusually diverse spread of habitats that allow for high biodiversity, including brownfield sites, which host specialist species and early colonising plants<sup>1</sup>. Transport networks support important linear habitats, such as verges, that contribute to habitat connectivity by acting as green corridors between woodlands, parklands and rivers although roads and railways can also be a barrier to wildlife. However, as development and urbanisation continues to deplete and fragment natural habitats, making new and existing urban areas more hospitable for wildlife should be an important focus.

Sheffield’s ‘urban zone’

As a historically industrial city, Sheffield’s ‘urban zone’ (based on the Sheffield Development Framework and contained in the red outline; Figure 2) is focussed around the river confluences to the south-east of the district. Supporting its reputation as a green city, nearly a third of this area (33%, Figure 1) is composed of urban gardens and landscaped areas (gardens alone make up 4,056ha or 27%). This provides valuable habitat for species using the urban environment, such as hedgehogs and many garden birds. A further 16% of the urban zone is covered by amenity grassland such as parks and communal areas (such as that around many housing estates), whilst 11% of the area is covered by woodland (not including iTree data), most of which is publicly accessible. Some arable land (245ha) remains pocketed between suburban zones, concentrated mostly to the south-east in Handsworth and Woodhouse.

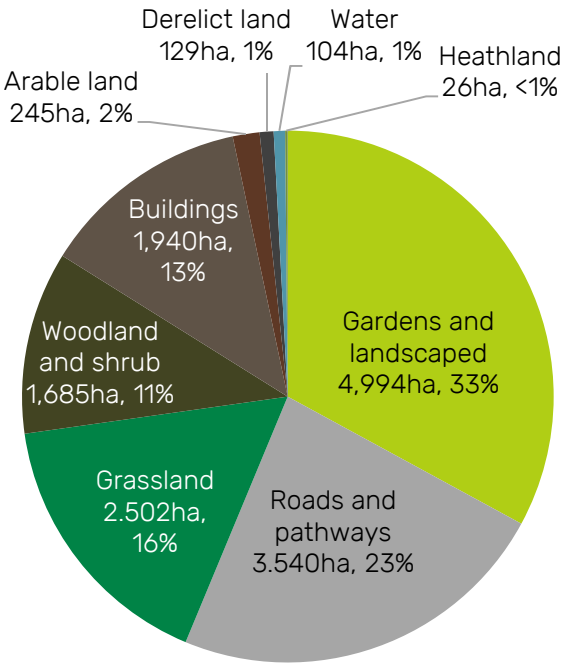
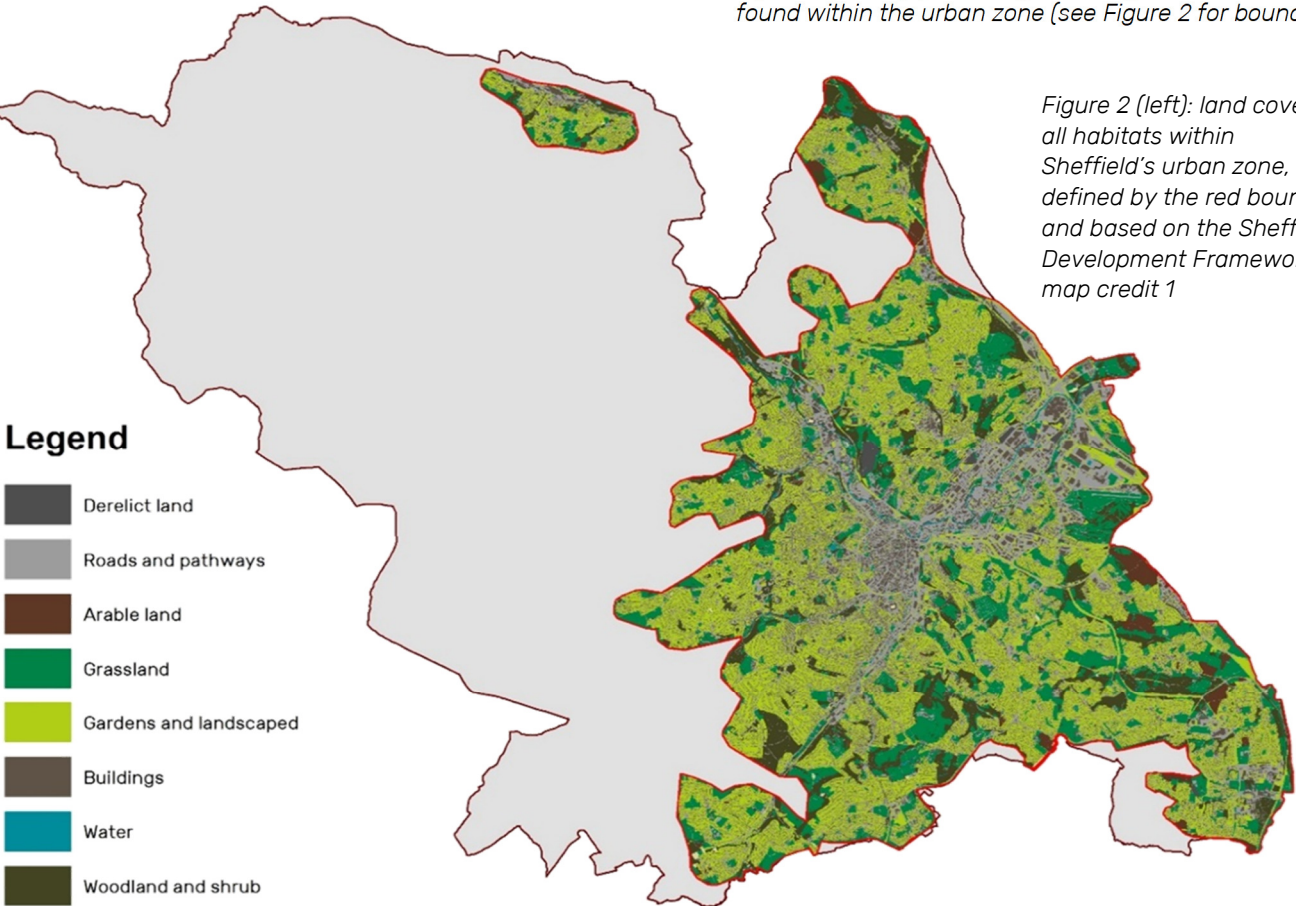


Figure 1 (above): percentage coverage of all habitat types found within the urban zone (see Figure 2 for boundary)

Figure 2 (left): land cover of all habitats within Sheffield’s urban zone, defined by the red boundary and based on the Sheffield Development Framework; map credit 1



# What urban or modified habitats does Sheffield have?

Figures 3 and 4 show the composition and distribution of habitats which are highly modified or influenced by people and the built environment, across the whole district, excluding developments such as buildings and roads. These have mostly been modified for human use, and are often intensively managed, but may contain natural features such as retained parkland trees. Private gardens, covering 4,290ha, occur throughout the residential areas of the district, concentrated across the east of the region. Amenity grasslands and parks provide considerable – and different – additional greenspace, contributing to both wildlife habitat and human well-being. Other landscaped areas, such as public gardens and greenspace around apartment blocks, also contribute to the landscape of urban green spaces. Urban roadside vegetation, mostly comprising grass verges, is often species-poor and highly managed in contrast to rural verges (see Grassland & Farmland chapter).

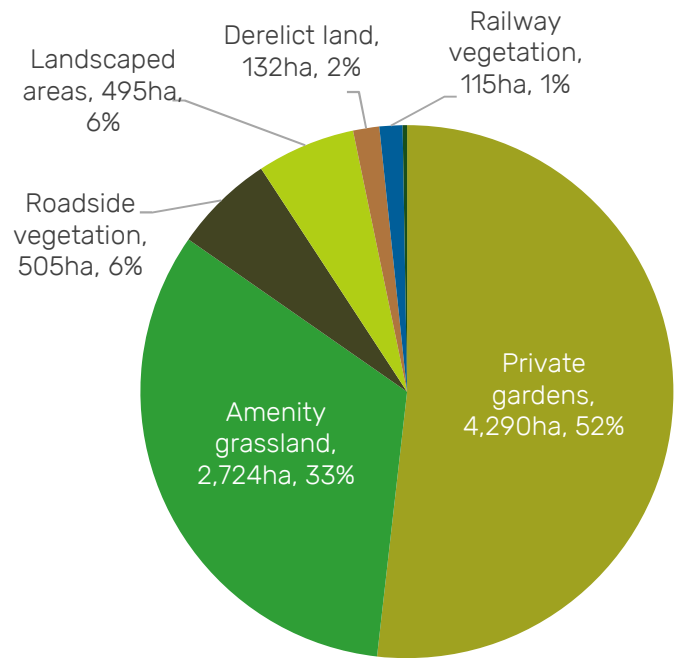


Figure 3 (above): percentage coverage of habitats, within the whole of the Sheffield district (see Figure 4 below), that are heavily modified and may be considered to be urban

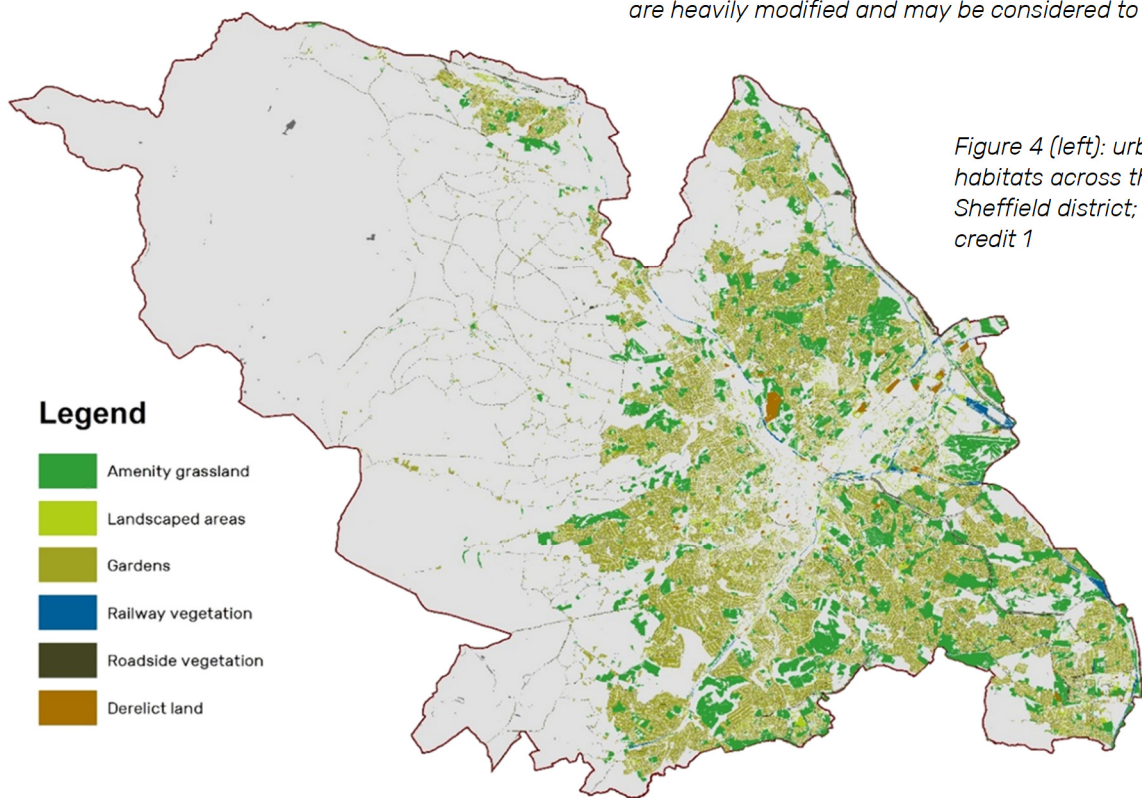


Figure 4 (left): urban habitats across the Sheffield district; map credit 1



## Case study: Bats and industrial heritage in Sheffield

### Robert Bell, South Yorkshire Bat Group

Sheffield is widely known for its proud industrial heritage and is globally recognised for its major contribution to the development of steel forging and special steel refinement. Industrialisation saw Sheffield's five rivers culverted, steel works constructed alongside water-courses, and weirs and channels created to extract water to power forges and mills. At numerous locations in surrounding hills, mining for minerals (such as the heat resistant gannister and pot clay) took place to feed the demand of brickworks within river valleys in order to make fire bricks to line the city's furnaces. Viaducts, bridges and tunnels were constructed to allow the entry of rail, canal and improved road linkages into the city, overcoming the challenges of transporting finished goods and raw materials over the rough landscape.

These intense bouts of construction, and the subsequent decline of numerous stone and brick structures, has resulted in the development of some excellent bat habitats often close to the city centre. An extensive cool and dark culvert system below the train station has now been occupied by Daubenton's bat, which trawls for insects throughout the day while commuters queue on the platforms above. During the winter, pipistrelle bats move into an old railway arch to hibernate, whilst other species overwinter in old brick kilns within the city. Former brick works in west Sheffield support whiskered and common pipistrelle bat small day roosts, whilst brown long-eared bats use voids between concrete roofing sheets to rear young within easy reach of woodlands. Whilst many of the old mines within surrounding hills have now been closed, some remain. One is now shown to comprise Sheffield's first confirmed autumn swarming site, with Daubenton's bat, Natterer's bat, brown long-eared bat and whiskered bat caught at the site in 2017<sup>2,3</sup>.

Sheffield residents are rightly proud of their industrial heritage, much of which receives protection for heritage reasons. It is however important to remember that whilst our concentration was elsewhere, wildlife frequently moved in to exploit the opportunities we left behind. With sensitive repair and restoration, old buildings and structures can be maintained for people and wildlife. This is surely the way forward if we are to retain some of Sheffield's most hidden of treasures.

Brown long-eared bat © Tom Marshall



Image © Rob Bell

Bochum Parkway  
© Olivia Richardson

## Case study: Sheffield Living Highways

Living Highways is a partnership project involving the University of Sheffield, Sheffield & Rotherham Wildlife Trust (SRWT) and Amey who are delivering the Streets Ahead programme for Sheffield City Council (SCC). The aim of the project is to enhance the wildlife interest of grass road verges throughout the city by adapting management practices.

A city-wide mowing trial took place in 2016-17 which looked at the impact of reducing road verge mowing frequency by 50% on botanical and invertebrate communities. The study is also examining public perceptions of such changes. As part of the trial, it was found that Bochum Parkway (pictured) harboured several wildflower species, suggesting it is a meadow remnant. Reduced mowing at this site will continue and the length of the trial area extended. The expectation is that species such as ox-eye daisy and knapweed will flourish alongside common cat's ear and various vetches. These in turn may support invertebrates that are largely absent from intensively managed grasslands. The trial is showing that not all areas are suitable for a simple reduction in mowing, so areas are now being examined with a range of potential management changes in mind. For example, at Tinsley, yellow rattle seed and green hay (fresh meadow cuttings) have been added to a species poor verge where it has transformed both the structure and visual character of a previously low-value amenity grassland, illustrating what can be achieved with a little intervention.

## Key urban hotspots

Sheffield has an outstanding array of urban green spaces, featuring a variety of habitat types and covered by a number of site designations. These include city parks, cemeteries, commons, Local Nature Reserves (LNRs) and Local Wildlife Sites (LWSs). Some reserves such as Salmon Pastures and Crabtree Ponds are in the heart of the city where, together with important local wildlife sites such as Bole Hills, Clay Wood and The Cholera Monument, they offer Sheffield's residents a place to escape the hustle and bustle of city life. These cherished sites also help to create wildlife corridors across the city, including along Sheffield's urban rivers, and help connect larger woodland and parkland areas within the district. They are also valuable sites for recreation (see Figures 5 and 6 below) and education, and are often managed and maintained by volunteers.



Urban wildflowers  
© Paul Hobson

## Case study: Sunnybank LNR – a hidden gem

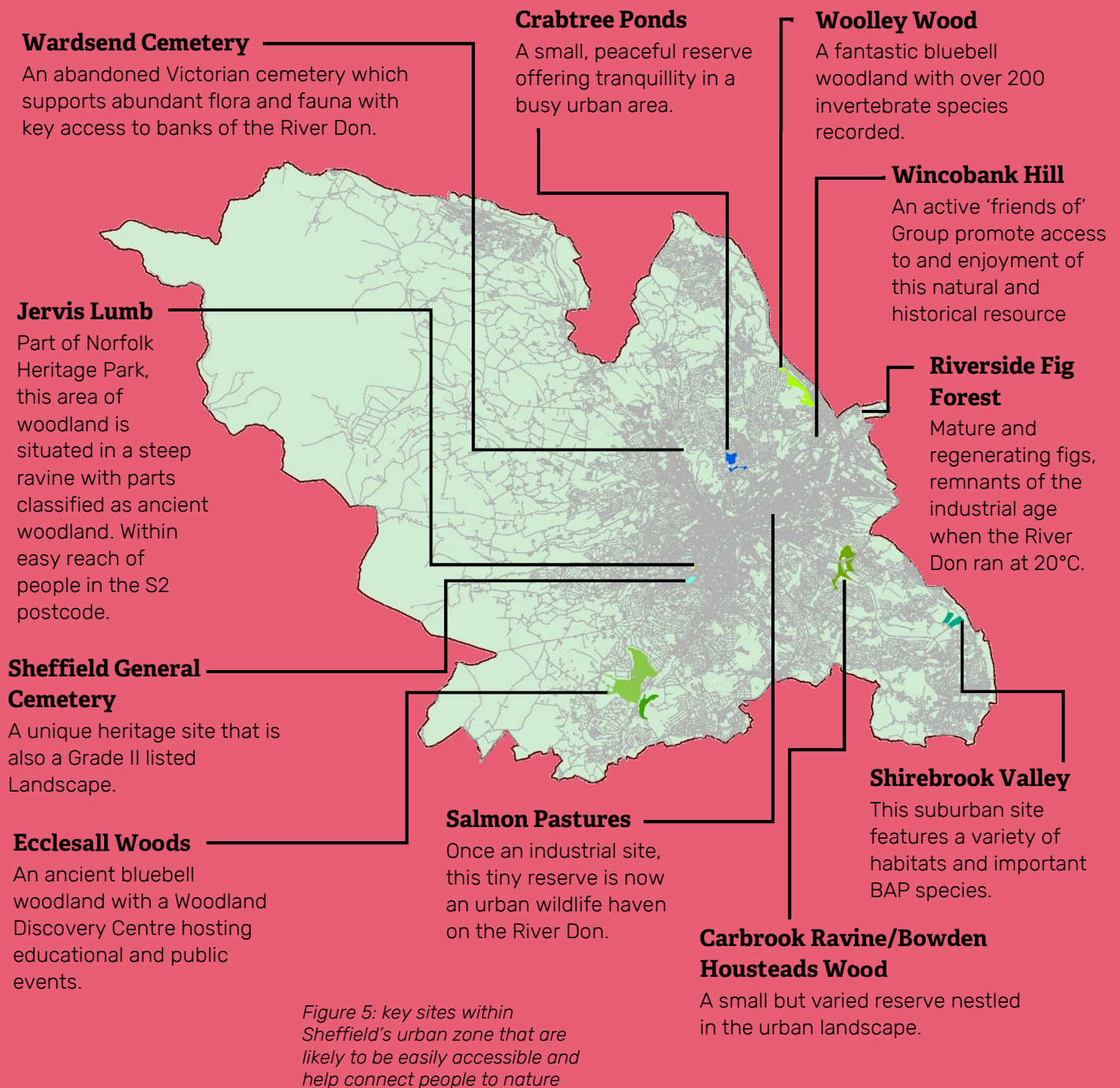
### Hannah Wittram, Sheffield & Rotherham Wildlife Trust

Covering just 0.8ha, Sunnybank LNR is a small site situated to the south-west of Sheffield city centre. Created on a site where housing was demolished in the early 1980s, Sunnybank was initially managed by the Sheffield City Wildlife Group, which later became Sheffield & Rotherham Wildlife Trust.

Despite its size, the reserve is a valuable site for both urban wildlife and the local community. It features secondary woodland with ash, bird and wild cherry, rowan, silver birch, wych elm and sycamore; herb-rich grassland; a pond; and scrub patches of blackthorn, hawthorn and bramble, which provide a good food source and cover for birds. Vetch, red clover and hedge bedstraw flourish in the grassland, providing nectar-rich food sources for invertebrates. The pond provides the perfect home for amphibians, and allows water mint, water forget-me-not and spearwort to grow. This mosaic of habitats provides refuge for a variety of species in a heavily urbanised environment. The reserve also contributes to the wildlife corridors created by gardens and other green spaces. Interesting species recorded on the site include: song thrush; tawny owl; pipistrelle bat; hedgehog; five bumblebee species; and the priority white-letter hairstreak butterfly, amongst many others. One other species often found on the reserve is the common frog. Since 2002 there has been a popular annual 'Frog Rescue Day' coinciding with the hay meadow cut, with volunteers and rangers working together to get the frogs out of the way of the machines. In 2017, a record 190 frogs and one smooth newt were rescued.

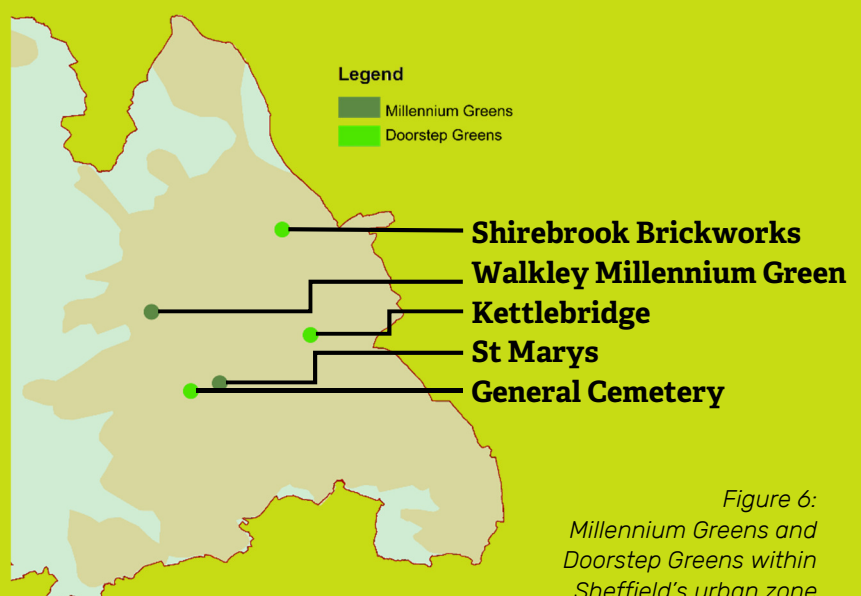
A large number of people travel through the reserve every day, as it connects Ecclesall Road and Broomhall Place, and it is in the centre of a heavily populated area. This makes Sunnybank very valuable to the local community, as it provides nature right on their doorstep and a green space that local people can use, be it for dog walks, relaxing in the summer, or picking blackberries in the autumn. SRWT carries out community work days and holds reserve advisory group meetings so that locals can have a say in and help manage this little gem of a reserve for future generations and wildlife to enjoy.





## Improving access to green space: Millennium and Doorstep Greens

Sheffield's urban zone has three Doorstep Greens – new or renovated areas of public open space close to people's homes, permanently accessible by the local community (Figure 6: right). There are also two Millennium Greens which are similar sites created to celebrate the millennium. Coupled with the various accessible designated sites and other greenspaces (e.g. Figure 5), Sheffield has many high quality accessible wild spaces. However, there is much more that needs to be done in Sheffield to meet proposed standards for greenspace access for all in cities<sup>4</sup>.



## Designated and protected sites in the urban environment

Nearly half of all LWS land (46%) falls within Sheffield's urban zone. Similarly, 57% of Sheffield's land designated as LNRs also falls within the urban zone, meaning that it is likely to be highly accessible to the general public. Some of these key sites are detailed on the previous page. Many of these urban LWSs are in positive conservation management. This is shown in Figure 7.

Figure 7 (right): management status of LWSs within Sheffield's urban zone by size (left) and number of sites (right). Only sites larger than 0.5ha were considered to exclude sites mostly outside the urban zone.

■ Positive ■ Not Positive

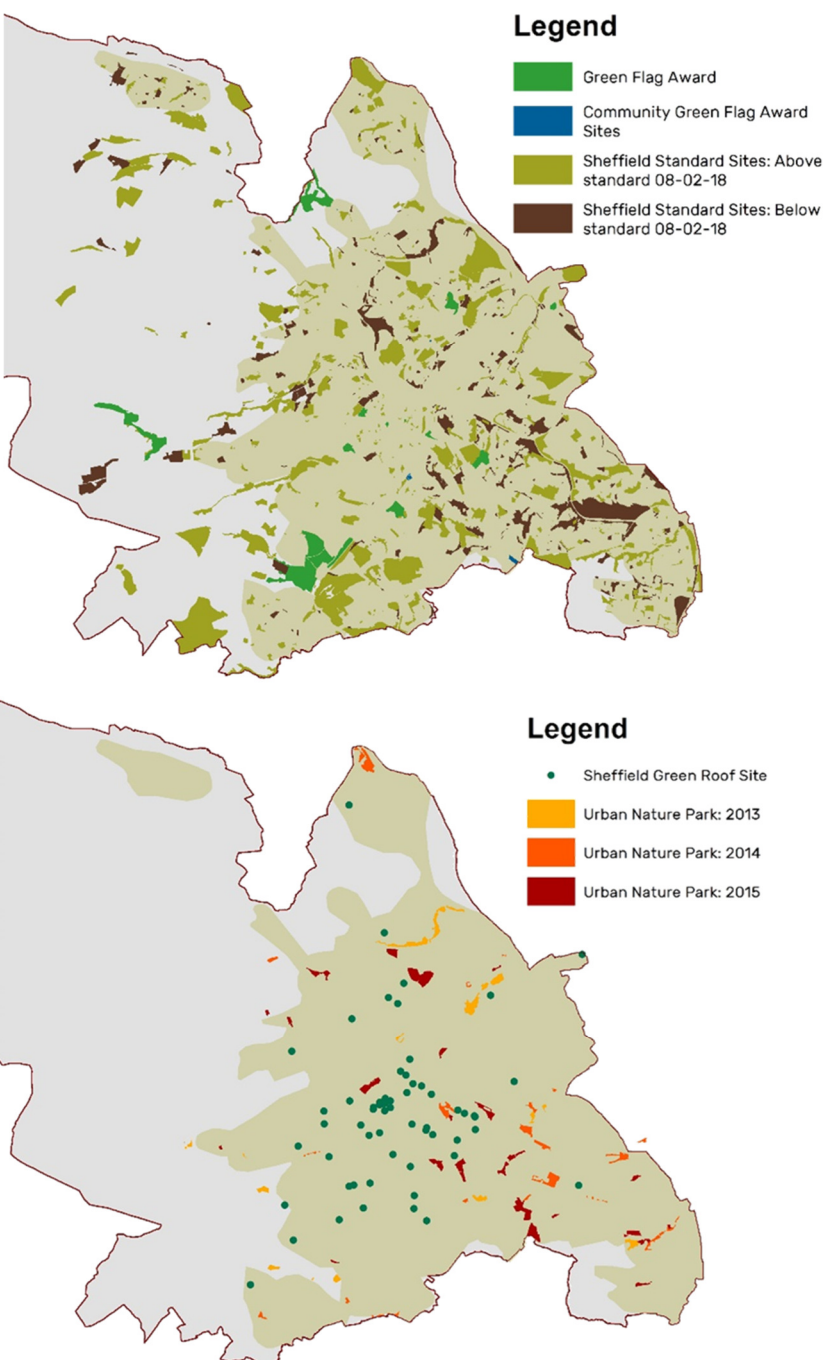
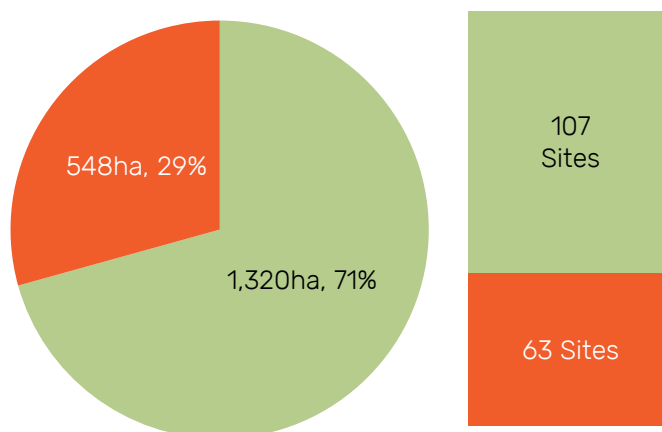


Figure 8: Sheffield Standard Sites, coloured by status on 2/2/18 (top), and Green Flag and Community Green Flag sites plus Urban Nature Parks by year plus Green Roofs (bottom).

## Green space management and standards

As well as being covered by designated site status, the value of several of Sheffield's urban green spaces is also recognised by additional standards. Fifteen sites (348ha) and seven sites (7.3ha) have been awarded Green Flag and Community Green Flag status, respectively<sup>5</sup> (Figure 8: top left). Of note is Wyming Brook nature reserve (of Green Flag Status and part of a SSSI) which has been recognised not only for its wildlife but for its public accessibility and excellent management.

The Sheffield-specific Sheffield Standard was produced under the Green and Open Spaces Strategy (GOSS) with the intention of establishing a baseline for green spaces. As with Green Flag sites, these areas are recognised not just for wildlife but also for community benefits. Sites are managed to reach and exceed a set 'standard'.

Urban Nature Parks (UNP) are areas of green and open spaces with more biodiverse habitats, requiring less maintenance than traditional parks. Starting in 2013, from an original aim of 300ha, the UNP project converted 378ha (Figure 8: bottom left) of existing green spaces into Urban Nature Parks also under the GOSS.

Sheffield has also been a pioneer for Green Roofs, originating from a research project in 1999 through to a Marie Curie Project from 2009–2013. The city features a number of landmark green roof projects plus a centre of excellence. These sites (Figure 8: bottom) support various UKBAP species including song thrush, starling and house sparrow<sup>6</sup>, and offer actual habitat to invertebrates with six bumblebee species recorded<sup>7</sup>. The Sheffield Green Roof Habitat Action Plan highlights target species and recommendations in more detail<sup>8</sup>.

## Case study: Establishing an urban wildflower meadow: Beauchief Nature Park Carol Behagg and Diana Holland, Beauchief Environment Group

The Beauchief Environment Group (est.1988) is a local volunteer group that manages an area of land consisting of ancient woodland, ancient meadows and a golf course, in S8, owned by SCC. In 2013 the group approached the Council to use a derelict former SCC tree nursery as a resource to create a wildflower and native grass meadow – a now scarce habitat across the UK. Legacy funding covered ground preparation and seed purchases.

Bramble, docks, nettle, and willowherb were rampant with only a few trees on the perimeter. Vegetation was sprayed-off twice using a tractor with additional hand digging by the group to remove stubborn bramble and other roots. The field was then harrowed to be ready for sowing in spring 2015 with a mix of suitable native grass, and both native annual and perennial meadow wild flower species, sourced from a specialist. The annual meadow species, which germinate and mature in one season, were chosen for colour and coverage in the first year and to prevent undesirable species from returning. The resulting spectacle in 2015 was amazing, with cornflower, corncockle, field camomile, field poppy, corn marigold and red campion being most evident. The perennials – red clover, tufted vetch, meadow vetchling and yarrow – also became established. After a late cut the group collected seeds which group members scattered in early spring 2016.

The summer of 2016 produced a completely different picture in the meadow. Perennial species dominated but many annuals were still present, supporting numerous pollinators. Unexpectedly, viper's bugloss also appeared and its seed was collected. The meadow was cut late summer and some 'green hay' was used by the Council on other grassland projects. The meadow grew well again in 2017 with established grasses and perennial wild flowers flourishing. As the land was nutrient rich, plant growth was tall and dense, and a second cut was needed that year. Again, green hay was saved for other Council sites. Yellow rattle seed, collected from Gulleys Wood Meadow (one of the ancient meadows) was sown on areas of exposed open soil such as molehills. Its future establishment should help to control more vigorous grasses.

The project has been truly exciting and worthwhile, and the meadow is enjoyed by all throughout the year. The area is now classified as one of Sheffield's 'Urban Nature Parks' but needs continued ongoing management. Periodic grazing or 'cut and remove' would be beneficial, but fencing is expensive. Hopefully the seeds will continue to be a valuable resource.

Below: before and after shots of scrub management and wildflower sowing



## Case study: Hedgehog Heroes

Sara Blackburn & Paul Richards  
Sheffield & Rotherham Wildlife Trust

Once a common sight in our gardens, hedgehogs are now declining rapidly across the UK, with an estimated 30% of the population disappearing over the last decade<sup>9</sup>. The Sorby Natural History Society (SNHS) have produced maps showing this decline locally from the 1970s to the 1990s<sup>10</sup>, and more recently to 2016<sup>11</sup>. The reasons for this decline are still not known for certain, but it is likely that habitat loss and development – particularly the loss of hedgerows and suitable garden habitat, as well as habitat fragmentation and the intensification of agriculture, are to blame. Roads, garden pest control (such as the use of slug pellets), plus the increasing use of impenetrable garden fencing, are factors that particularly affect the survival of urban hedgehogs.

The Nature Counts project engaged with the general public, appealing for information on urban hedgehogs in Sheffield using both postcards and an online survey. Over two years (2016-2018) more than 500 records were collected, recording 454 live hedgehogs, 46 dead hedgehogs and 19 signs of hedgehog activity (droppings or footprints). Most sightings (both dead and alive) were from public gardens (342), with sightings also reported from school grounds, woodland edge and suburban streets. There is some degree of recorder bias in showing distributions where hedgehogs are more easily seen; roadkill data can offer a wider perspective of hedgehog occurrences beyond back gardens. The map (Figure 9) is also available at [wildsheffield.com/hedgehogmap](http://wildsheffield.com/hedgehogmap)

The project also revealed information on public attitudes towards hedgehogs and the home-based conservation efforts that are being made to help them. Of the 491 people who responded to the survey over 75% had a hedgehog hole in their garden boundary (an aperture in a fence or wall through which hedgehogs can move), improving the overall connectivity of garden habitats. The latter has been recognised nationally as a significant limiting factor for hedgehog success<sup>12</sup>. Other methods for supporting hedgehogs, such as creating suitable hibernation sites, encouraging invertebrate food supplies and hedgehog-friendly gardening practices, have been promoted throughout the project. This baseline data will enable ongoing monitoring to offer a true reflection of local hedgehog numbers and hopefully an increase will be seen in subsequent years as awareness of the hedgehog's plight increases. As a result of this project, feedback on one new major housing development in the Manor means plans now include a 'hedgehog highway' – a series of planned hedgehog holes in the fences of the new houses.

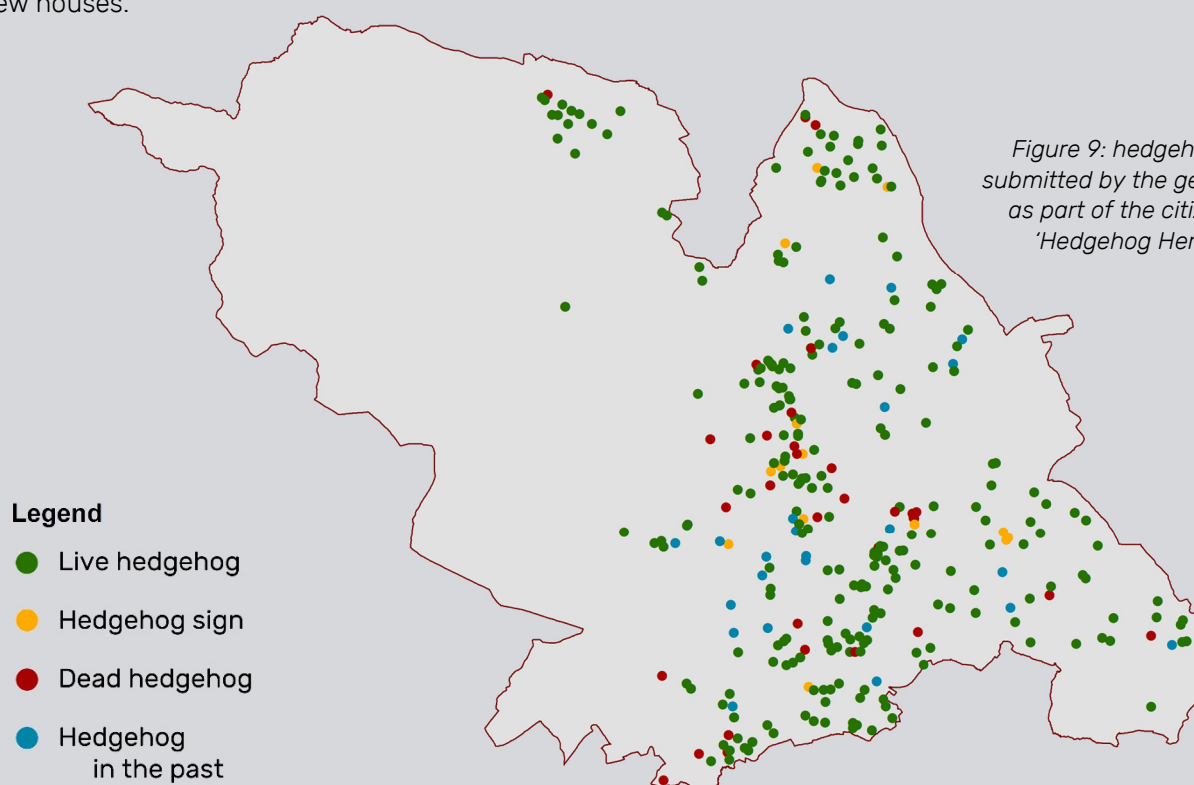


Figure 9: hedgehog sightings submitted by the general public as part of the citizen-science 'Hedgehog Heroes' project.

## Urban species highlights



© Margaret Holland

### Black redstart

Redevelopment of brownfield, former industrial sites and derelict buildings impacts species such as black redstart. This species has adapted to nest on buildings and is encouraged in Sheffield by green roofs (on the continent it is a garden bird). They prefer early stages of succession on brownfield sites, abandoning these as the site matures. However, they experienced a 50% decline from 1975–80 to 2003–08 and are now only an occasional visitor to Sheffield<sup>13</sup>.



© Dawn Monrose

### Bee orchid

Bee orchids are found on road verges scattered throughout the city. There is a particularly high concentration on verges on Europa Link as a result of mitigation for a recent industrial development. These dramatic plants, whose flowers mimic a bee, are a great example of a species that is taking advantage of previously disturbed ground in an urban location.



© Jon Hawkins

### Waxwing

Waxwings are a welcome winter visitor and are often seen in the city centre and suburbs feeding on the winter fruit of Sheffield's trees. Some so-called 'eruption' years occur, following a good breeding season, when larger numbers are triggered by extreme weather in the breeding grounds.

## Why are these species important?

These species demonstrate the diversity of habitats within urban areas of Sheffield and the opportunities that they provide. Additionally, the presence of species such as dipper and otter, which are highly sensitive to industrial pollution, indicates much improved pollution control in Sheffield. More details are given in the Waterways & Standing Water chapter.

## Case study: Biodiversity in Urban Gardens projects (BUGS; 1999-2007) Professor Phil Warren, the University of Sheffield

The Biodiversity in Urban Gardens in Sheffield project (BUGS), and a successor project (BUGS2) extending the research to five other UK cities, were the first large scale systematic, scientific studies of the extent and nature of garden habitats across entire cities, the factors affecting plant and invertebrate biodiversity, and the effectiveness of widely cited advice on wildlife gardening. The projects were led by Kevin Gaston, Phil Warren and Ken Thompson at the University of Sheffield, with participation of many gardeners who volunteered their plots for study. The projects gathered evidence showing the amount and type of habitat that gardens provide in cities, and that their biodiversity makes them important for both conservation and in enhancing people's contact with nature in cities. Results of systematic surveys showed that about 25% of a typical UK city are gardens; that small gardens are disproportionately important because there are so many; and that across all gardens in a city the cumulative number of habitat features such as ponds, trees, nest boxes and compost heaps are significant at the city scale<sup>14,15</sup>.

Analyses of biodiversity showed that plant diversity was much higher within and across gardens than any other UK habitat type, and, whilst non-natives are a major component of this, native species are more widespread in gardens than often assumed<sup>16,17</sup>. Factors influencing invertebrate biodiversity were complex, and related both to internal features (trees and structural complexity) and surrounding land use<sup>18</sup>. The studies' results questioned some widely cited ideas about garden biodiversity, such as the importance of native plants over non-natives for invertebrates, and found that widely advocated garden improvements for wildlife (e.g. artificial bumblebee nests) have varied success<sup>19</sup>. There were also policy and planning implications of the results: for example, in demonstrating the effects of increased housing density (and thus reduced garden sizes) on the loss of important, beneficial garden features such as trees. The work informed research projects and campaigns at the Royal Horticultural Society and Local Biodiversity Action Plans. A popular book by Ken Thompson 'No Nettles Required' has now taken the science to the wider public.

[www.bugs.group.shef.ac.uk](http://www.bugs.group.shef.ac.uk)

Garden spider  
© Chris Maguire



## Case study: Sheffield city peregrine falcons

**David Wood, Chair, Sheffield Bird Study Group (SBSG)**

In the 1960s, peregrine falcons (peregrines) experienced a nationwide population crash due to organochlorine pesticides working their way up the food chain, with only 385 UK pairs recorded in 1961, mostly in Scotland. Peregrines were also very scarce in the Sheffield area, with just 14 records across the 1,200 km<sup>2</sup> of the Sheffield Bird Study Group (SBSG) recording area from 1958-79. Breeding attempts were noted in the Peak District in the early 1980s but eggs were robbed and birds were persecuted in suitable breeding areas in the Dark Peak. A round-the-clock nest watch in 1984 led to the first breeding success since the 1950s. A slow increase in the breeding population resulted in the SBSG area giving 5-8 annually occupied territories in the 2003-08 Sheffield Breeding Birds Atlas.

Peregrines began to breed in urban locations in the UK from the late 1990s, with pairs on cathedrals in Exeter and Winchester, while pairs in London (2001) and Derby (2006) attracted considerable media attention. After only four reports from lowland sites to the east of Sheffield (an area of around 600 km<sup>2</sup>) during the period 1960-80, sightings became increasingly regular around the turn of the millennium, and a pair was suspected of a breeding attempt on the cooling towers at Tinsley in 2004. A pair was present on the cooling towers in subsequent years, and copulation was observed in 2007. However, no nest or eggs were located and demolition of the towers in August 2008 put an end to hopes that breeding would take place there. Records of what were presumed to be one or both of the Tinsley birds were increasingly received from central Sheffield and one roosted on St George's Church at the University of Sheffield on several dates during July-August 2005.

In summer 2008, following regular sightings of peregrines around Sheffield city centre, I persuaded the University's Pro-Vice Chancellor with responsibility for Estates that a nest platform should be placed on St George's in the hope of attracting a breeding pair. Working with staff in the University's Department of Estates we liaised extensively with those responsible for the Derby Cathedral peregrine platform, a national expert on urban peregrines, and the RSPB. The church's status as a listed building meant that certain restrictions had to be observed, but eventually we were able to find a compromise whereby the masonry of the building would not be affected.

With the support of the University of Sheffield, a nest platform was erected on a raised platform within the walls at the top of the tower on St George's Church in December 2009, but was unused despite the regular presence of adult birds. In summer 2011, staff in the Department of Estates & Facilities manufactured a nest platform on the basis of recommendations and specifications from experts in urban peregrines, and this platform was located on the north-facing external ledge at the top of the church tower. This platform was used by the pair that had taken up residence in the vicinity and they fledged two young in June 2012, constituting the first urban breeding record of peregrines in Sheffield. The same site has been used every year since then, with four eggs laid on each occasion, producing a total of seventeen fledged young to 2017. In recent years, two additional breeding pairs have been recorded in the neighbouring Rotherham District.

By contrast, there were just two successful breeding attempts by peregrines in the Dark Peak between 2007 and 2014, as illegal persecution there continues.

[sheffieldperegrines.wordpress.com](http://sheffieldperegrines.wordpress.com)

## Brownfield sites

'Brownfield sites' are previously used, derelict commercial or industrial sites often awaiting redevelopment. Such sites are incredibly important for wildlife due to their open mosaic habitats, offering low nutrient soils with altered pH, mixed vegetation, shelter within building remains and raised temperatures due to areas of bare ground<sup>20,21</sup>. Brownfield or Open Mosaic Habitats on Previously Developed Land (OMHPDL) is a (NERC Act Section 41) Habitat of Principal Importance in England<sup>22</sup>. Usually nutrient poor, these fragmented habitats present a disturbed environment, where successional plants quickly flourish, and also provide a range of refuges for some of Britain's rarities including black redstarts, great crested newts and a number of species of bats, lizards and orchids. Rare invertebrates in particular favour these habitats: 50% of England's rare hymenoptera and 35% of rare ground beetles being found on such sites<sup>23</sup>, with an additional estimated 15% or more of UK rare and scarce invertebrates also supported<sup>24</sup>. Ownership is often private and disturbance from humans will vary depending on access. The habitat provided can be short-lived or available for several years, but while available, opportunistic species will begin to colonise brownfield land.

Despite huge regeneration within Sheffield recently, many undeveloped areas still exist (Figure 10). Whilst they appear to be wasteland, they support rich biodiversity and need protecting. Brownfield land is usually used first for development, especially in favour of development on greenbelt<sup>25</sup>. Despite the government's push to use 'derelict' land for housing<sup>26, 27</sup>, we should be wary that redeveloping old industrial sites may threaten a potentially unique habitat supporting rare, vulnerable species. In fact, the National Planning Policy Framework recognises this by saying that we should 'encourage the effective use of land by reusing land that has been previously developed (brownfield land), provided that it is not of high environmental value.'

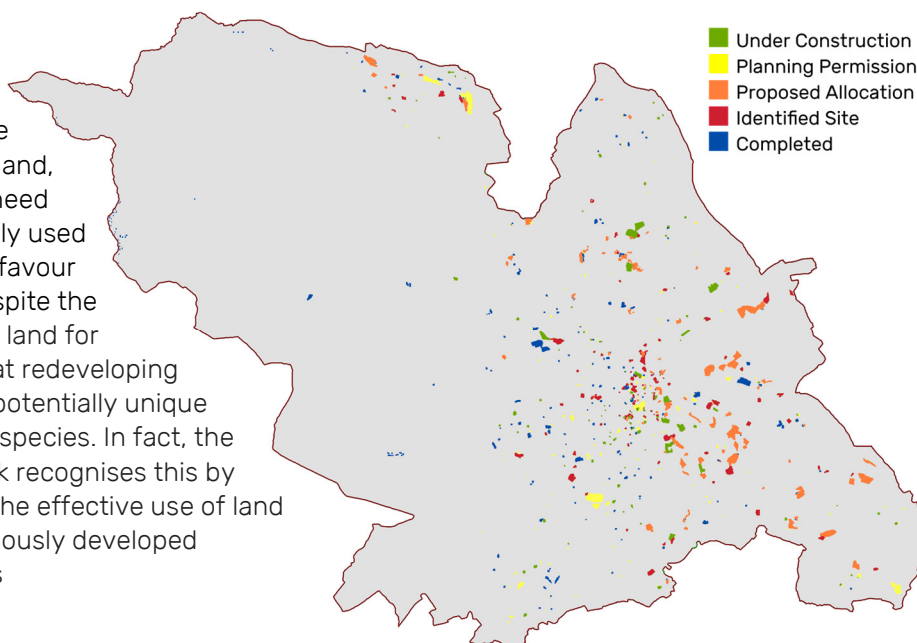


Figure 10 (above): current housing land information (as of March 2018).  
Data: SCC. Map credit 3

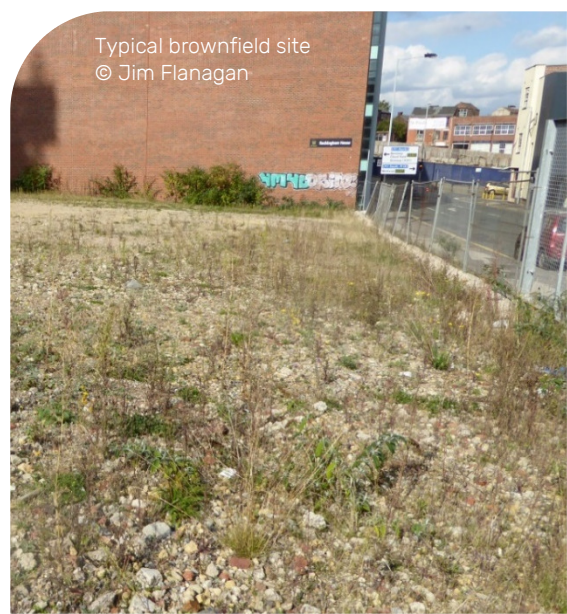
### Case study: The wheat bug

**Jim Flanagan, Sorby Natural History Society recorder  
and co-organiser of the terrestrial bugs national recording schemes**

The wheat bug is one of the more recent arrivals to the UK. It is native to New Zealand, occurring in a wide range of habitats and feeding on many plants including non-native grasses and cultivated crops from Europe. Infrequently, in hot, dry years, the bug has migrated to crops and caused damage to cereals and brassicas.

The first British wheatbug record came from Suffolk in September 2007. It was found new to Yorkshire in September 2014 from a sparsely vegetated brownfield site off Rockingham Street in the centre of Sheffield, now lost to development. To the end of 2017 there have been a total of seven records for South Yorkshire.

Six other species of *Nysius* groundbug occur in the UK and all are similar in appearance. South Yorkshire now has a total of four *Nysius* species. The two most commonly found in South Yorkshire until recently were *N. ericae* and *N. thymi*, with the latter usually found on sites (including quarries) on the Magnesian Limestone with *N. ericae* more widespread on sparsely vegetated brownfield. There is evidence that the wheatbug may be as common as these, and most previous records are from brownfield sites. In Britain all *Nysius* species overwinter as adults and feed on plant sap and seeds and are found mostly in warm environments. Well-drained brownfield sites, which heat up rapidly in the sun, are favoured places. Although the bug is known to cause crop damage in New Zealand, none has yet been reported from Europe and so it is not yet considered to be a major risk to crops in the UK. However, the trend for a warming climate may increase the chance of this happening.



## Case study: 'Grey to Green' in Sheffield

### Simon Ogden, Head of City Regeneration, Sheffield City Council

**Grey—  
——to  
Green—  
—— Sheffield**

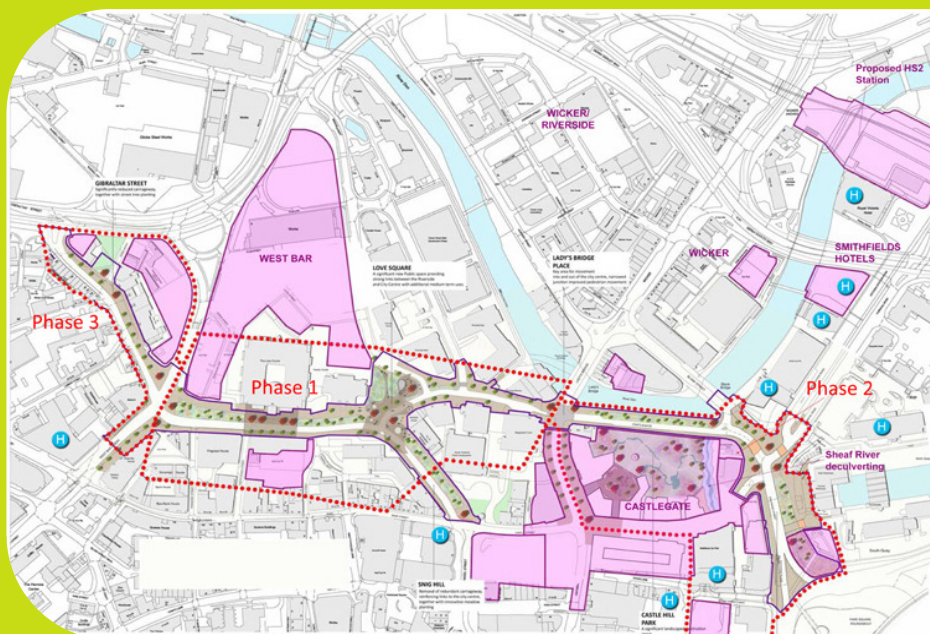
Grown from proposals in the City Centre Masterplan 2013, Grey to Green is an exciting three-phase project to transform the 'grey' redundant former Inner Ring Road space into a 'green corridor', turning once dull streets into vibrant, green public spaces of flowering meadows and wetlands in a growing business and living area.

The project aims to both enhance the environment for enjoyment, recreation, investment and regeneration and improve resilience to climate change and flooding. The scheme, designed by the Council's Landscape and Highways teams, was greatly enriched by partnership with Professor Nigel Dunnett of the University of Sheffield's Landscape Department and with local social enterprise Green Estate. It has received strong support from businesses and the public.

Completed in 2016, Phase 1 saw a significant area of wild flowers, trees and shrubs replacing redundant carriageway from West Bar to Lady's Bridge. Benches offer seating to enjoy the sights and scents of the plant life and wildlife. Sustainable Drainage (SUDS) allows the new public space to act as a rain garden to moderate the flow of water in an area that has twice been ravaged by floods. When completed it will be the largest 'retro-fit' SUDS scheme in the UK. Additionally, five colourful works of public art, forged from steel and stone, both celebrate the area's rich cultural heritage and brighten the scene in the winter when perennials are cut back.

This first phase has received national recognition through a number of awards. Highlights include Civic Trust Sheffield People's Choice 2017; Civic Voice National Award 2017; the National Green Champion Construction Category Award at the International Green Apple Awards and winning two categories at the CEEQUAL awards, plus the overall 'Eric Hughes Award 2016 for Outstanding Contribution to Improving Sustainability'. This phase cost £3.68 million and was funded by the European Regional Development Fund (ERDF), the Sheffield City Region Investment Fund (SCRIF) and SCC.

Phase 2 is in design and is planned to be built in 2018/19 subject to consultation and approvals. Further phases will take place as and when funding becomes available and updates will be available on the Council's website.



[www.greytogreen.org.uk](http://www.greytogreen.org.uk)



# UK Biodiversity Indicator Focus

## Pressure from invasive species:

### B6c. Terrestrial

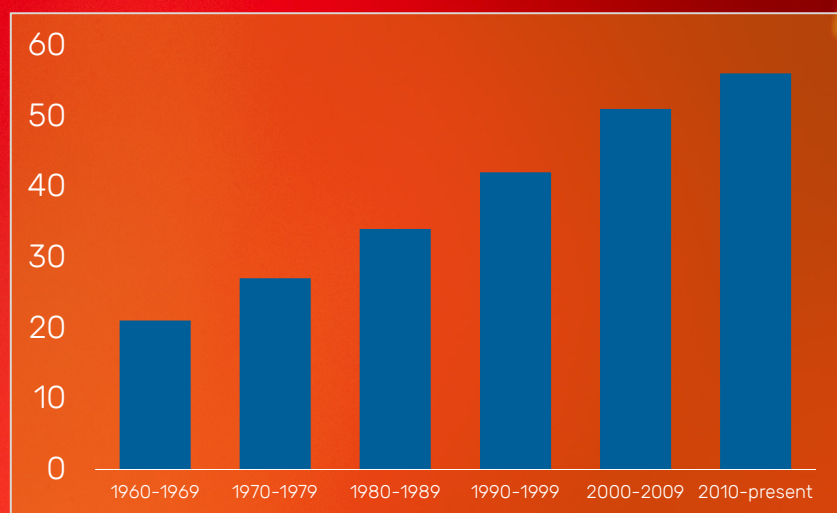


Figure 11 (left): cumulative number of novel terrestrial invasive species recorded in Sheffield, per decade, as categorised in 'Non-Native Species in Great Britain: establishment, detection and reporting to inform effective decision making'. Data: NBN Gateway, Sheffield Biological Records Centre

#### Harlequin ladybird

Thirty-two of the 46 native species of ladybird have been recorded in Sheffield but many are threatened by competition from the introduced harlequin ladybird, from eastern Asia. It was first recorded locally in 2006<sup>28</sup> and is now likely to be the most common species in the district<sup>29</sup>.

#### Muntjac deer

Spreading into Sheffield from the south and east in 1995<sup>30</sup>. Along with other native species of deer – red and roe – muntjac have been sighted almost to the city centre<sup>31</sup>.

#### Grey squirrel

Outcompetes red squirrels and introduces squirrelpox virus. Reds declined dramatically across Sheffield and were restricted to Upper Derwent and Ewden Valley by 1990. The last local record was taken from Greno Woods in 1987<sup>32</sup>.

#### American mink

Regularly recorded in the city centre and industrial areas of the River Don with evidence of local breeding<sup>33</sup>. Mink coexist locally with otter, predate on local breeding birds and have eradicated most local water vole populations.

Urban areas are often subject to introductions of non-native species. The combination of disturbed and anthropogenic habitats can provide opportunities for novel and invasive species to become established. These species can potentially cause problems for native species by outcompeting or preying on them or by modifying habitats.

#### New Zealand flatworm

Translocation and introduction of plants for cultivation in gardens can bring in additional species with soil and pots. Of the 15 species of terrestrial predatory flatworm found in Britain, only four are native. These invasive species may all impact local biodiversity at some level. In 2016-17, surveys by SNHS and SRWT revealed the spread of invasive flatworms into urban Sheffield.

The New Zealand flatworm *Arthurdendyus triangulatus* is a non-native known predator of UK earthworms. A lack of tight biosecurity and extensive movement of imported plant material has allowed this species to reach the wetter, northern areas of Britain, where it now thrives. The result, revealed by a national survey<sup>34</sup>, is a decline in earthworms and an associated reduction in soil formation and fertility. The New Zealand flatworm may also eat slugs when earthworms are scarce<sup>35</sup>. In an associated survey, fewer molehills were found to occur where there were flatworms, suggesting that these small invertebrates are having a big impact on more than just worms.

The surveys also revealed Australian flatworms *Australoplana sanguinea* – another earthworm-eating species. First records were also made for another smaller species from Australia, *Kontikia ventrolineata*, which predaes small snails and slugs. A fourth species, *Microplana terrestris*, was also found for the first time in Sheffield in an urban park. This is the only native species found locally, and feeds scavenging on dead worms and slugs<sup>36</sup>.

## Case study: Invasive slugs and snails in Sheffield

Robert Cameron and Bob Clinging, Sorby Natural History Society

The combination of climate change, reduction in pollution and the introduction of exotic species has resulted in a number of slugs and snails being recorded recently for the first time in Sheffield, and in a great increase in numbers and area occupied by others. Among snails, there are three that deserve special mention. The common garden snail, *Cornu aspersum*, and the dark-lipped banded snail, *Cepaea nemoralis*, were very rare in Sheffield until the 1990s; the latter confined to a few allotments to the west of the city centre. Both are now abundant, found in many gardens, parks and on waste ground. The girdled snail, *Hygromia cinctella*, like *Cornu aspersum*, is not a native species, first recorded in Great Britain in 1950 in Devon. For many years it remained confined to the South West, but by 1999 it had spread as far north as Gloucestershire. Since then, it has spread rapidly. It was first recorded in Sheffield during a garden invertebrate survey in 2000. It has now been found in many sites along the Sheaf valley, and most recently in the Porter valley. It is now known from much further north, up to Edinburgh.

Among slugs there are also some recent arrivals. Most dramatic is the first Sheffield record (2017) of the ghost slug, *Selenochlamys ysbriada*. This was first discovered and described from Cardiff, although it belongs to a family restricted to the Caucasus and Crimea (where it has since been found). Like the worm slug, it is mainly subterranean and carnivorous. Until the Sheffield record was made, it appeared to be confined to South Wales, where it is often common, and to a few isolated places in southern England. There are many other invaders. The worm slug, *Boettgerilla pallens*, was first detected in Britain in 1972. Since it is subterranean it is often missed, but numerous records made by Sorby Invertebrate Group (SIG) recorders in the last 20 years show that it is now widespread in the city. *Ambigolimax valentianus*, originally described as the greenhouse slug, was known for some time only in such places. From the 1980s onward, however, it has spread rapidly out of doors. It was recorded in the Sheffield General Cemetery and in at least one garden in 2016 and will undoubtedly become widespread. Unfortunately it is hard to distinguish from another alien species, *Ambigolimax nyctelius*, that has also been spreading recently. This species is known for sure just north of the city (Elsecar) and is almost certainly here. *Deroceras invadens* was first reported in Britain in 1930. It has spread all over the country and is now very common in Sheffield.



Left: Ghost slug, *Selenochlamys ysbriada* first recorded in Sheffield in 2017.

Far left: *Cornu aspersum*, the common garden snail, was locally rare until the 1990s but is now widespread.

Some other slugs are harder to track because identification is difficult. The yellow house slug, *Limacus flavus*, never very common, appears to have been replaced by the very similar green cellar slug, *Limacus maculatus*, which is now very abundant in gardens and compost heaps. Among the large round back slugs, *Arion* species, there are two relatively recent invaders, *Arion vulgaris*, often called the Spanish slug, and another, as yet unnamed. The latter may occur in the General Cemetery, but better material is needed to confirm the identification.

These species are not easy to distinguish from the common and widespread *Arion rufus*. In all these cases, the slugs and snails are undoubtedly carried accidentally by us, but then disperse actively over much shorter distances. In conjunction with surveys carried out by SIG members, we can see how fast these incomers spread in Sheffield. Potentially, there are more to come, like *Deroceras panormitanum*, at present known only from Cardiff.

## Threats to urban habitats and species

What is the threat?	What does it cause?
<b>Residential and industrial development: urban expansion and urban development within existing greenspaces</b>	Whilst biodiversity is considered during development, loss of suburban fringe habitats and increased residential development can lead to habitat fragmentation and a reduction of refuge sites, threatening species such as hedgehogs. Loss of greenspaces and allotments removes suitable wildlife habitat. Loss of urban trees can lead to a reduction in connectivity and availability of breeding sites for bird and butterfly species. Domestic pets can have significant negative effects on garden wildlife <sup>37</sup> .
<b>Litter and pollution</b>	Litter can be lethal to small animals. Light and noise pollution can negatively affect a number of nocturnal and migratory species such as bats and breeding birds <sup>38,39</sup> .
<b>Transport systems</b>	Collisions with road traffic threaten urban species such as hedgehog, badger and otter. Although rail and road networks can provide habitat connectivity along linear sections, they can also restrict animal movements if they include little associated green space such as road verges.
<b>Invasive species</b>	Non-native invasive species can be brought into the urban environment via the movement of goods and people into cities, coupled with deliberate imports of plants and animals. This can consequently have a negative impact on native species, for example, hybridization of native bluebells with Spanish hybrids.
<b>Redevelopment of buildings and other urban structures</b>	Renovation of buildings can threaten vulnerable species such as bats that use man-made structures as roosts. Redevelopment can also lead to the loss of brownfield sites which may support rare species.
<b>Intensive gardening related to the loss, or homogenisation, of wildlife-friendly garden habitat, for example, hard landscaping</b>	Tidier gardens may reduce biodiversity, and pesticides threaten garden wildlife. Increased fencing reduces habitat connectivity for suburban species. Hard landscaping removes available habitat for plants and associated pollinators.

## Recommendations

1. Develop targeted conservation plans for key indicator species or local species in severe decline such as hedgehogs and bats.
2. Promote the value of urban LWSs and the importance of their protection and ongoing management for wildlife to planners and developers.
3. Focus efforts on improving the overall condition of key urban LWSs currently in poor condition or not in positive management for wildlife.
4. Develop a strategic plan for tackling key terrestrial non-native invasive species in the city and raise awareness about how invasive species can spread.
5. Promote wildlife friendly gardening to improve biodiversity and habitat connectivity by raising awareness about garden waste and highlighting the impacts of pesticides, such as slug pellets, on wildlife.
6. Raise awareness with developers, planners and the general public about the importance of gardens, ponds, green spaces, sustainable drainage systems (SUDS), green corridors, green walls and green roofs as well as small modifications to buildings that can benefit wildlife and people. Examples include hedgehog highways, swift nest box bricks and wildflower meadows.
7. Develop more urban meadows and promote the planting of native and wildlife-friendly species within the city.
8. Develop citywide mapping of core sites, opportunity sites, buffer zones, corridors and stepping stones (including greenspace and linear structure) in order to improve connectivity for wildlife.
9. Continue to engage people with their local green spaces for the purposes of both active conservation and recreation.
10. Raise awareness of the importance of priority brownfield sites for biodiversity within urban environments to planners and developers.





green-veined white on urban wildflowers,  
Sheffield city centre  
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