

Merthyr Tydfil and District Naturalists Society

**Proposed garden area at
Cyfarthfa Park, Merthyr Tydfil**

Preliminary Ecological Appraisal



January 2022

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Cover photographs: Left: looking north from southern boundary; Right: looking north-east across northern part of study area.

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Executive summary

A survey was undertaken of an area of derelict ground at Cyfarthfa Park to inform a proposed gardening project. It supports a mix of damp, semi-improved rough grassland and scrub, with piles of nutrient rich soil and other debris, apparently from the adjacent council yard. The habitats are of relatively recent origin and have been subject to periodic disturbance by vehicles. Much of the scrub that formerly occupied the site margins has been cleared within the last few months.

The survey found a moderately diverse mix of common and ruderal plants in the southern part, but the rest of the area is more shaded and disturbed. No part of it supports species of high value for nature conservation. Despite the survey being carried out at a suboptimal time of year the eutrophic and disturbed nature of the habitats suggest that further surveys are unlikely to confirm any flora or fauna with significance for nature conservation at any more than a 'within the site' context.

Potential ecological constraints with regard to the proposed garden development are the presence of Japanese Knotweed at the western margin, and a very low risk of disturbing bird nests, or small numbers of small mammals, reptiles or amphibians during the initial site clearance. Measures to minimise these risks are proposed. The woodland adjacent to the site is classified as Restored Ancient Woodland and recommendations are also made to minimise harm to this.

The garden project has potential to enhance the site's value for biodiversity, and a number of possible enhancement measures are proposed. In addition, demonstration of wildlife friendly and sustainable gardening techniques at this site could encourage visitors to modify their own gardens and extend the ecological benefits over a wider geographical area.

1. Introduction

Merthyr Tydfil and District Naturalists Society has appointed Sturgess Ecology to undertake a Preliminary Ecological Assessment (PEA) of land at Cyfarthfa Park, Merthyr Tydfil (grid reference SO040076). The proposed site currently supports derelict disturbed ground at the rear of some council sheds near the Cyfarthfa Park car-park. The survey has been requested to support a planning application for a new garden area with raised beds and disabled access.

The broad objectives of the PEA study were as follows:

1. To review existing ecological data for the site and its immediate surroundings.
2. To carry out an 'extended Phase 1 Habitat Survey' to describe the current condition of the habitats, and record protected and notable species (or potential habitat for them).
3. To assess the nature conservation significance of the species and habitats, identify any further survey requirements, make recommendations to inform the design and construction process, and identify potential ecological mitigation measures.
4. To make recommendations for environmental enhancements or opportunities.

The study area boundary is outlined in red in figure 1. The boundary includes one of the sheds, but this will remain unaffected by the proposed project.



Figure 1. Study area boundary with aerial background view

The survey and assessment were undertaken by Dr Peter Sturgess CEnv MCIEEM and followed the general principles for PEA set out by the Chartered Institute for Ecology and Environmental Management¹.

¹ CIEEM (2017). Guidelines for Preliminary Ecological Appraisal, 2nd edition. Chartered Institute for Ecology and Environmental Management, Winchester.

2. Existing ecological data

2.1 Methods

The objectives for the data search were to gather and review existing information on wildlife within the study area and its immediate surroundings, and to highlight any biodiversity information that might be relevant to the current proposal.

A data search was commissioned from the South-East Wales Biodiversity Records Centre (SEWBRc) (data search reference 0212-789). This provided data on protected and priority species and other species of nature conservation significance within 1km of the study area.

The presence of statutory protected sites within 1km of the site was investigated through the Multi-Agency Geographic Information for the Countryside web-site (MAGIC.defra.gov.uk) and Natural Resources Wales (NRW) web-site. The NRW Ancient Woodland Inventory was also checked. Information on local wildlife sites and B-lines was obtained through the SEWBRc data search.

2.2 Protected sites

A summary figure showing the locations of protected sites within a 1km radius of the study area, taken from the SEWBRc data search, is presented in Figure 2.

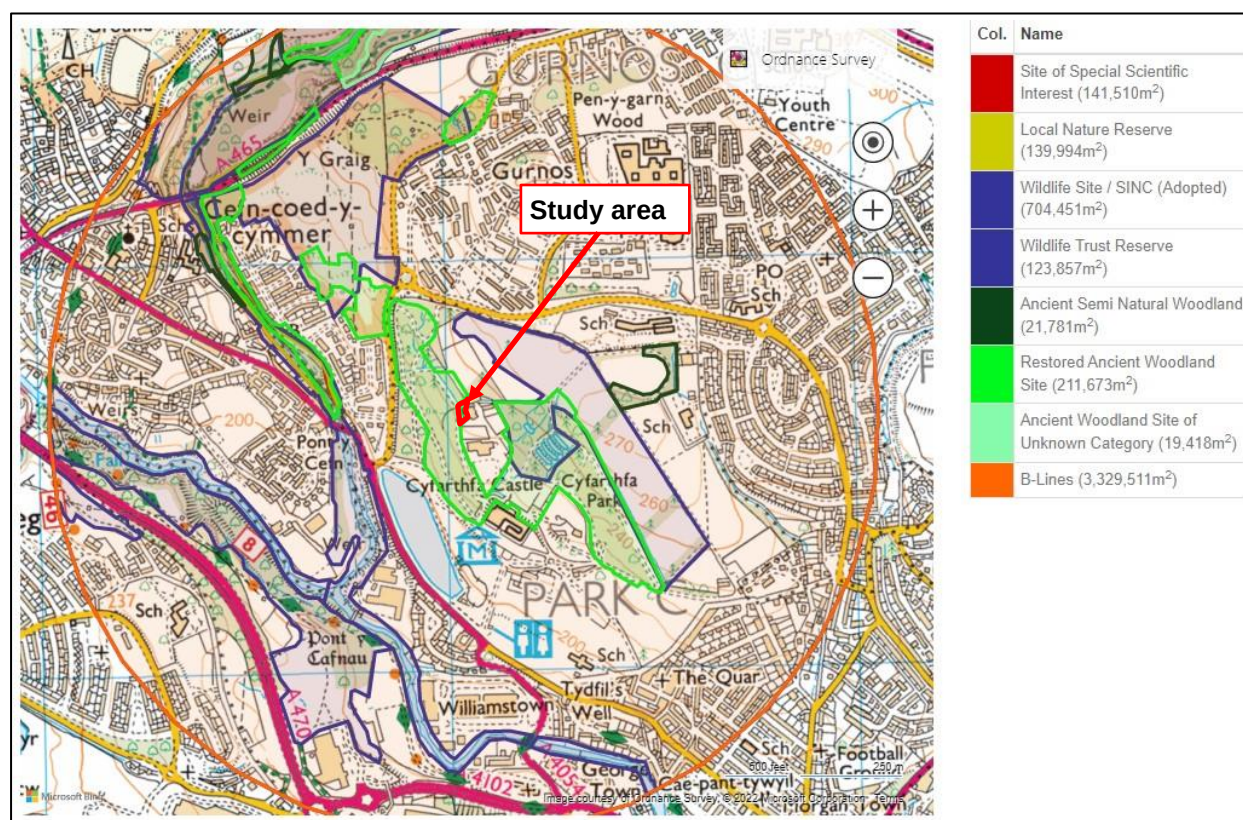


Figure 2. Protected sites within 1km of study area (from SEWBRc data search)

There is only one statutory protected site within 1km of the study area; the Cwm Taf Fechan Woodlands Site of Special Scientific Interest (SSSI). This lies approximately 300m west at its nearest point. The SSSI is centred along a steep-sided limestone ravine with semi-natural broadleaved woodland on the valley sides. Other notable features include flushes, tufa formations and quarry spoil. It supports many rare plants including Limestone Fern, Green Spleenwort and Mountain Melick. The humid conditions in the wooded ravine support a

particularly rich moss and liverwort flora, with over a hundred species recorded. There are also areas of acid grassland, limestone grassland and dry heath. Much of the southern part of the SSSI is a Local Nature Reserve. The SSSI is sufficiently far away from the study area that the proposed works would have no direct impact on it, nor on any of its special features or associated species.

The Ancient Woodland Inventory confirmed that the woodland directly adjacent to the site's western boundary is classified as a Restored Ancient Woodland Site (RAWS). This applies to woodlands that are predominately broadleaves now and are believed to have been continually wooded for over 400 years. However, they have gone through a period when canopy cover was more than 50% non-native conifer tree species. RAWS classification is based on remote sensing, and does not mean that the woodland is fully restored or that it is in good ecological condition.

There are 7 Sites of Importance for Nature Conservation (SINCs) within 1km of the proposed works area. The closest is the Cyfarthfa Park SINC, which is 79m east of the site at its nearest point. Summary descriptions of the SINCs, taken from Merthyr Tydfil Local Development Plan² are given in Table 1.

SINC	Description	Distance from study area
Cyfarthfa Park	Part of an area of mainly ornamental parkland within Merthyr Tydfil. The SINC includes semi-natural woodland and several enclosures of neutral grassland in the eastern half of the park. Also includes small areas of plantation woodland and scrub and several woodland ponds.	79m
Cwm Taf Fechan	The SINC contains Cwm Taf Fechan SSSI. The limestone geology gives rise to limestone woodlands, species-rich calcareous grasslands, species-rich neutral grasslands and calcareous scrub. Many species of interest have been recorded from the woodlands which are the designated feature of the SSSI. The neutral and calcareous grasslands of the valley slopes and bottom are typically species-rich. Otter ranges along the Afon Taf Fechan, which also supports a range of native fish species including salmon. Nationally rare and scarce invertebrate and bryophyte species have been recorded from the SSSI.	269m
Y Graig	Area of fridd habitats dominated by bracken with patches of unimproved acid grassland and dry heathland, particularly around gritstone outcrops. An area of species-rich damp neutral and marshy grassland to the west and some wet willow woodland exists to the south. Other habitats include scrub and boulder scree. Associated with the habitats of Cwm Taf Fechan SSSI/SINC to the north, but separated from these by the A465 Heads of the Valleys Road. Regionally rare plant species frequent the woodlands. The damp neutral and marshy grasslands support the regionally scarce plants.	353m
Cwm Taf Fawr	Section of major river tributary of the Afon Taf. The river extends into Brecon Beacons National Park to the north. Includes adjacent woodlands, which are relatively undisturbed in the upper reaches and more urban in character further downstream. The upper reaches in particular are of high ecological value, comprising limestone gorge woodland with a rich ground flora. Numerous rare plant species occur here. Further south the riverside woodland is more acid in character, but nevertheless supports a relatively diverse ground. The site also includes some adjacent areas of species-rich calcareous, neutral and acid grasslands. The calcareous grasslands in particular support numerous species which are scarce in the County Borough. Otter ranges along the Afon Taf Fechan, which also supports a range of native fish species.	524m

² Merthyr Tydfil County Borough Council Local Development Plan (2016 – 2031). Background Paper: Review of Sites of Importance for Nature Conservation June 2017.

SINC	Description	Distance from study area
Cwm Taf Fields & Cefn Coed Tip	Linear series of fields between the Afon Taf Fawr and the A470, also containing areas of semi-natural woodland and a re-vegetated limestone slag tip from the former Cyfarthfa Ironworks as well as smaller areas of semi-improved acid grassland, scrub, bracken slopes and dry heathland. The fields are a mosaic of damp and dry neutral grasslands with species-rich areas. The woodlands are variable in character, including areas of wet willow woodland, acid oak woodland and some base-rich ash woodland near the calcareous tip. The thin soils on the tip plateau support a unique type of calcareous grassland.	576m
Afon Taf	The major river in the County Borough. Includes areas of bankside habitats, particularly towards the south where the river corridor is less industrialised than further north. Associated habitats are chiefly semi-natural woodland, including areas of ancient semi-natural woodland and linear wet woodlands. There are also numerous neutral grasslands, scrub patches and bracken stands, as well as small areas of marshy grassland and tall herb vegetation. Notable features of the river course include cobble banks which support localised plants. Otter occurs throughout the length of the river which is known to be of value to a wide variety of birds, fish, bats and reptiles.	814m
Gellideg North Fields	Series of fields containing species-rich rhos pastures, acid grasslands, marshy grasslands, neutral grasslands and areas of bracken, together with scattered mature trees and sections of dry acid oak woodland and wet alder woodland alongside a small stream. The grasslands support a wide range of regionally scarce insect species.	842m

The Cyfarthfa Park SINC is less than 100m away from the study area and is discussed further in the assessment section of this document. However, the proposed works would be unlikely to have any direct or indirect impacts on the other SINC's due to the distance from the proposed works, so they are not considered further.

The study area lies within a B-lines corridor. B-lines is a new project headed by Buglife, aiming to create networks of wildflower-rich habitats for wild pollinators to forage, shelter, hibernate and move across the landscape. Land within the network of 3km wide B-lines corridors is intended to be favoured for projects that create and restore habitats that benefit wild pollinators.

2.3 Species records

The SEWBRc data search produced 1,275 records, covering 277 species. 435 records were of mobile species that had been recorded more than 1km from the study area. A high proportion of the data was from the Cwm Taf Fechan SSSI/ LNR, which is popular with naturalists and is particularly well recorded. Some of the records have been submitted with a 1km grid square reference, so it is often unclear whether or not they are actually from within the current study area, and in some cases they were clearly recorded from more than 1km away. The records are not all discussed here, but a summary species list is included in Appendix 1. The closest are discussed briefly below and other species records considered most relevant (on the basis of professional judgement) are included in the assessment section.

There were no records from within the study area, but there were several within 300m, from the grounds of Cyfarthfa Park. Most of these were of species that are still relatively common and widespread, including Bluebell, Common Feather-moss, Cinnabar Moth and several common bumblebees, and House Sparrow, Redpoll, Green Woodpecker and Starling. There are also records of species beside the ornamental ponds that have apparently been planted,

including Royal Fern, Oak Fern and Narrow-leaved Water-plantain. A number of the closest bird records are also associated with the ponds and lake, including Black Swan, Canada Goose, Mallard, Shelduck, Cormorant, Tufted Duck and Green Sandpiper. The rarely recorded Daffodil Fly was seen on a patch of Daffodils east of the lake in 2019, and White-letter Hairstreak butterfly was reported from the road beside the lake in 2009.

There are also records of Common Frog, Common Toad and Slow Worm within 300m of the study area. The streams to the north of the study area have records of Brown/ Sea Trout.

A Hedgehog was reported from the Gurnos Road at the western edge of the woodland in 2017.

There are several nearby records of bats, the closest being Soprano Pipistrelle, Daubenton's Bat and Natter's Bat.

A number of non-native species with invasive tendencies were also recorded, including Japanese Knotweed, Rhododendron, Hollyberry Cotoneaster, Montbretia, Butterfly Bush and Canadian Waterweed, Snowberry, Wilson's Honeysuckle, American Signal Crayfish and Grey Squirrel.

3. Habitat survey

3.1 Survey method

The habitat survey was carried out on 20 January 2022.

The objectives for the study were:

- To broadly describe the site using Phase 1 habitat survey methods.
- To compile a preliminary list of plant species for the site.
- To record any observations of protected or notable animal species, or habitats with potential for their occurrence.

The survey was undertaken using a simple walk-through method. Habitats were mapped by eye onto an aerial photograph base. The mapping was based on standard JNCC mapping conventions³, but in greater detail to produce an 'extended Phase 1 habitat survey'.

Plant and animal species were recorded as they were seen, noting the habitats they were recorded in. Fauna observations were limited to groups that are readily identifiable in winter, such as birds. The species list from the survey is presented as Appendix 2.

The weather during the survey was cool but sunny, and there had been a recent frost. January is not an optimal time of year for this type of study, but the timescale was determined by the project programme (with a March deadline). A survey at this time of year can be limited by the number of plant species that have died back, and many species are only detectable from dead stems and vegetative characteristics. However, a winter survey can be useful in this type of disturbed ground habitat, because dense ruderal vegetation has died back, making it easier to check for signs of certain mammal species.

³ JNCC (2010). Handbook for Phase 1 Habitat Survey: A Technique for Environmental Audit. Joint Nature Conservation Committee, Peterborough.

3.2 Habitat survey findings

The habitat plan is presented as Figure 3. Specific habitats and areas within the site are described in Table 2 below by Target Notes (TN1 to 11). Each Target Note includes a brief description of the habitat and the main plant species present, and a photograph of the main features.

The habitat plan should only be considered approximate because features have been plotted by eye, and in some cases the habitats merge gradually into one another rather than having clearly defined boundaries. In this situation the symbols for scrub have included dense Ivy and Bramble at the boundary wall, as well as the remnants of scrub that has recently been cleared but which still retains stumps and scrub ground flora.



Figure 3. Habitat survey plan

Table 2. Habitat Survey Target Notes

TN	Description/ photographs
1	Semi-improved damp, neutral grassland. A gentle south-facing slope with a mix of grassland and ruderal plants on compacted damp soil. The vegetation had apparently been cut in late summer/autumn and there were still a few tyre marks and areas of broken ground. The sward appears to be moderately diverse and mossy, with dominant species including Yorkshire Fog, Common Bent, Creeping Buttercup, Pointed Spear-moss, Red Clover, Ribwort Plantain, Cock's-foot, False Oat-grass, Dandelion, Red Fescue, Daisy and Perennial Rye-grass. Less frequent species include Broad-leaved Dock, Tufted Hair-grass, Hard Rush, Soft Rush, Oval Sedge, Pendulous Sedge, Ragwort, Wood Avens, Common Knapweed, Common Vetch, Common Mouse-ear, Ivy, and an indeterminate species of Marsh Orchid. The margin beside the buildings have a higher proportion of ruderal species including Soft Sow-thistle, Spear Thistle, Wall Lettuce and Ragwort.  
2	Rock pile and disturbed ground. A pile of rocks and metal frames, grown through by grasses and tall herbs. Plants recorded here include Hard Rush, Selfheal, Tutsan, Hogweed, Bramble, Creeping Buttercup, Broad-leaved Dock, Water Figwort, Wood Avens, Hairy(?) Bittercress and several species of moss. 

TN	Description/ photographs
3	Southern boundary. The site's southern edge is bordered by a metal palisade fence, with a scrubby young Sycamore growing through it. The fence is at the top of a south-facing bank, the southern side supports rough grassland and a recently planted Yew hedge and Apple trees. Ground flora species along the boundary include Ivy, Hart's-tongue Fern, Herb Robert, Bramble, Dandelion, Tufted Hair-grass, Male Fern, Creeping cinquefoil, Ribwort Plantain and Springy Turf-moss. 
4	Japanese Knotweed at western boundary. A linear stand of Knotweed on a west facing slope parallel with the western wall. Associated species include Bramble, Cleavers, Hedge Bindweed, Nettle, Pendulous Sedge, False Oat-grass, Creeping Buttercup, Cock's-foot and Tutsan. The boundary wall is locally dominated by dense Ivy, with occasional Ash and Sycamore saplings. Some of these have been cut down and others have Ash Die-back disease. The boundary wall also has debris along its base, including dead wood, bricks, rubble and ash. 

TN	Description/ photographs
5	Scrub remains. Several scrubby trees have been removed from the centre of the site, apparently mainly Ash, Sycamore and Alder. The remains of stumps are still present, together with the sparse former ground flora. The main associated plant species include Ivy, Herb Robert, Wood Avens and Nettle. 
6	Damp, disturbed ground. A heavily rutted area with standing water in some of the deeper tyre marks at the time of the survey. Mostly in the shade of the adjacent building. The sparse vegetation is dominated by Yorkshire Fog and Creeping Buttercup, with associates including Ribwort Plantain, Broad-leaved Dock, Wood Avens, Dandelion and Nettle. A single plant of Yellow Flag Iris was noted in damp ground beside the rear of the building. 
7	Woodland (outside study area boundary). Mainly mature broad-leaved woodland, with a canopy dominated by Ash and Sycamore, with occasional Hazel, Oak, Beech, Holly, Larch and Spruce. The ground flora appears to be dominated by Ivy and Bramble, with occasional Nettle and Dog's Mercury. There appears to be a tangled understorey with a moderate amount of dead wood habitat. 

TN	Description/ photographs
8	Soil pile and scrub. A linear pile of damp soil, rubble, brick and other debris, including tree stumps, metal and plastic. The southern side of the heap has recently been cleared of Bramble and Butterfly Bush scrub (reportedly while machinery was pulled out of the area). The northern side mostly still supports dense Bramble adjacent to the boundary wall. Associated species include Nettle, Cleavers, Hedge Bindweed, Water Figwort, Soft Rush, Male Fern, Ivy, Meadow Buttercup, Hairy(?) Bittercress and an indeterminate Willow. 
9	Cleared scrub. An area where Ash and Butterfly Bush scrub has been removed. The ground flora includes elements of scrub, ruderal and grassland vegetation. Prominent species include Ivy, Foxglove, Germander Speedwell, Male Fern, Wood Dock, Tufted Hair-grass and Nettle. 

TN	Description/ photographs
10	Hard standing. A concrete slab in front of the open shed at TN11; of no ecological significance. 
11	Building. (Will be unaffected by the proposed garden project). A large, open-fronted shed, used for storage of council vehicles. The shed has a brickwork lower wall, and is mainly clad by steel sheeting over a steel frame. There are no features likely to be used by roosting bats, but there is an owl-box mounted on the gable end of the south-west facing side of the roof, overlooking the proposed garden site. The narrow strip of ground at the south-eastern edge of the study area is heavily shaded between two buildings. It supports sparse flora dominated by common mosses, with associated species including Nettle, Selfheal, Herb Robert, Wall Lettuce, Dandelion and Creeping Buttercup. A seedling of Monkey-flower was also present, but possibly just a casual that will not persist here. 

4. Assessment

The following section assesses the nature conservation value of the habitats and plant species recorded during the survey and draws on information from the data collation exercise. The main references for the evaluation process are the Wildlife Sites Guidance Wales⁴ and the Welsh Government's Environment (Wales) Act 2016 Section 7 lists of habitats and species of principal importance for the purpose of maintaining and enhancing biodiversity in relation to Wales. The various broad groups of plants and animals are evaluated separately, in approximate taxonomic order, and summarised in Table 3 at the end of the section.

4.1 Overview of habitats

The site appears to be of relatively recent origin, formed from tipped soil, rubble and other debris, possibly dating from the time that the council sheds were constructed. The land has been left largely derelict for several years and only managed by occasional cutting back of the vegetation.

The habitat is a mosaic of damp grassland, disturbed ground and scrub, but it does not qualify as the priority habitat 'Open mosaic habitats on previously developed land' because it is too small and shaded, and is not characterised by low nutrient levels or early successional vegetation. The most ecologically interesting part of the site is the semi-improved neutral grassland in the south of the site, although this appears to be a rather disturbed example of this habitat, on heavily compacted damp soil and with a high proportion of ruderal plants.

4.2 Plant species

The site supports a moderately high plant diversity, probably attributable to the range of substrata present and the ruderal flora associated with recent disturbance. Most of the plants that were recorded during the survey are very common and none of the species are listed as being especially rare within the Wildlife Sites Guidelines. The presence of a Marsh Orchid is of interest within the site (although it could not be identified to species in winter).

It is possible that additional plant species might be confirmed through more detailed investigations and at other times of year. However, the potential for plants with high nature conservation significance to be found within the study area is considered very low.



Marsh Orchid seed-head (from edge of grassland at TN1)

⁴ Wales Biodiversity Partnership (2008). Guidelines for the Selection of Wildlife Sites in Wales.

The data search included many uncommon plant species, but these were mostly from the SSSI or SINC grassland habitats over 500m from the study area, and they did not include any rare or scarce species that would be likely to occur on this site.

Several mosses were recorded during the survey, but they were all limited to common species. The potential for uncommon bryophytes to occur in the study area is considered very unlikely given the high nutrient status of the site and disturbed nature of the habitats.

One plant was found that is listed as a non-native invasive species, included on Schedule 9 of the Wildlife and Countryside Act. Japanese Knotweed occurs as patches along the proposed access track. It is unlawful to plant or otherwise cause the spread of this species in the wild. This is discussed further in the constraints and recommendations sections.



Japanese Knotweed at western boundary (TN4)

4.3 Fungi

The data search only included a small number of grassland fungi from almost 1km away and which would not be expected to occur in the study area. Very few fungi were identified during the survey. This is probably partly due to the time of year. Young Scarlet Elf-cups were noted on damp wood at the boundary, and other dead-wood fungi might be expected on the old tree stumps in the soil pile at TN8. The grassland is probably too damp and recently disturbed to be of value for waxcap fungi. Overall, the potential for the habitats within the study area to support any fungi of significance for nature conservation is considered very low.



Young Scarlet Elf-cup fungi on damp dead wood at the western boundary (TN5)

4.4 Lichens

A small specimen of a *Peltigera* lichen (probably *P.membranacea*) was found on one of the old stumps in the soil pile, but the only other lichens seen were fragments of common species that had fallen from branches of the adjacent trees. The SEWBreC data included a small number of species from the SSSI, but none that would be likely to occur on the habitats in the study area. There is no reason to suspect that any rare or scarce species of lichens might occur within the study area.

4.5 Invertebrates

Winter is not a good season to try to assess habitats for invertebrates, but the grassland and scrubby margins do appear capable of supporting a moderate diversity of common species. Habitats that might be especially suitable could be the south-facing grassland that could be used by native bees, the Nettles at the margins for certain butterfly larvae, and the dense Ivy on the boundary wall that could provide a useful nectar source when few other plants are flowering. Given the history of gardening and old glass houses in this part of Cyfarthfa Park it is possible that some native invertebrate species may have been introduced through the horticultural activities (e.g. flatworms or molluscs, which can be spread through plant pots and growing media).

The invertebrates reported by the SEWBreC data search were mostly from at least 500m away, found in the SSSI. Many of the moth records were from pre-1927, or from more than 500m away. There are several recent records of the non-native American Signal Crayfish and one of Golden-ringed Dragonfly from the feeder to Cyfarthfa Park lake, but these would not be relevant to the present study area because there is no direct aquatic connection.

Overall the study area is unlikely to support an invertebrate population with nature conservation significance at any higher than a 'within the site' context.

4.6 Amphibians

No amphibians were seen during the survey (but they would be expected to be hibernating at this time of year). The SEWBreC data search confirmed several species are known to occur in the various ponds at Cyfarthfa Park including Common Frog and Common Toad. A report for Cyfarthfa Conservation Area⁵ also mentions the occurrence of Palmate Newt, which the SEWBreC data also reports from the SSSI to the north.

The habitats within the study area could potentially be used by amphibians as terrestrial foraging habitat, and the scrubby margins and old stumps in the soil heaps could provide possible hibernation sites. However, the site does not appear likely to be of especially high value for them because the active council yard and car-parks could constitute a barrier to their movements to and from the south and east, and the adjacent woodland would probably provide much better cover for hibernation.

4.7 Reptiles

The SEWBreC data reported Common Lizard and Slow Worm within 1km of the study area. Most of the Lizard records were from the SSSI and Y Graig, but the nearest Slow Worm was reported from the Taff Trail approximately 300m west of the study area.

There were no reptile records from the immediate vicinity. However, this may reflect under-recording, rather than reptiles being absent. The habitats within the study area appear potentially suitable for them, particularly along the southern boundary, which is sunnier and

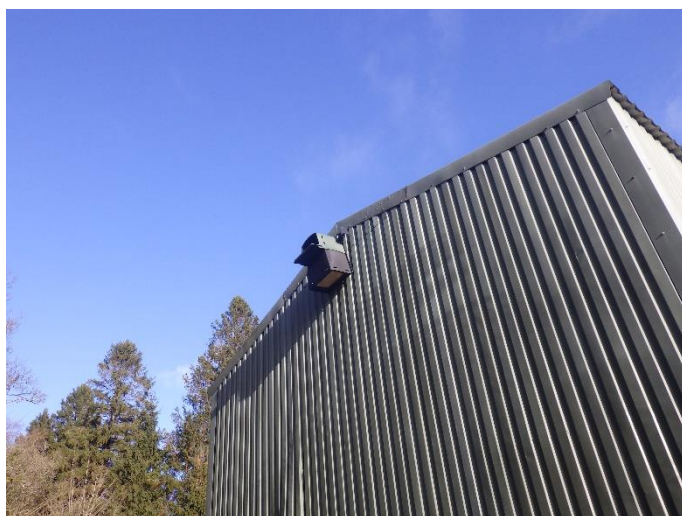
⁵ Cyfarthfa Conservation Area: Character Appraisal. Report by Merthyr Tydfil County Borough Council. December 2009.

better drained than the rest of the site. However, the shade, damp and disturbance over most of the area is not ideal for reptiles so the risk of their presence is low.

4.8 Birds

Many of the SEWBreC records were observations of birds from the wider area, reflecting the popularity of the Cyfarthfa Park woodland and ponds with birdwatchers. Some of the rarer species in the data search records were very old, such as Corncrake from the 1950s and Green Sandpiper and Snow Bunting from 1963 and Lesser Spotted Woodpecker from 1995.

The scrubby Ivy and Bramble at the site margin are likely to be used by birds for nesting during spring and summer. Birds breeding in or close to the site are likely to be limited to relatively common woodland and garden species. The owl box on the shed at TN11 appears to be a Barn Owl box design, but could also support breeding Tawny Owl, given its close proximity to broad-leaved woodland. There are several SEWBreC records of Barn Owl, but the nearest is over 800m away in the SSSI.



Owl box on building (TN11)

4.9 Mammals

The only species of mammal noted during the survey was a Grey Squirrel on a bird feeder on one of the nearby buildings. There were no tracks or signs of other mammal species, but much of the ground was too frozen to have been suitable for footprints. The adjacent woodland is likely to support a variety of common wild mammals, and it is likely that small mammals such as mice and voles could use the scrubby margins of the site, at least occasionally.

The data search provided several mammal records, but few of these species have potential to occur at the study area. The closest record of Hedgehog is only 200m away, so this species would appear to be resident in the Cyfarthfa woodland. There are three records of Red Squirrel from the Cyfarthfa Woodlands in 1973 but this species is currently presumed absent from the area. The nearest known Badger sett is over 500m away.

There are numerous Otter records along the local rivers, but these are not considered significant to the current proposals because there is no suitable watercourse on the site. It is feasible that an Otter could cross through the study area, perhaps if visiting the ponds to the east, but this would not be expected to be a regular occurrence due to the built-up nature of the council yard, and the adjacent woodland providing a much better alternative route.

The SEWBreC data included many bat records. A high proportion were from the SSSI and beside the local watercourses. There were several closer to the study area, including a Brown

Long-eared Bat roost at Cyfarthfa Castle, and bats feeding over the Cyfarthfa lake. There are no mature trees or built structures within the site that appear likely to support roost sites for bats. The large metal clad shed is unlikely to support roosting bats, but a large, open-fronted building of this type could feasibly be used by flying bats in certain conditions, such as in wet weather.

Overall, the study area is considered to have very low nature conservation value for mammals.

Table 3. Summary of nature conservation value.

Ecological feature	Summary of nature conservation value
Cyfarthfa Park SINC	Ornamental parkland with semi-natural woodland, neutral grassland and ponds. County value. (Outside of proposed works area).
Cyfarthfa woodland adjacent to site	Restored Ancient Woodland. Mixed canopy with apparently relatively low diversity ground flora. Local value. (Outside of proposed works area).
Plants	The southern grassland area is of likely botanical value within the site , but the rest of the area, and the bryophyte community is of negligible value. It also supports Japanese Knotweed that will need to be taken into account.
Fungi	Negligible value.
Lichens	Negligible value.
Invertebrates	Likely value within the site.
Amphibians	Likely Negligible value but occurrence of small numbers cannot be ruled out
Reptiles	Likely Negligible value , but occurrence of small numbers cannot be ruled out
Birds	Negligible value , although there is potential nesting habitat for common breeding birds at the site margin.
Mammals	Negligible value , but with potential cover for common small mammals at the site margin.

5. Ecological constraints and recommendations

The following section summarises potential constraints to possible development in relation to the plants and animals found within the site, including protected species. Broad recommendations are provided for ensuring legal compliance.

5.1 Protected sites

The Cyfarthfa Park SINC lies outside the proposed garden area and is separated from it by the council yard and buildings, so it will not be directly affected by any of the proposed works. However, the restored ancient woodland is directed adjacent to the study area, so there is potential for disturbance of the woodland habitat, and possible indirect effects on any wildlife that uses the wider woodland area (which includes the SINC). To minimise this risk the woodland must be properly protected at all stages. The following measures are recommended:

- All construction vehicle and pedestrian access should be from the existing council access at the south and east sides, and not through the woodland.

- When selecting plants for the garden it is important to choose species that will not escape and colonise the woodland.
- The garden should not be lit at night, to avoid adverse impacts on nocturnal wildlife such as bats and moths. (Occasional moth trapping for educational purposes may be an exception.)
- The western boundary wall should include a few holes at ground level, large enough to allow access for animals such as Hedgehogs and amphibians.
- Ideally the site will be run on sustainable organic gardening principles, avoiding any use of pesticides because these could affect wildlife visiting from the adjacent woodland (such as slug pellets that might affect birds and small mammals). If chemical treatments are necessary these should only be carried out by qualified personnel, using methods that will not harm wildlife using the wider area.

5.2 Non-native invasive plants

Japanese Knotweed is present in the proposed works area. This is a non-native invasive species listed on Schedule 9 of the Wildlife and Countryside Act. It is unlawful to plant it or otherwise cause it to spread in the wild. Merthyr Tydfil Council staff are reportedly aware of this Knotweed and it is subject to an ongoing treatment programme. Japanese Knotweed can be controlled by using herbicide but may require treatment over several years. Herbicide applied late in the year by stem-injection is reported to be more effective than spraying.

Knotweed is easily spread when fragments of rhizome are transported in soil, often accidentally with machinery/ vehicle tyres. Its roots have been reported to spread up to a 7m radius from the above-ground parts of the plant, which means that a high proportion of the southern area is potentially affected. Any vehicles working on the site should be carefully checked and cleaned before leaving the site to remove any traces of Knotweed before moving to other areas. If any material potentially containing Knotweed rhizomes has to be removed from site it should be disposed of at a licensed tip.

Ideally a plan for preventing spread of Knotweed should be developed well in advance of starting works on site.

5.3 Birds

All native wild birds and their nests are protected under the Wildlife and Countryside Act. As such, it is unlawful to damage, destroy or disturb bird nests while they are in use.

Where potential nesting habitat (the scrub at the site margin in particular) could be disturbed by construction activities, the work should be scheduled outside the bird nesting season (which is typically March to mid-August inclusive) or only permitted after a thorough inspection to confirm that the work site and its immediate surroundings does not contain any nests.

5.4 Reptiles

All native reptiles are protected under the Wildlife and Countryside Act. The Act requires that reasonable measures should be taken to avoid death or injury to reptiles. In this case the probability of reptiles being present appears very low but cannot be ruled out.

Given the low probability of reptiles being present, it is recommended that any clearance at the site margins should be carried out carefully and in stages. First removing the above-ground vegetation by hand before any mechanical clearance of soil or other debris is undertaken. The subsequent earthworks should proceed cautiously and under a watching brief so that any reptiles (or amphibians or small mammals) can be rescued and moved to

safety. Ideally this would be carried out when temperatures are at least 10°C so that amphibians and reptiles are sufficiently active to move away from the disturbance.

5.5 Hedgehogs and small mammals

Hedgehogs are protected under Section 6 of the Wildlife and Countryside Act 1981, which prohibits killing by certain methods, and all native wild mammals receive protection under the Wild Mammals (Protection) Act, which makes cruel ill-treatment of wild mammals an offence. Any works that would potentially affect mammal resting, breeding or hibernation sites should endeavour to be undertaken in such a way that does not cause them unnecessary suffering. In this situation the site clearance measures set out above to minimise harm to reptiles will also minimise harm to small mammals because they all face similar dangers from construction.

6. Possible ecological opportunities

The proposed new garden project is intended to be beneficial for both people and wildlife. Using the site as a demonstration for wildlife friendly and sustainable gardening techniques will mean that the ecological benefits will potentially extend to the gardens of many visitors over a much wider geographical area. Home composting, rainwater harvesting and avoidance of peat products and harmful chemicals and creating small-scale habitats for insects should all be promoted. A number of other measures that could possibly be included to retain and enhance the site's value for biodiversity are suggested below.

- Garden plants do not have to be native species, but they should be species known to have high value for wildlife, and which will not spread into the adjacent woodland.
- Eradicate the Knotweed.
- Plant fruit trees at the west and northern boundaries, where they provide good habitat for insects but not cast too much shade on the rest of the garden.
- Retain some of the dense Ivy at the boundary as cover and a late source of nectar.
- The south-west facing walls of the buildings could be good places to install 'bug hotels' and / or grow climbing plants.
- Aim to have a good variety of plants, and have some in flower for as much of the year as possible.
- Salvage some of the old stumps and retain a pile as cover for wildlife at a sunny margin.
- Include areas of tall, flower-rich vegetation at the margins as cover for wildlife (they may need to be cut back in late summer, but perhaps leaving some as cover through the winter).
- Consider forming some of the paths from cellular paving / grass-crete to minimise the amount of unvegetated ground surface.
- Consider a flower-rich green roof for any covered structures such as sheds.
- Include a bird bath, or a larger water-feature or pond for dragonflies and amphibians.
- The downpipes from the roofs of the existing sheds could be a useful source of water for irrigation or a water-garden.
- Add additional bird and bat boxes on the walls of the building.

7. Recommendations for further survey

Despite the winter fieldwork, this survey has provided a broad account of the habitats, flora and fauna in the proposed works area. It should not be regarded as a complete inventory of every species but the disturbed, damp, nutrient rich ground is unlikely to support any species of significant value for nature conservation, so no further survey is considered necessary at this stage.

However, it is likely to be beneficial to carry out further surveys in due course, in parallel with the environmental education function of the ongoing gardening project. This could be very helpful in introducing visitors to common garden wildlife. Areas for further survey might include the following:

- Maintaining a list of birds visiting the garden, and any that nest in the garden.
- Monitoring the butterflies and bees that visit the garden.
- Carrying out occasional moth-trapping and bat-surveys with visitors.

If the construction works are delayed for a year or more it would be appropriate to update the ecology survey to check that the current findings remain valid, or to identify any changes that require a re-assessment of the ecological constraints. Any re-survey should not be undertaken during the winter.

Appendix 1. Summary of SEWBRc data search

The following table summarises the records obtained through the SEWBRc data search (data search reference 0212-789). The data search was for a 1km search buffer for protected and priority species, and other species of conservation concern (including non-native invasive species). NB. Some of the records provided were from up to 3km away from the search area (for mobile species such as bats and Barn Owls, or where the data has been submitted as 1km grid square data).

Scientific Name	English Name	Earliest Year	Latest Year	Total Records
PLANTS				
<i>Agrimonia procera</i>	Fragrant Agrimony	2002	2002	1
<i>Alchemilla glabra</i>	Smooth Lady's-mantle	1960	1991	4
<i>Alchemilla xanthochlora</i>	Intermediate Lady's-mantle	2002	2005	3
<i>Alisma lanceolatum</i>	Narrow-leaved Water-plantain	2015	2015	1
<i>Asplenium trichomanes</i> subsp. <i>trichomanes</i>	Maidenhair Spleenwort	1960	1970	2
<i>Botrychium lunaria</i>	Moonwort	2007	2007	2
<i>Brachypodium pinnatum</i>	Heath False-brome	1990	1990	1
<i>Bromopsis erecta</i>	Upright Brome	2007	2007	1
<i>Buddleja davidii</i>	Butterfly-bush	2001	2021	12
<i>Campylium stellatum</i>	Yellow Starry Feather-moss	1991	1991	1
<i>Carex montana</i>	Soft-leaved Sedge	2007	2007	1
<i>Carex riparia</i>	Greater Pond-sedge	2013	2013	1
<i>Carex vesicaria</i>	Bladder-sedge	1999	1999	1
<i>Carex viridula</i> subsp. <i>brachyrrhyncha</i>	Long-stalked Yellow-sedge	1960	2007	5
<i>Centaurea scabiosa</i>	Greater Knapweed	2013	2018	6
<i>Ceratocarpus claviculata</i>	Climbing Corydalis	2007	2007	2
<i>Chrysosplenium alternifolium</i>	Alternate-leaved Golden-saxifrage	2017	2017	1
<i>Cirsium acaule</i>	Dwarf Thistle	2007	2007	1
<i>Colura calyptrofolia</i>	Fingered Cowlwort	2006	2006	2
<i>Cotoneaster</i>		1978	2018	5
<i>Cotoneaster bullatus</i>	Hollyberry Cotoneaster	2015	2015	1
<i>Cotoneaster horizontalis</i>	Wall Cotoneaster	2002	2002	1
<i>Cotoneaster microphyllus</i>	Small-leaved Cotoneaster	1969	1969	1
<i>Cotoneaster simonsii</i>	Himalayan Cotoneaster	1991	2015	2
<i>Crococsmia</i>	Montbretia	2018	2021	4
<i>Crococsmia pottsii</i> x <i>aurea</i> = <i>C. x crocosmiiflora</i>	Montbretia	2002	2015	3
<i>Echium vulgare</i>	Viper's-bugloss	2013	2013	1
<i>Elodea canadensis</i>	Canadian Waterweed	2007	2015	4
<i>Epilobium brunnescens</i>	New Zealand Willowherb	2002	2017	3
<i>Fallopia japonica</i>	Japanese Knotweed	1960	2021	44
<i>Fallopia sachalinensis</i>	Giant Knotweed	2007	2007	1
<i>Filago minima</i>	Small Cudweed	1972	2007	3
<i>Galium sternerii</i>	Limestone Bedstraw	2007	2007	1
<i>Geum rivale</i>	Water Avens	1960	2016	20
<i>Gymnadenia conopsea</i>	Fragrant Orchid	1960	1970	2
<i>Gymnocarpium dryopteris</i>	Oak Fern	1907	2015	7
<i>Gymnocarpium robertianum</i>	Limestone Fern	1960	2007	6
<i>Helianthemum nummularium</i>	Common Rock-rose	2003	2007	2
<i>Hieracium angustatifolium</i>	Small-leaved Hawkweed	1894	1900	4
<i>Hieracium cacomitum</i>	Hawkweed	1894	1894	2
<i>Hyacinthoides hispanica</i>	Spanish Bluebell	2002	2002	1
<i>Hyacinthoides non-scripta</i>	Bluebell	1960	2018	30
<i>Hypnum cupressiforme</i> var. <i>lacunosum</i>	Great Plait-moss	2010	2010	2
<i>Impatiens glandulifera</i>	Indian Balsam	2005	2020	4
<i>Kindbergia praelonga</i>	Common Feather-moss	1991	2015	5
<i>Lamiastrum galeobdolon</i> subsp. <i>argentatum</i>	Yellow Archangel	2002	2021	4
<i>Lamiastrum galeobdolon</i> subsp. <i>montanum</i>	Yellow Archangel	2002	2002	1
<i>Lathraea squamaria</i>	Toothwort	1960	2017	13
<i>Lathyrus nissolia</i>	Grass Vetchling	2007	2007	2
<i>Lonicera nitida</i>	Wilson's Honeysuckle	2015	2015	1
<i>Luzula multiflora</i> subsp. <i>multiflora</i>	Heath Wood-Rush	2013	2013	1

Scientific Name	English Name	Earliest Year	Latest Year	Total Records
<i>Lycopodium clavatum</i>	Stag's-horn Clubmoss	2007	2007	2
<i>Meconopsis cambrica</i>	Welsh Poppy	2007	2020	5
<i>Mimulus guttatus</i>	Monkeyflower	1960	2007	10
<i>Mimulus guttatus</i> x <i>luteus</i> = <i>M. x robertsii</i>	Hybrid Monkeyflower	2002	2002	1
<i>Neottia nidus-avis</i>	Bird's-nest Orchid	1960	1970	2
<i>Nuphar lutea</i>	Yellow Water-lily	2007	2007	1
<i>Ophrys apifera</i>	Bee Orchid	2015	2015	1
<i>Orthotrichum cupulatum</i>	Hooded Bristle-moss	2017	2017	1
<i>Osmunda regalis</i>	Royal Fern	2015	2015	1
<i>Paris quadrifolia</i>	Herb-paris	1960	1970	2
<i>Parthenocissus quinquefolia</i>	Virginia-creeper	2018	2018	1
<i>Persicaria wallichii</i>	Himalayan Knotweed	2007	2007	1
<i>Phegopteris connectilis</i>	Beech Fern	1989	1989	1
<i>Pinguicula vulgaris</i>	Common Butterwort	1960	2007	5
<i>Platanthera bifolia</i>	Lesser Butterfly-orchid	1960	2010	3
<i>Prunus laurocerasus</i>	Cherry Laurel	1975	2018	13
<i>Prunus padus</i>	Bird Cherry	1960	2002	6
<i>Pyrola rotundifolia</i>	Round-leaved Wintergreen	2021	2021	2
<i>Rhododendron ponticum</i>		1975	2015	2
<i>Saxifraga granulata</i>	Meadow Saxifrage	1960	1970	2
<i>Sedum album</i>	White Stonecrop	1974	1974	1
<i>Sedum forsterianum</i>	Rock Stonecrop	1974	1974	1
<i>Sinapis arvensis</i>	Charlock	2017	2017	1
<i>Symphoricarpos albus</i>	Snowberry	2002	2015	5
<i>Trollius europaeus</i>	Globeflower	1960	1970	2
<i>Typha angustifolia</i>	Lesser Bulrush	1981	1981	1
<i>Veronica agrestis</i>	Green Field-speedwell	2002	2002	2
<i>Viola canina</i>	Heath Dog-violet	2003	2005	2
FUNGI, LICHENS AND SLIME MOULDS				
<i>Caloplaca flavocitrina</i>		1996	1996	1
<i>Gliophorus irrigatus</i>	Slimy Waxcap	2021	2021	1
<i>Gliophorus laetus</i>	Heath Waxcap	2016	2016	1
<i>Gliophorus psittacinus</i>	Parrot Waxcap	2004	2021	7
<i>Hygrocybe acutoconica</i> var. <i>acutoconica</i>	Persistent Waxcap	2015	2015	1
<i>Hygrocybe flavipes</i>	Yellow Foot Waxcap	2014	2019	4
<i>Lepraria diffusa</i> var. <i>diffusa</i>		1996	1996	2
<i>Lepraria nivalis</i>		1996	1996	2
<i>Milesina murariae</i>		2017	2017	2
<i>Peltigera canina</i>		1976	1976	1
<i>Peltigera horizontalis</i>		1996	2018	3
<i>Usnea florida</i>	Witches' Whiskers Lichen	2013	2015	2
<i>Verrucaria elaeomelaena</i> s. lat.		2010	2010	2
<i>Verrucaria pinguicula</i>		1996	1996	1
INVERTEBRATES				
<i>Acronicta psi</i>	Grey Dagger	1900	2017	5
<i>Acronicta rumicis</i>	Knot Grass	1900	2020	8
<i>Agrochola litura</i>	Brown-spot Pinion	1908	1910	11
<i>Agrochola lychnidis</i>	Beaded Chestnut	1900	1900	2
<i>Amphipyra tragopoginis</i>	Mouse Moth	1900	1900	1
<i>Andrena humilis</i>	Buff-tailed Mining Bee	2017	2017	1
<i>Andrena tarsata</i>	Tormentil Mining Bee	2015	2020	3
<i>Apamea remissa</i>	Dusky Brocade	1900	2001	2
<i>Arctia caja</i>	Garden Tiger	1900	1900	1
<i>Argynnis paphia</i>	Silver-washed Fritillary	2008	2021	16
<i>Aromia moschata</i>	Musk Beetle	2021	2021	1
<i>Atolmis rubricollis</i>	Red-necked Footman	2016	2016	2
<i>Bembecia ichneumoniformis</i>	Six-belted Clearwing	2016	2016	1
<i>Boloria euphrosyne</i>	Pearl-bordered Fritillary	1927	1927	1
<i>Boloria selene</i>	Small Pearl-bordered Fritillary	1996	2007	5
<i>Bombus hortorum</i>	Garden Bumblebee	2014	2020	6
<i>Bombus humilis</i>	Brown-banded Carder-bee	1995	1995	1
<i>Bombus jonellus</i>	Heath Bumblebee	2021	2021	1
<i>Bombus lapidarius</i>	Red-tailed Bumblebee	2010	2021	13
<i>Bombus lucorum</i>	White-tailed Bumblebee	2010	2020	9
<i>Bombus monticola</i>	Bilberry Bumblebee	2017	2018	2
<i>Bombus pascuorum</i>	Common Carder Bee	2010	2021	21
<i>Bombus pratorum</i>	Early Bumblebee	2014	2021	15

Scientific Name	English Name	Earliest Year	Latest Year	Total Records
<i>Bombus rudericus</i>	Red-shanked Carder-bee	2020	2020	1
<i>Bombus sylvestris</i>	Forest Cuckoo Bee	2020	2020	1
<i>Bombus terrestris</i>	Buff-tailed Bumblebee	2015	2021	19
<i>Bombus terrestris</i>	Western Bee-fly	2019	2019	1
<i>Brachylomia viminalis</i>	Minor Shoulder-knot	1927	1927	1
<i>Calopteryx virgo</i>	Beautiful Agrion	2021	2021	1
<i>Cantharis nigra (=thoracica)</i>		2018	2018	1
<i>Ceramica pisi</i>	Broom Moth	1900	2016	8
<i>Chorisops nagatomii</i>	Bright Four-spined Legionnaire	2018	2019	3
<i>Chrysis fulgida</i>	Shimmering Ruby-tail	2019	2019	1
<i>Cirrhia icteritia</i>	Sallow	1927	2021	2
<i>Clusia tigrina</i>		2021	2021	1
<i>Coenonympha pamphilus</i>	Small Heath	2007	2018	46
<i>Conocephalus fuscus</i>	Long-winged Cone-head	2021	2021	1
<i>Cordulegaster boltonii</i>	Golden-ringed Dragonfly	1995	2017	7
<i>Cossus cossus</i>	Goat Moth	2019	2019	2
<i>Crambus pratella</i>	Scarce Grass-veneer	1927	2007	2
<i>Craniophora ligustri</i>	Coronet	2001	2020	10
<i>Cryptocephalus parvulus</i>		2021	2021	1
<i>Ctenophora pectinicornis</i>		2020	2020	1
<i>Diarsia rubi</i>	Small Square-spot	2001	2001	1
<i>Ecliptopera silaceata</i>	Small Phoenix	1900	2021	9
<i>Ennomos fuscantaria</i>	Dusky Thorn	2021	2021	1
<i>Erynnis tages</i>	Dingy Skipper	2012	2016	4
<i>Eugnorisma glareosa</i>	Autumnal Rustic	1900	1900	1
<i>Euphydryas aurinia</i>	Marsh Fritillary	1977	2018	35
<i>Graphiphora augur</i>	Double Dart	1927	1927	1
<i>Harmonia axyridis</i>	Harlequin Ladybird	2015	2021	21
<i>Hemaris tityus</i>	Narrow-bordered Bee Hawk-moth	1900	2020	4
<i>Hepialus humuli</i>	Ghost Moth	1900	2021	3
<i>Hoplodrina blanda</i>	Rustic	1900	1900	1
<i>Hydraecia micacea</i>	Rosy Rustic	1900	1900	1
<i>Hydrelia sylvata</i>	Waved Carpet	1900	1918	8
<i>Lasiommata megera</i>	Wall	2007	2019	14
<i>Lestes sponsa</i>	Common Emerald Damselfly	2014	2016	2
<i>Leucania comma</i>	Shoulder-striped Wainscot	1900	2001	2
<i>Lithobius (Lithobius) pilicornis</i>		2018	2018	1
<i>Lithophane ornitopus lactipennis</i>	Grey Shoulder-knot	1927	1927	1
<i>Litoligia literosa</i>	Rosy Minor	1900	1900	1
<i>Lophosia fasciata</i>		2015	2020	4
<i>Lycia hirtaria</i>	Brindled Beauty	2019	2021	6
<i>Macaria wauaria</i>	V-Moth	1927	1927	1
<i>Magdalis carbonaria</i>		2021	2021	1
<i>Megamerina dolium</i>		2021	2021	1
<i>Melanchra persicariae</i>	Dot Moth	1900	2001	2
<i>Mniotype adusta</i>	Dark Brocade	1927	1927	1
<i>Norellia spinipes</i>	Daffodil Fly	2019	2019	2
<i>Orgyia recens</i>	Scarce Vapourer	1917	1917	2
<i>Orthetrum coerulescens</i>	Keeled Orthetrum	2016	2016	1
<i>Orthochaetes setiger</i>		2017	2018	2
<i>Orthosia gracilis</i>	Powdered Quaker	1900	1900	1
<i>Oxycera pardalina</i>	Hill Soldier	2018	2018	1
<i>Pacifastacus leniusculus</i>	American Signal Crayfish	2020	2021	3
<i>Parasyrphus nigritarsis</i>		2016	2016	1
<i>Pelurga comitata</i>	Dark Spinach	1908	1927	4
<i>Perizoma albulata</i>	Grass Rivulet	2018	2018	2
<i>Perizoma albulata albulata</i>	Grass Rivulet	1927	1927	1
<i>Polydorus formosus</i>		2018	2020	6
<i>Pyrochroa coccinea</i>	Black-headed Cardinal Beetle	2019	2019	2
<i>Quedius auricomus</i>		2010	2010	1
<i>Rhagium bifasciatum</i>		2018	2019	2
<i>Rhagium mordax</i>		2015	2015	1
<i>Rhamphomyia caliginosa</i>		1996	1996	1
<i>Satyrus w-album</i>	White-letter Hairstreak	2009	2021	3
<i>Scotopteryx chenopodiata</i>	Shaded Broad-bar	1900	2021	6
<i>Speyeria aglaja</i>	Dark Green Fritillary	1927	2018	9
<i>Spilosoma lubricipeda</i>	White Ermine	1900	2001	3
<i>Spilosoma lutea</i>	Buff Ermine	1900	2021	10
<i>Stratiomys potamida</i>	Banded General	2014	2017	2
<i>Sympetrum danae</i>	Black Darter	2015	2015	1

Scientific Name	English Name	Earliest Year	Latest Year	Total Records
<i>Tholera cespitis</i>	Hedge Rustic	1900	1900	1
<i>Tholera decimalis</i>	Feathered Gothic	1927	1927	1
<i>Timandra comae</i>	Blood-vein	2018	2021	3
<i>Tyria jacobaeae</i>	Cinnabar	1900	2021	10
<i>Xanthorhoe ferrugata</i>	Dark-barred Twin-spot Carpet	1900	2021	3
<i>Xestia castanea</i>	Neglected Rustic	2014	2014	1
<i>Xylena exsoleta</i>	Sword-grass	1906	1907	5
<i>Xylena vetusta</i>	Red Sword-grass	1904	2015	15
<i>Zophomyia temula</i>		2016	2016	1
FISH				
<i>Salmo salar</i>	Atlantic Salmon	1991	2007	15
<i>Salmo trutta</i>	Brown/Sea Trout	1997	2007	12
<i>Salmo trutta subsp. fario</i>	Brown Trout	1969	1997	23
AMPHIBIANS				
<i>Bufo bufo</i>	Common Toad	1994	2016	7
<i>Lissotriton helveticus</i>	Palmate Newt	2021	2021	1
<i>Rana temporaria</i>	Common Frog	1964	2021	12
<i>Triturus cristatus</i>	Great Crested Newt	1966	1966	1
REPTILES				
<i>Anguis fragilis</i>	Slow-worm	1994	2020	23
<i>Zootoca vivipara</i>	Common Lizard	2007	2021	18
BIRDS				
<i>Acanthis cabaret</i>	Lesser Redpoll	2011	2011	1
<i>Accipiter gentilis</i>	Goshawk	2016	2021	2
<i>Actitis hypoleucos</i>	Common Sandpiper	2005	2005	1
<i>Aegithalos caudatus</i>	Long-tailed Tit	1978	2021	44
<i>Alcedo atthis</i>	Kingfisher	2002	2019	11
<i>Anas platyrhynchos</i>	Mallard	1975	2021	70
<i>Anthus pratensis</i>	Meadow Pipit	2007	2007	1
<i>Apus apus</i>	Swift	2007	2021	33
<i>Ardea cinerea</i>	Grey Heron	2002	2021	22
<i>Asio flammeus</i>	Short-eared Owl	2013	2013	1
<i>Aythya fuligula</i>	Tufted Duck	1975	1975	2
<i>Branta canadensis</i>	Canada Goose	1975	2021	39
<i>Bucephala clangula</i>	Goldeneye	1995	1995	1
<i>Chloris chloris</i>	Greenfinch	2005	2019	29
<i>Chroicocephalus ridibundus</i>	Black-headed Gull	2005	2017	12
<i>Cinclus cinclus</i>	Dipper	1976	2020	61
<i>Crex crex</i>	Corncrake	1954	1954	1
<i>Cuculus canorus</i>	Cuckoo	2014	2014	1
<i>Curruca communis</i>	Whitethroat	2007	2007	1
<i>Cygnus atratus</i>	Black Swan	1975	1975	2
<i>Dryobates minor</i>	Lesser Spotted Woodpecker	1995	1995	2
<i>Falco peregrinus</i>	Peregrine	2007	2018	11
<i>Falco subbuteo</i>	Hobby	2018	2018	1
<i>Falco tinnunculus</i>	Kestrel	2012	2019	3
<i>Ficedula hypoleuca</i>	European Pied Flycatcher	2016	2018	2
<i>Fringilla montifringilla</i>	Brambling	2009	2009	1
<i>Hirundo rustica</i>	Swallow	2007	2020	12
<i>Larus argentatus</i>	European Herring Gull	1981	2021	23
<i>Larus canus</i>	Common Gull	2010	2010	1
<i>Larus fuscus</i>	Lesser Black-backed Gull	2010	2019	10
<i>Linaria cannabina</i>	Linnet	2010	2015	4
<i>Loxia curvirostra</i>	Red Crossbill	2015	2015	1
<i>Milvus milvus</i>	Red Kite	2010	2021	18
<i>Motacilla cinerea</i>	Grey Wagtail	1991	2021	50
<i>Passer domesticus</i>	House Sparrow	1975	2021	100
<i>Phalacrocorax carbo</i>	Cormorant	2005	2021	17
<i>Phoenicurus phoenicurus</i>	Redstart	2017	2020	2
<i>Phylloscopus sibilatrix</i>	Wood Warbler	2014	2014	2
<i>Phylloscopus trochilus</i>	Willow Warbler	1992	2018	20
<i>Picus viridis</i>	European Green Woodpecker	1975	2020	37
<i>Plectrophenax nivalis</i>	Snow Bunting	1963	1963	1
<i>Prunella modularis</i>	Dunnock	2005	2020	49
<i>Pyrrhula pyrrhula</i>	Eurasian Bullfinch	2005	2021	56
<i>Regulus regulus</i>	Goldcrest	2007	2021	35
<i>Riparia riparia</i>	Sand Martin	1976	2020	10
<i>Scolopax rusticola</i>	Woodcock	2010	2013	2
<i>Sturnus vulgaris</i>	Starling	1975	2020	23
<i>Tadorna tadorna</i>	Shelduck	1975	1975	2

Scientific Name	English Name	Earliest Year	Latest Year	Total Records
<i>Tringa ochropus</i>	Green Sandpiper	1963	1963	2
<i>Turdus iliacus</i>	Redwing	2005	2019	16
<i>Turdus philomelos</i>	Song Thrush	1992	2021	55
<i>Turdus pilaris</i>	Fieldfare	2013	2019	5
<i>Turdus viscivorus</i>	Mistle Thrush	2005	2021	37
<i>Tyto alba</i>	Western Barn Owl	1961	2021	14
MAMMALS				
<i>Chiroptera</i>	Bats	1990	2020	26
<i>Erinaceus europaeus</i>	West European Hedgehog	2006	2021	18
<i>Lutra lutra</i>	European Otter	1970	2021	33
<i>Meles meles</i>	Eurasian Badger	1990	2011	4
<i>Mustela nivalis</i>	Weasel	2020	2020	1
<i>Myotis</i>	Unidentified Bat	2010	2013	29
<i>Myotis daubentonii</i>	Daubenton's Bat	2001	2012	21
<i>Myotis nattereri</i>	Natterer's Bat	2010	2018	14
<i>Neovison vison</i>	American Mink	2010	2014	5
<i>Nyctalus noctula</i>	Noctule Bat	2006	2014	2
<i>Pipistrellus</i>	Pipistrelle	1983	2019	49
<i>Pipistrellus pipistrellus</i>	Common Pipistrelle	2002	2019	69
<i>Pipistrellus pipistrellus</i>	Pipistrelle	2010	2020	18
<i>Pipistrellus pygmaeus</i>	Soprano Pipistrelle	2001	2020	38
<i>Plecotus auritus</i>	Brown Long-eared Bat	2010	2020	5
<i>Rhinolophus ferrumequinum</i>	Greater Horseshoe Bat	2020	2020	1
<i>Rhinolophus hipposideros</i>	Lesser Horseshoe Bat	1976	2020	27
<i>Sciurus carolinensis</i>	Eastern Grey Squirrel	1976	2021	21
<i>Sciurus vulgaris</i>	Eurasian Red Squirrel	1973	1973	3

Appendix 2. Species list

This list presents the scientific and common names of the plant and animal species recorded on 20 January 2022 on land at Cyfarthfa Park (grid reference SO040076). This should not be regarded as a complete list because it is not the result of detailed study and was carried out during the winter.

The list includes some species that were recorded outside the study area in the immediately adjacent habitats. These are denoted by an asterisk(*) after the species name.

Species name	Common name
VASCULAR PLANTS	
<i>Acer pseudoplatanus</i>	Sycamore
<i>Agrostis capillaris</i>	Common Bent
<i>Agrostis stolonifera</i>	Creeping Bent
<i>Alnus glutinosa</i>	Alder
<i>Arrhenatherum elatius</i>	False Oat-grass
<i>Asplenium scolopendrium</i>	Hart's-tongue Fern
<i>Bellis perennis</i>	Daisy
<i>Buddleia davidii</i>	Buddleia
<i>Calystegia sepium</i>	Hedge Bindweed
<i>Cardamine sp.</i>	Bittercress
<i>Cardamine pratensis</i>	Cuckoo Flower
<i>Carex pendula</i>	Pendulous Sedge
<i>Carex remota</i>	Remote Sedge
<i>Centaurea nigra</i>	Common Knapweed
<i>Cerastium fontanum</i>	Common Mouse-ear
<i>Cirsium arvense</i>	Creeping Thistle
<i>Cirsium vulgare</i>	Spear Thistle
<i>Cornus sericea</i>	Red-osier Dogwood
<i>Corylus avellana</i>	Hazel
<i>Crepis capillaris</i>	Smooth Hawkbit
<i>Dactylis glomerata</i>	Cock's-foot Grass
<i>Dactylorhiza sp.</i>	Marsh-orchid (indeterminate)
<i>Deschampsia cespitosa</i>	Tufted Hair-grass
<i>Digitalis purpurea</i>	Foxglove
<i>Dryopteris filix-mas</i>	Male Fern
<i>Elytrigia repens</i>	Couch
<i>Epilobium sp.</i>	Willowherb
<i>Fagus sylvatica*</i>	Beech
<i>Reynoutria japonica</i>	Japanese Knotweed
<i>Festuca rubra</i>	Red Fescue
<i>Fraxinus excelsior</i>	Ash
<i>Galium aparine</i>	Cleavers
<i>Geranium robertianum</i>	Herb Robert
<i>Geum urbanum</i>	Wood Avens
<i>Hedera helix sl</i>	Ivy
<i>Heracleum sphondylium</i>	Hogweed
<i>Holcus lanatus</i>	Yorkshire Fog
<i>Hypericum androsaemum</i>	Tutsan
<i>Hypochaeris radicata</i>	Common Cat's-Ear
<i>Ilex aquifolium*</i>	Holly
<i>Iris pseudacorus</i>	Yellow Flag

Species name	Common name
<i>Juncus effusus</i>	Soft Rush
<i>Juncus inflexus</i>	Hard Rush
<i>Lapsana communis</i>	Nipplewort
<i>Larix sp.*</i>	Larch
<i>Leucanthemum vulgare*</i>	Ox-eye Daisy
<i>Lolium perenne</i>	Perennial Rye-grass
<i>Malus pumila*</i>	Apple
<i>Mercurialis perennis*</i>	Dog's Mercury
<i>Mimulus sp.</i>	Monkeyflower
<i>Mycelis muralis</i>	Wall Lettuce
<i>Myosotis cf arvensis</i>	Field Forget-me-not
<i>Picea cf abies*</i>	Norway Spruce
<i>Plantago lanceolata</i>	Ribwort Plantain
<i>Poa annua</i>	Annual Meadow-grass
<i>Potentilla reptans</i>	Creeping Cinquefoil
<i>Prunella vulgaris</i>	Self-Heal
<i>Quercus cf robur*</i>	Pedunculate Oak
<i>Ranunculus acris</i>	Meadow Buttercup
<i>Ranunculus repens</i>	Creeping Buttercup
<i>Rubus fruticosus (agg)</i>	Bramble
<i>Rumex obtusifolius</i>	Broad-Leaved Dock
<i>Rumex sanguineus</i>	Wood Dock
<i>Salix sp.</i>	Willow (indet. hybrid)
<i>Scrophularia auriculata</i>	Water Figwort
<i>Senecio jacobaea</i>	Ragwort
<i>Senecio vulgaris</i>	Groundsel
<i>Sonchus oleraceus</i>	Smooth Sow-thistle
<i>Taraxacum sp.</i>	Dandelion
<i>Taxus baccata*</i>	Yew
<i>Torilis japonica</i>	Upright Hedge-parsley
<i>Trifolium pratense</i>	Red Clover
<i>Urtica dioica</i>	Nettle
<i>Veronica chamaedrys</i>	Germander Speedwell
<i>Vicia sativa</i>	Common Vetch
<i>Vicia sepium</i>	Bush Vetch
BRYOPHYTES	
<i>Barbula cf convoluta</i>	Lesser Bird's-claw Beard-moss
<i>Brachythecium rutabulum</i>	Rough-stalked Feather-moss
<i>Bryum sp.</i>	Thread-moss
<i>Calliergonella cuspidata</i>	Pointed Spear-moss
<i>Didymodon insulanus</i>	Cylindric Beard-moss
<i>Didymodon fallax</i>	False Beard-moss
<i>Funaria hygrometrica</i>	Common Cord-moss
<i>Homalothecium sericeum</i>	Silky Wall Feather-moss
<i>Hypnum cupressiforme</i>	Cypress-leaved Plait-moss
<i>Kindbergia praelonga</i>	Common Feather-moss
<i>Plagiomnium undulatum</i>	Hart's-tongue Thyme-moss
<i>Polytrichum juniperinum*</i>	Juniper Haircap
<i>Rhynchostegium confertum</i>	Clustered Feather-moss
<i>Rhytidiadelphus squarrosus</i>	Springy Turf-moss
<i>Syntrichia montana</i>	Intermediate Screw-moss

Species name	Common name
<i>Tortula muralis</i>	Wall Screw-moss
LICHENS	
<i>Peltigera sp.</i>	Dog-lichen
FUNGI	
<i>Dacrymyces stillatus</i>	Common Jellyspot
<i>Daldinia concentrica</i>	King Alfred's Cakes
<i>Galerina sp.</i>	Galerina
<i>Hymenoscyphus fraxineus*</i>	Ash Die-back
<i>Sarcoscypha austriaca</i>	Scarlet Elfcup
BIRDS	
<i>Aegithalos caudatus</i>	Long-tailed Tit
<i>Columba palumbus*</i>	Wood Pigeon
<i>Cyanistes caeruleus</i>	Blue Tit
<i>Dendrocopos major*</i>	Great Spotted Woodpecker
<i>Erithacus rubecula</i>	Robin
<i>Garrulus garrulus*</i>	Jay
<i>Motacilla alba</i>	Pied Wagtail
<i>Parus major</i>	Great Tit
<i>Pica pica*</i>	Magpie
<i>Troglodytes troglodytes</i>	Wren
<i>Turdus merula</i>	Blackbird
<i>Turdus viscivorus</i>	Mistle Thrush
MAMMALS	
<i>Sciurus carolinensis*</i>	Grey Squirrel (live sighting)