

Preliminary ecological appraisal of land at Ael-y-bryn, Aberhafesp, Newtown, Powys SY16 3HR

Oakwood Ecology

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Oakwood Ecology

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Summary

A preliminary ecological appraisal was commissioned by Mr Jack Woosnam to inform the design of a proposed development on land at Ael-y-bryn, Aberhafesp, Newtown, Powys SY16 3HR. The development includes the construction of a holiday park, the creation of vehicular access to the site, and the installation of all services and infrastructure.

This report includes the results of a desk-study, a habitat survey and a survey to assess the presence or likely absence of various protected species, an assessment of the potential impacts of the development proposals on the ecological features identified during those surveys, and recommendations to avoid, mitigate, or compensate for. Industry-standard survey methodologies were followed.

There are no statutorily designated sites within two kilometres of the development site. There are 202 historical records of statutorily protected species within the search radius, 134 of which are classified as records of mobile species.

The habitats on the site include lowland mixed deciduous woodland, plantation deciduous woodland, neutral grassland, stream, and hedgerows. No evidence of protected species was found during the field survey, and only bats are considered likely to be resident on the site, potentially roosting in holes in trees.

The ecological value of the site is deemed to be low, and the overall impact of the development is likely to be a minor negative one.

A range of recommendations are made to alleviate any potentially negative impacts, and a biodiversity accounting audit yields a biodiversity net gain of approximately 11%, assuming all compulsory recommendations are adopted. The adoption of a range of additional voluntary recommendations would increase this gain.

1 Introduction

1.1 Overview

- 1.1.1 This preliminary ecological appraisal was commissioned by Mr Jack Woosnam to inform the design of a proposed development on land at Ael-y-bryn, Aberhafesp, Newtown, Powys SY16 3HR (approximate centroid grid ref. SO04509337) (**Figures 1 & 2**). The proposed development includes the construction of a holiday park (15 timber cabins and 20 static caravans), the creation of vehicular access to the site, and the installation of all services and infrastructure (including a sewage treatment plant) (**Figure 3**).

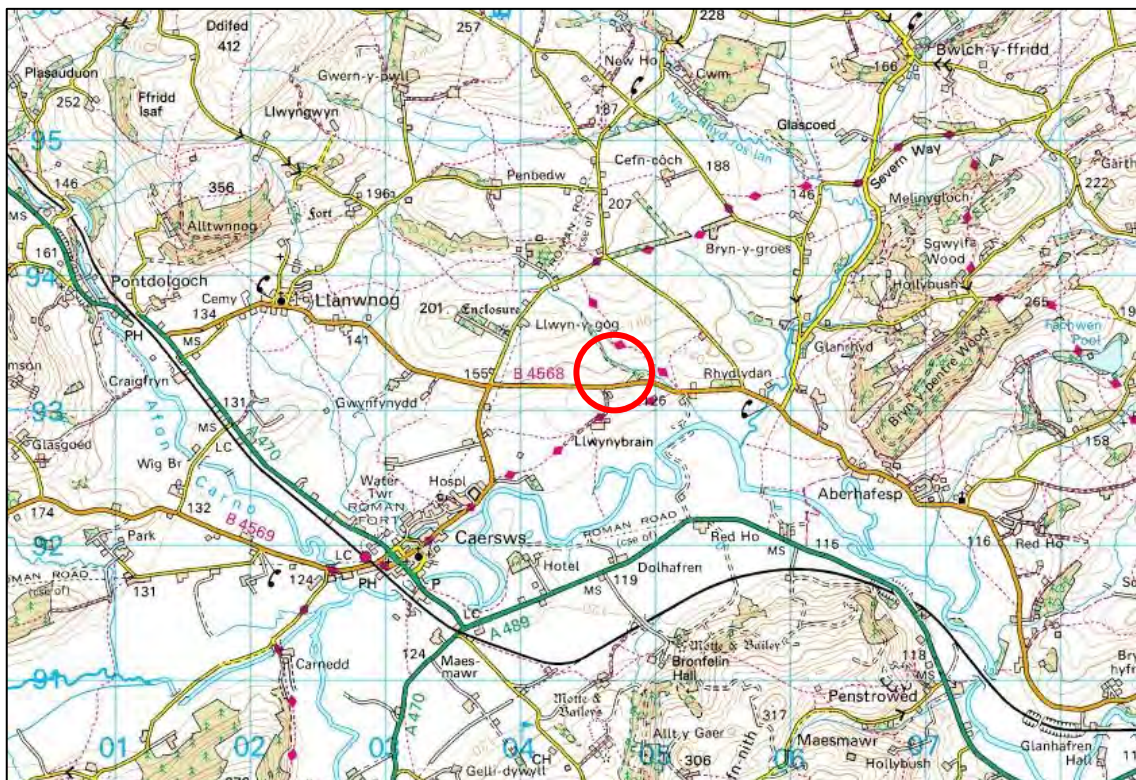


Figure 1. Location map of the proposed development site (circled red).

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Figure 2. Map showing the survey area (which is different to the red-line boundary).
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Figure 3. Proposed site layout.

1.2 Aims

- 1.2.1 This appraisal includes the results of a desk study, a phase 1 habitat survey and a protected species survey, and follows industry best practice guidelines (CIEEM, 2017). The results of these surveys provide a baseline which is used to assess the potential impacts of the proposed development. Where further information is required to effectively carry out this assessment, recommendations for further surveys are made.

1.3 Statutory protection

- 1.3.1 A 'protected species' includes any animal or plant listed as such in the Wildlife and Countryside Act 1981 (Schedules 1, 5 & 8 and supplementary Acts) (W&CA), the Protection of Badgers Act 1992, and the Conservation of Habitats and Species Regulations 2017 (Schedules 2 and 5) (EPS). Amongst other things, this protection covers the killing, injury, disturbance, capture and sale of the animal species, and extends to the destruction of their resting places or shelters.

- 1.3.2 In addition, other Priority species and habitats are a material consideration in the planning process, which in effect means that they should be preserved and/or enhanced whenever possible. These include:

- species and habitats listed as a national priority for the conservation of biodiversity (Environment (Wales) Act 2016));
- species listed as a local priority for conservation, for example in the relevant local Biodiversity Action Plan (BAP);
- red listed using International Union for the Conservation of Nature (IUCN) criteria;
- listed as Near Threatened or amber listed;
- listed as a nationally rare or nationally scarce species;
- endemic to a country or geographic location.

1.4 Surveyor qualifications

- 1.4.1 My formal qualifications include an MSc in Biological Recording and a Post-graduate Certificate in Ornithology from Birmingham University. I have attended many short courses on survey techniques, ecological impact assessment and mitigation as part of my programme of Continuing Professional Development; I am licensed to survey Bats and Great Crested Newts in Wales and England (Licence no's S086636/1 (NRW Bats) and S085282/1 (NRW Newts)); and I have been a self-employed Ecological Consultant since 2004, having worked with a wide range of habitats and species.

- 1.4.2 It is the policy of Oakwood Ecology, in accordance with the CIEEM Code of Professional Conduct and in compliance with the legal requirements of EPS survey licences, that all biological records collected during these surveys are submitted to the relevant local biological records centre.

2 Methodology

2.1 Desk study

2.1.1 The desk study was carried out to identify any designated sites and protected or otherwise notable species in the vicinity of the site that may be affected by the proposed development. The study area covers the development site and extends beyond its boundary for two kilometres.

2.1.2 The following sources were consulted:

- The Powys Biodiversity Information Service (BIS) (www.b-i-s.org)
- MAGIC interactive maps (www.magic.gov.uk/MagicMap.aspx)

2.2 Phase 1 habitat survey

2.2.1 A phase 1 habitat survey was carried out using the UKhab classification scheme (UKhab working group, 2018) and using the botanical nomenclature of Stace (2019). All habitats and features were classified, recorded, and mapped, and all plants were identified to species level where possible using Stace (*ibid.*) and Rose (2006).

2.2.2 Habitat condition was assessed using the criteria outlined in Crosher *et al.* (2019).

2.2.3 The exact location of the sewage treatment plant in the south-eastern field was not known at the time of survey, so the survey area was extended to cover a significant portion of this field and amounted to approximately 10.4 Ha.

2.3 Protected and Priority Species Survey

2.3.1 Any field signs of statutorily protected animal species observed during the survey were noted. Bird names are taken from the BOU British List (2013). The species and field signs searched for include:

- Badger (*Meles meles*) – setts (main, annexe, subsidiary, or outlier), latrines (dung pits), and tracks, hairs caught on fences, scratch marks, etc;
- Bats (Order Chiroptera) – scratch marks or droppings at likely roosts (trees, buildings, or other structures);
- Birds (Class Aves) - note specially protected species (Schedule 1 of W&CA);
- Dormouse (*Muscardinus avellanarius*) - suitable habitat in woodland, scrub and hedgerows, nests, and dormouse-nibbled nuts (Sept – Dec);
- Great Crested Newt (*Triturus cristatus*) - freshwater ponds or terrestrial habitat within 500m;

- Invertebrates (various phyla) – desk study;
- Otter (*Lutra lutra*) - suitable watercourse habitat. Field signs such as holts, spraints, couches, footprints and feeding remains at suitable sites;
- Reptiles (Class Reptilia) - note suitable habitat (heathland, scrub, rough grassland, moorland, sea cliffs and sand dunes), look for basking reptiles and check refugia;
- Water Vole (*Arvicola amphibius*) - note suitable habitat (watercourses). Check for burrows, droppings, runs in vegetation and signs of feeding;
- White-clawed Crayfish (*Austropotamobius pallipes*) - note suitable habitat (watercourses), check refugia (boulders on streambed).
- Other protected species that may have been recorded in the area, as highlighted by the desk study.

2.3.2 During the survey, the suitability of the habitats for protected animal species was continuously assessed.

2.4 Biodiversity accounting

2.4.1 Since 1970, 41% of species in the UK have declined, and, in Wales, 17% are at risk of extinction (Hayhow, *et al.*, 2019). Before 1970, substantial losses have largely gone unrecorded or unquantified. Legislation introduced in England has sought to counter this situation by requiring all developments to leave biodiversity in a better state after completion, by at least 10% as measured using the approved DEFRA metric (version 2.0). In Wales, the Environment (Wales) Act 2016 (Section 6) simply requires that biodiversity be maintained and enhanced to an unspecified amount, and the Construction Industry Research and Information Association (CIRIA), in partnership with the Chartered Institute of Ecology and Environmental Management (CIEEM) have published best practice guidelines on how to measure and achieve biodiversity net gain (Baker *et al.*, 2016).

2.4.2 Using the DEFRA metric, the terrestrial habitats on the proposed development site can be quantified in terms of biodiversity units, and any change in this value as a result of the proposed development can be predicted (N.B., there is as yet no metric for protected animal species). A reduction in biodiversity units can be alleviated by suitable mitigation and compensation measures, and suitable enhancement measures can result in a measurable net gain for biodiversity.

3 Results

3.1 Desk-study

3.1.1 There are no statutorily designated sites within the 2km search radius (**Figure 4**).

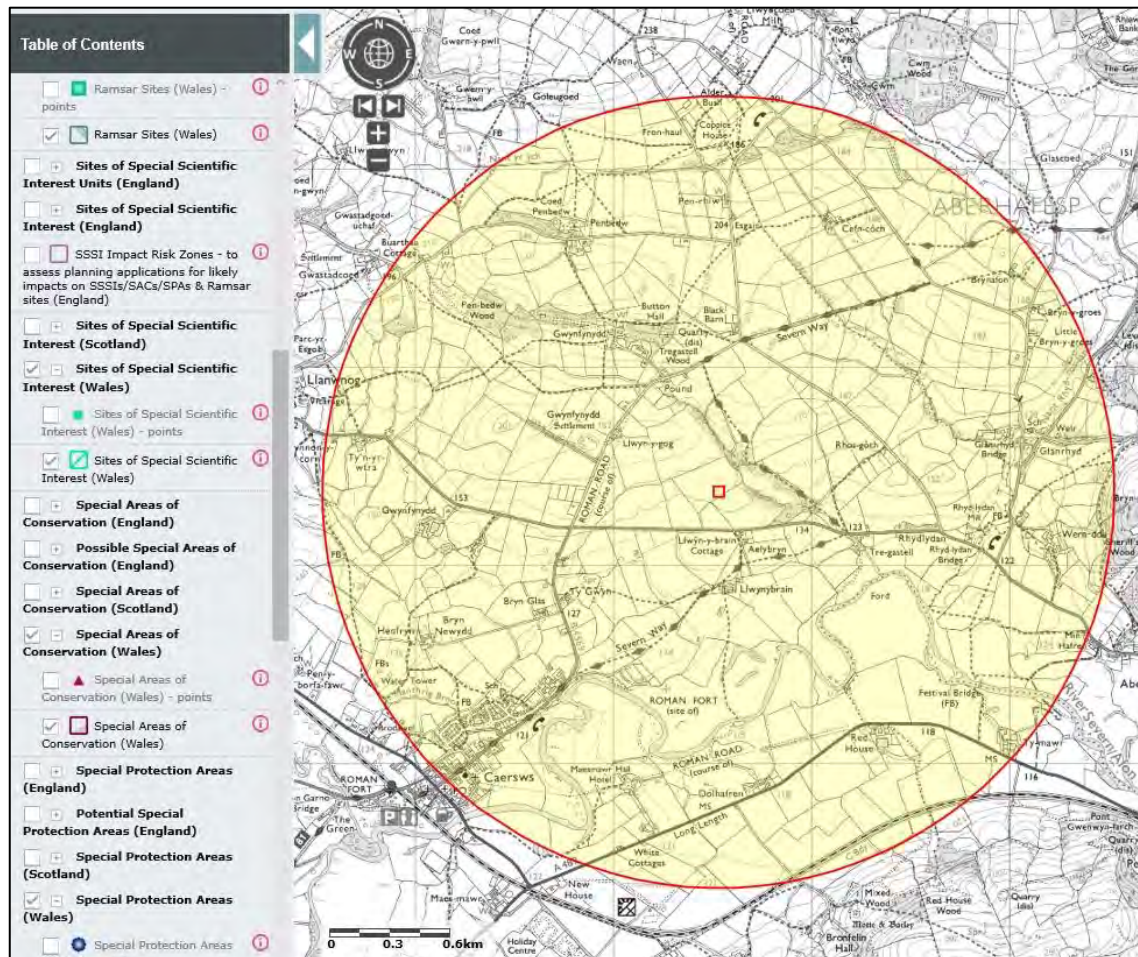


Figure 4. Map showing the lack of designated sites within a 2km radius around the site.
(From MAGIC Interactive Maps)

- 3.1.2 There are 202 historical biological records with the 2km search radius. These include 71 records of Priority Species. These results are summarised in **Table 1**; the full details are not suitable for general publication because they contain sensitive records but are available on request.
- 3.1.3 A distinction is made between species considered to be relatively mobile (those able and likely to move more than 500m in one period) and those that are relatively immobile, because the mobile species are much more likely to utilise the site, even if only infrequently.

	Taxon	No. of records	Closest record (m)	Mobile species (>500m) (Y/N)
Priority Species	Amphibians (Common Frog, <i>Rana temporaria</i>)	1	1980	N
	Badger	3	250	Y
	Birds	44	642	Y
	Bony fish (Actinopterygii)	5	1079	Y
	Hedgehog (<i>Erinaceus europaeus</i>)	1	1479	Y
	Invertebrates (Wall butterfly, <i>Lasiommata megera</i>)	1	1333	Y
	Otter	11	462	Y
	Polecat (<i>Mustela putorius</i>)	1	1727	Y
	Vascular plants (Bluebell, <i>Hyacinthoides non-scripta</i>)	1	722	N
	Water Vole	1	1361	Y
Species of Conservation Concern	Birds	15	1125	Y
	Beetles (Coleoptera)	25	861	N
Locally Important Species	Birds	39	1125	Y
	Bony fish	3	1462	Y
	Bryophytes	2	1125	N
	Dragonfly (Odonata)	1	1642	Y
	Vascular plants	39	621	N
Invasive non-native species	American mink (<i>Neovison vison</i>)	2	1508	Y
	Canada goose (<i>Branta canadensis</i>)	1	1125	Y
	Giant Hogweed (<i>Heracleum mantegazzianum</i>)	1	1036	N
	Grey squirrel (<i>Sciurus carolinensis</i>)	3	1003	Y

Table 1. Summary of the results of the historical records search.

3.1.4 Mobile Priority taxa recorded within the 2km study radius include:

- Badger - occurring throughout the farmed landscape.
- Birds - a wide variety of species, including raptors, waders, passerines, and wildfowl species.
- Bony fish - including Atlantic salmon (*Salmo salar*), brown trout (*Salmo trutta*), and European eel (*Anguilla anguilla*), all of which are restricted to aquatic habitats.
- Hedgehog (*Erinaceus europaeus*) - prefers woodland/grassland edge or scrub and hedgerows with some cover.
- Invertebrates - with one record of Wall butterfly. Larval foodplants are common grass species, and the adults favour short grassland habitats.
- Otter - have an obvious affinity with water bodies, but Otters do also sometimes commute overland.
- Polecat (*Mustela putorius*), - a generalist throughout farmland habitats.
- Water vole - Burrows in riparian habitat, forages in slow-flowing water bodies.

3.2 Phase 1 habitat survey

3.2.1 The field survey was carried out on the 7th May 2020, and the distribution of habitats on the site is depicted in **Figure 5**; **Appendix 1** contains a list of species observed during the field survey, and illustrative photographs are presented in **Appendix 2**.

3.2.2 All of the fields (and plantations) were bounded by post-and-wire stock fencing. The following habitats were recorded:

Lowland mixed deciduous woodland (w1f) (semi-natural origin)

3.2.3 Canopy-forming species in this habitat include frequent pedunculate (*Quercus robur*) and sessile oaks (*Q. petraea*), with occasional ash (*Fraxinus excelsior*) and rare aspen (*Populus tremula*). Long-standing grazing by livestock has taken its toll on the natural regeneration of woody species, and a sparse shrub layer has only rare crab-apple (*Malus sylvestris*), hawthorn (*Crataegus monogyna*), hazel (*Corylus avellana*) and rowan (*Sorbus aucuparia*).

3.2.4 The field layer is similarly stunted by grazing, and dominated by grasses, although woodland forbs include common dog-violet (*Viola riviniana*), herb-Bennet (*Geum urbanum*), lesser celandine (*Ficaria verna*), pignut (*Conopodium majus*), and wood sorrel (*Oxalis acetosella*). The ground layer has a limited range of common woodland mosses.

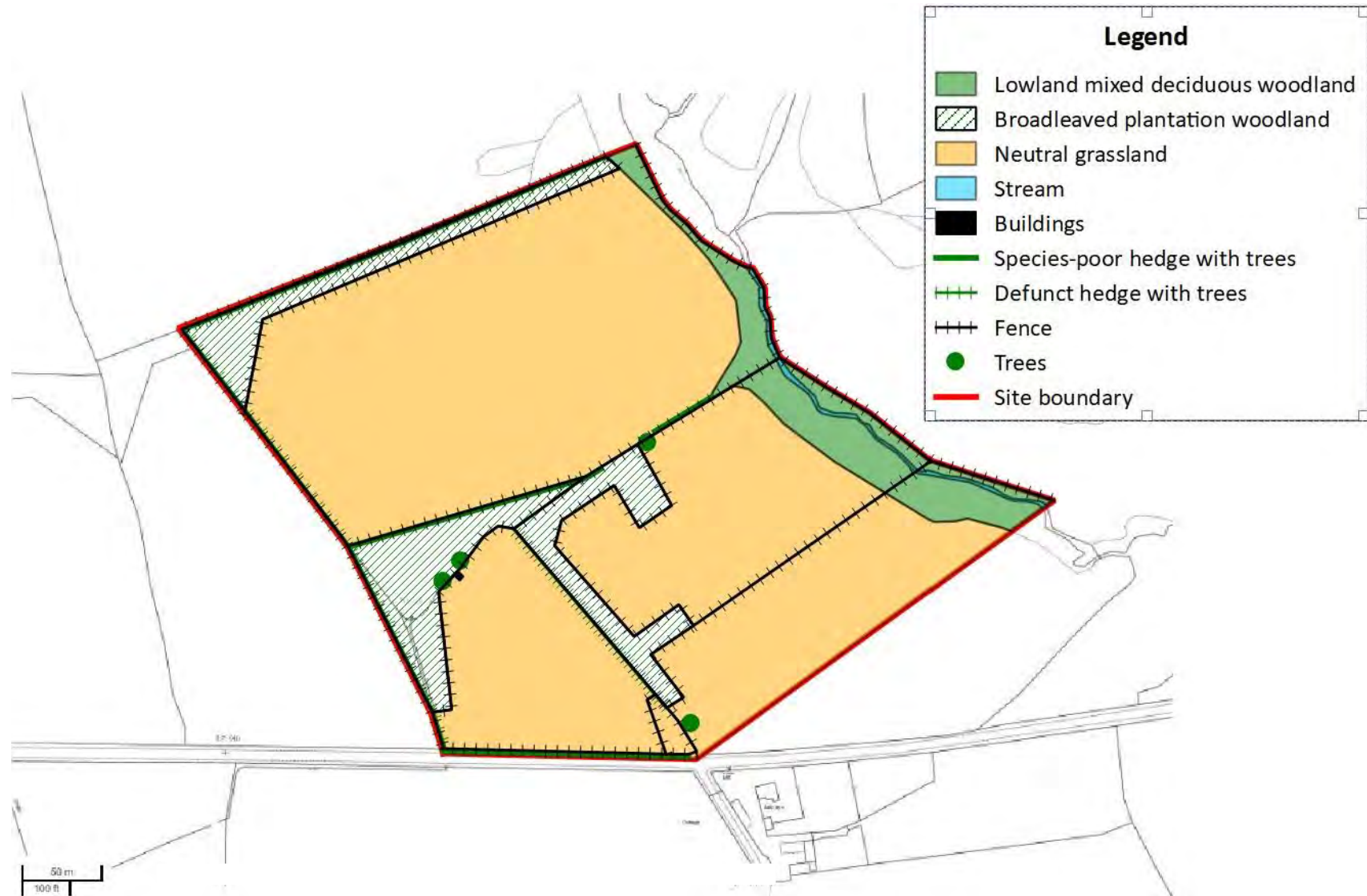


Figure 5. Map of existing habitats in the survey area.
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- 3.2.5 Age diversity of the trees and shrubs is moderate, although with very few young trees, and structural diversity is low due to decades of grazing which has inhibited the recruitment of new trees and limited the development of the shrub layer. There is a moderate amount of deadwood, both in fallen stems and retained deadwood in the mature and veteran trees.

Other woodland; broadleaved plantation (w1g7)

- 3.2.6 Three small plantations were established as part of a woodland creation agri-environment scheme eight years ago; the young trees are mostly birch (*Betula pendula* and *pubescens*) and wild cherry (*Prunus avium*) but with shrubs (hazel and apple) around the edges. Rare over-mature oaks (pedunculate and sessile) were included in these exclosures, and there is some natural regeneration of these.
- 3.2.7 The field layer is the same assemblage as the adjacent neutral grassland, although the lack of grazing has allowed a longer sward to develop and the coarser, more palatable grasses to become more frequent (e.g., meadow foxtail (*Alopecurus pratense*) and false oat-grass (*Arrhenatherum elatius*)).

Neutral grassland (g3c6 & g3c8)

- 3.2.8 Depending on the amount of agricultural 'improvement' and nutrient enrichment, this habitat varies between semi-improved and improved grassland, with perennial rye-grass (*Lolium perenne*) and meadow foxtail dominating in the richer areas and common bent (*Agrostis capillaris*) and Yorkshire fog (*Holcus lanatus*) dominating in the poorer areas. In addition, occasional patches of soft rush (*Juncus effusus*) and creeping buttercup (*Ranunculus repens*) indicate wetter areas, either seasonally inundated or close to the water table.
- 3.2.9 Overall, the assemblage is fairly species-poor, and is grazed by horses or sheep, resulting in a monotonous sward of common grass species (as above plus frequent sweet vernal-grass (*Anthoxanthum odoratum*), creeping bent (*Agrostis stolonifera*) (in wetter patches), and occasional cock's-foot (*Dactylis glomerata*)), with only occasional or locally frequent forbs such as white clover (*Trifolium repens*), creeping thistle (*Cirsium arvense*), and thyme-leaved speedwell (*Veronica serpyllifolia*).

Stream (r2b)

- 3.2.10 The site includes a short section of streamway near its eastern boundary, which runs along the bottom of a dingle in the midst of the semi-natural deciduous woodland. The stream itself was almost dry at the time of survey, but when water does flow it runs over pebbles and cobbles with no visible vegetation in the stream bed. The stream course has been substantially remodelled by a recent spate, which may account for the total lack of vegetation within the water course. Marginal aquatic vegetation has been eliminated by grazing, apart from a small number of grey willows (*Salix cinerea*) that are clinging on.

- 3.2.11 There is a moderate amount of coarse woody debris in the streamway, with all the ecological benefits that that micro-habitat presents for invertebrates.

Buildings

- 3.2.12 There is a small, dilapidated tin shed on the site. The only signs observed of utilisation by wildlife were bird droppings on some internal surfaces. No bird nests were present, so it is probably only used for occasional roosting. Due to the lack of shelter and general exposure to the elements, and the fact that all openings were covered by small-gauge wire mesh, it had negligible potential to accommodate roosting bats.

Hedgerows (priority habitat) (h2a)

- 3.2.12 A mixture of intact and defunct (gappy) hedgerows were recorded on the site, comprised of a reasonably wide range of woody species, including frequent Blackthorn (*Prunus spinosa*), Hawthorn and Hazel, occasional Elder (*Sambucus nigra*), and rare downy birch and crab-apple. Climbers included locally abundant ivy (*Hedera helix*) and dog-rose (*Rosa canina* agg.). Occasional hedgerow trees comprised large specimens of oak (both species) and ash.
- 3.2.13 The field layer was reasonably diverse, with frequent false-oat-grass and occasional patches of woodland forbs such as dog's-mercury (*Mercurialis perennis*), garlic mustard (*Alliaria petiolata*), greater stitchwort (*Stellaria holostea*), ground ivy (*Glechoma hederacea*), and lords-and-ladies (*Arum maculatum*). Areas of nutrient enrichment and/or disturbance were indicated by patches of nettle (*Urtica dioica*) and cleavers (*Galium aparine*).

3.3 Protected species

- 3.3.1 No field signs of any protected species were recorded during the field survey. The only signs of mammals observed included some fox paths, scrapings and droppings, and grey squirrels and their dreys were seen in the semi-natural deciduous woodland. In terms of the potential for utilisation of the habitats found onsite, the following were noted:

Badgers

- 3.3.2 The woodland and grassland habitats were ostensibly suitable as foraging and commuting habitat.

Bats

- 3.3.3 The woodland and grassland habitats constituted moderate-quality foraging habitat, and the hedgerows could be utilised by commuting and foraging bats. Some of the older (veteran) trees had a number of potential roost features, in knot-holes, and cracks in branches and stems.

Birds

- 3.3.4 A good range of birds were recorded during the field survey, either in the woodlands or flying overhead. The woodlands and hedgerows were highly suitable as nesting, roosting and foraging habitat for a wide range of species. Red-listed species recorded during the survey included curlew (*Numenius arcuatus*) and mistle thrush (*Turdus viscivorus*), and amber-listed species included bullfinch (*Pyrrhula pyrrhula*), redstart (*phoenicurus phoenicurus*), tawny owl (*Strix aluco*), and willow warbler (*Phylloscopus trochilus*). Of these, mistle thrush, bullfinch, redstart, tawny owl, and willow warbler may be breeding on the site. Other species on these lists that are likely to utilise the site include dunnock (*Prunella modularis*), fieldfare (*Turdus pilaris*), herring and lesser black-backed gulls (*Larus argentatus* and *L. fuscus*), marsh tit (*Poecile palustris*), pied flycatcher (*Ficedula hypoleuca*), redwing (*T. iliacus*), song thrush (*T. philomelos*), spotted flycatcher (*Muscicapa striata*), starling (*Sturnus vulgaris*), and woodcock (*Scolopax rusticola*).
- 3.3.5 Barn owl have been recorded 642m away, and some of the long grass in the plantation exclosures could be used as foraging habitat by this species, although the likelihood of this is decreasing as the young trees gain stature and cover more ground.

Dormouse

- 3.3.6 The woodland and hedgerow habitats on the site were moderately suitable as nesting and foraging habitat for this species, although the plantation woodlands were not old enough to produce large amounts of food, and many of the hedgerows had been trimmed regularly with a flail, which would limit their usefulness as foraging habitat.

Great Crested Newt

- 3.3.7 There is no suitable breeding habitat for this species on the site; the nearest pond marked on the 1:25,000 Ordnance Survey map is approximately one kilometre away. The terrestrial habitats would be moderately suitable for foraging, commuting and refuge, but the distance from breeding habitat would discourage newts from visiting the site.

Invertebrates

- 3.3.8 The desk study did not reveal any records of protected invertebrate species within 500m, and none were observed during this survey. This taxon is very poorly recorded generally, and no specialist surveys have been undertaken on this site.

Otters

- 3.3.9 Otters do not generally stray far from their preferred habitat of running water, so the only vaguely suitable habitat would be the stream on the eastern side of the site.

However, the small size and generally low flow rate of this water course makes it distinctly sub-optimal foraging habitat for this species, and there would be little reason to commute upstream of this point.

Reptiles

- 3.3.10 The habitats recorded on the site would offer limited potential for foraging reptiles, and these species are unlikely to be present in significant numbers

Water Voles

- 3.3.11 There is no suitable habitat for Water Vole on the site.

White-clawed Crayfish

- 3.3.12 The acidic nature of the underlying rock, and presumably therefore the water, make it unlikely the white-clawed crayfish are resident in the stream. No individuals were encountered during refuge searches.

Plants

- 3.3.13 No statutorily protected plant species were recorded on the site.

4 Impact Assessment

4.0.1 The principles of this assessment are based on best practice guidelines published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

4.1 Survey constraints

4.1.1 There were no significant constraints to the survey. Weather conditions were good, and all parts of the site were accessible.

4.1.2 Sightings of protected animals are always unlikely on a one-day survey, irrespective of the season, due to their cryptic habits. The presence of field signs is taken as a reliable proxy.

4.2 Ecological value of the site

4.2.1 The site is not designated for its biodiversity, nor is it contiguous with any designated sites. In fact, there are no designated sites within the 2km search radius.

4.2.2 Lowland mixed deciduous woodland and hedgerows are listed as habitats of principal importance under Section 7 of the Environment (Wales) Act 2016, and the semi-natural woodland is mapped as Ancient Woodland on the NRW Ancient Woodland Inventory 2011, which is deemed an irreplaceable habitat in the Biodiversity Net gain guidelines. Both habitats are relatively common in the local landscape, the deciduous woodland is in moderate condition and the hedgerows are in poor condition, so both habitats are deemed to be of moderate value in a local context.

4.2.3 The other habitats on the site are not considered to be a priority at a national or county level, and are of limited value to wildlife (although the woodland plantation will naturally develop into a higher value habitat in time), so are assigned a low ecological value.

4.2.4 With regard to protected species, it is concluded that only bats are likely to be resident on the site, and their roosts will be restricted to the mature trees in the deciduous woodland and the hedgerows.

4.2.5 Of the mobile Priority species recorded historically within two kilometres of the site, it is also possible that badger, various bird species, hedgehog, wall butterfly and polecat could utilise the site, but probably only on a casual basis for occasional opportunistic foraging or commuting and dispersal. It is also possible that a range of passerine birds could breed on the site.

4.2.6 Given the above factors, the overall ecological value of the site is deemed to be low.

4.3 Broad impact assessment

- 4.3.1 To reiterate, the proposed development includes the construction of a holiday park (15 timber cabins and 20 static caravans), the creation of vehicular access to the site, and the installation of all services and infrastructure (including a sewage treatment plant). The potential impacts comprise those felt in both the short- and long-term, including any residual impacts that may continue to be felt after the development has been completed.
- 4.3.2 In the absence of any mitigation, the development will result in the direct loss of approximately 2.79Ha of the semi-natural habitats on the site, i.e., the physical footprint of the proposed development, the vast majority of which would be neutral grassland, along with a small area of plantation woodland (approx. 200m²), and approx. 60m of hedgerow (**Figure 6**).

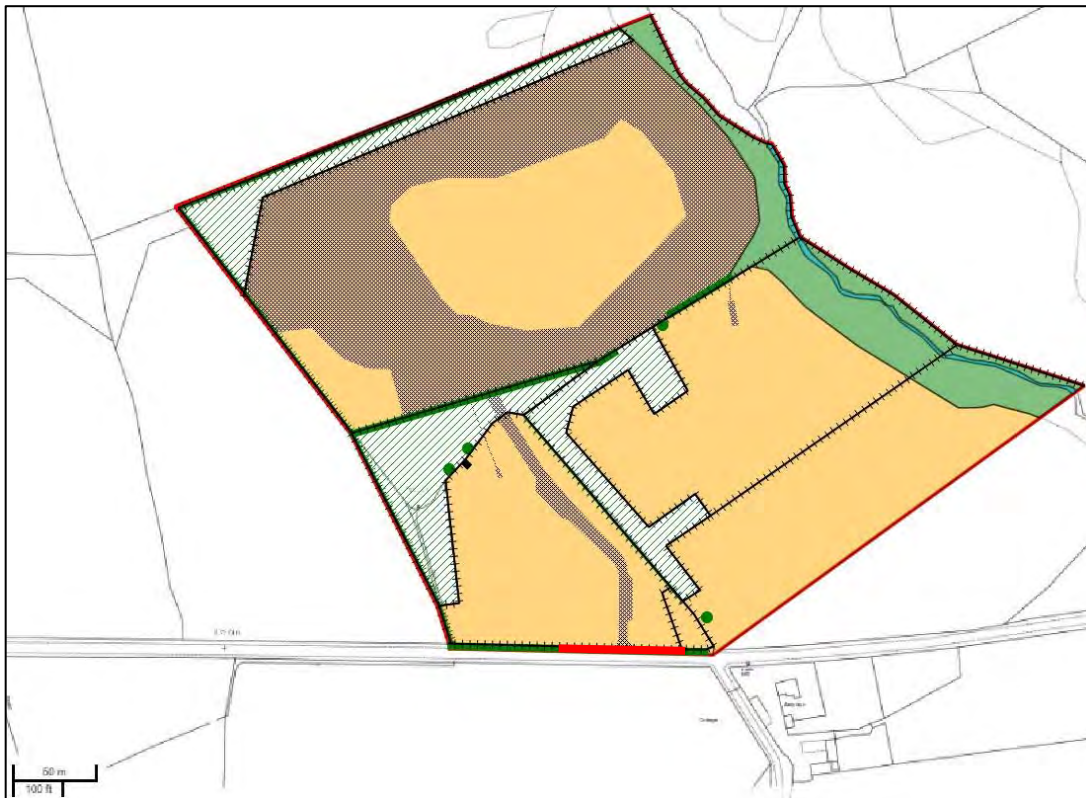


Figure 6. Map showing the approximate extent of the development footprint (shaded grey) on the semi-natural terrestrial habitats on the site.

- 4.3.3 Grazing livestock will largely be excluded from the area of cabins and caravans, with the possible exception of small numbers of animals for public viewing in purpose-made enclosures. Periodic cutting of the remaining amenity grassland will facilitate its use for picnics or for play areas.
- 4.3.4 Three small sections of hedgerow (including approx. 60m for the access off the B4568) will be lost where the new access road cuts through them. In addition,

approx. 160m of hedgerow will be relocated to secure the required visibility splay alongside the B4568 (140m to the east and 20m to the west of the new access road).

- 4.3.5 Indirect negative impacts of the development are likely to mainly consist of higher levels of disturbance to wild animals due to increased lighting, noise levels, and pet dogs. This will result in changes in animal behaviour on the site and, potentially, complete avoidance of the site, characterised as a moderate negative impact.
- 4.3.6 One other indirect negative impact that often occurs when new developments are sited next to established mature trees is the gradual pruning back and/or felling of those trees over time, due either to concerns about safety, shade, or leaf-fall, etc.
- 4.3.7 Potentially positive impacts of the development will include: the exclusion of grazing from the lowland mixed deciduous woodland and the hedgerow in the northern field, which could result in improved condition as natural processes are re-established, and the establishment of new plantings of specimen trees, as depicted on the proposed plan (see **Figure 3**), which will provide new foraging, roosting and nesting opportunities for a range of wildlife in time.
- 4.3.8 Given the relatively low ecological value of the habitats that will be lost, the moderate negative impact on commuting and foraging protected species that might use the site, and the positive impacts outlined above, the overall impact of the development is likely to be a minor negative one.

5 Conclusions and recommendations

5.1 General

5.1.1 The site includes lowland mixed deciduous woodland and hedgerows that are of moderate ecological value in the context of the wider countryside. No protected species will be directly affected by the proposed development, and the overall impact is likely to be a minor negative one.

5.2 Recommendations for further surveys

5.2.1 The current level of survey effort is adequate to determine the likely impact of the proposed development, and no further surveys are recommended.

5.3 Recommendations for mitigation

5.3.1 The principle of mitigation in the broad sense involves a hierarchy of desirable outcomes designed to minimise the negative impact of the development and to maintain or promote the conservation status of the species concerned where possible, as follows:

- Avoidance - can the development be designed so that there will be no negative impacts?
- Mitigation - can the development be designed to reduce the negative impacts?
- Compensation - can the unavoidable impacts be compensated for?
- Enhancement - the implementation of measures designed to improve the condition of habitats on the site and their use by associated animal species.

Avoidance

5.3.2 The development has been designed so that the direct impacts are minimised - the entire footprint of the development is restricted to habitats of low ecological value (i.e., mostly neutral grassland in fairly poor condition).

Mitigation

5.3.3 The neutral grassland and plantation woodland habitats that will be directly impacted by the development do not contain any species that require special mitigation measures.

5.3.4 However, mitigation measures are required for the hedgerows (including mature trees) that will be directly affected by the construction works.

5.3.5 With regard to the hedgerows, due care and attention will be paid to nesting birds in sections scheduled for removal or relocation: either site clearance will be carried out outside the bird nesting season (which runs from March to July inclusive), or the

absence of breeding birds in the working area will be confirmed by a suitably qualified person immediately prior to the commencement of works.

- 5.3.6 A method statement for the relocation of hedgerows is provided which will mitigate this impact of this process (**Appendix 3**). **Appendix 4** provides a method statement for the protection of all mature trees on the site, including those arising from hedgerows.

Compensation

- 5.3.7 In order to compensate for the loss of habitats, as outlined in Section 4, the following compulsory measures will be implemented:

- Livestock will be excluded from all of the lowland mixed deciduous woodland on the site by permanent fencing. Good condition is achievable because all of the major structural elements are already present;
- Livestock will be excluded from 180m of hedgerow along the western boundary of the northern field, and any gaps in this hedgerow will be planted up with suitable site-native shrub species, i.e., Hazel, Hawthorn, Holly, Rowan, in a single row at 50cm spacing;
- All external artificial lighting should be installed at as low a height, intensity and spacing as practicable; the light should be directed towards the ground and away from the woodland along the boundary by cowling; it should be triggered by movement-sensitive Passive Infra-Red (PIR) sensors. 'Warm white' (long-wavelength) bulbs with reduced UV output should be used, blue/white bulbs should be avoided. There should be no external lighting that is permanently left on.

Enhancement

- 5.3.8 The above measures will deliver a biodiversity net gain of 11% (**Table 2**) (assuming successful relocation of the hedgerow). In addition, the following enhancement measures could be implemented to improve the wildlife value of the site, as well as improving the amenity value for the benefit of prospective residents:

- The neutral grassland in the field in the south-western corner of the site could be over-seeded with a mixture of site-native herbaceous flowers (of local provenance) and managed as a lowland hay meadow, in accordance with guidance outlined in Crofts & Jefferson (1999) (<http://publications.naturalengland.org.uk/publication/35034>).
- All existing, and any newly planted internal hedgerows on the site could be allowed to grow up and produce fruit and seeds for wildlife;
- With three-week intervals between cuts, the areas of amenity grassland retained amongst the cabins and caravans could be managed as flowering lawns;

- Install as many bat and bird boxes as can be afforded, both on the buildings and attached to trees. These should be sited in accordance with best practice guidance available from the Bat Conservation Trust and the RSPB.
- Green roofs on the cabins, with a diversity of plant species.
- Rough or natural stone walls with holes for invertebrates and small birds to use.
- Ponds (not fish-stocked) with an irregular and shallow, sloping edge (these should be combined with stone and log piles close by to provide refuge for amphibians).
- Nectar-rich native planting and native species with berries in the autumn within formal landscaping.
- Early flowering plants that provide a nectar source for early invertebrates such as bees.
- South-facing banks with some bare ground (particularly beneficial for reptiles and invertebrates).
- Architectural features that provide nesting or roosting habitat (such as ornamental holes, stone ledges, wood cladding, etc.).
- Provide a range of 'bug hotels' with dead wood and stone piles, or purpose-made bug boxes with tubes and drill holes.
- Information packs and/or interpretation material for the residents.

Baseline habitat	Approx. area or length	Condition	Baseline biodiversity units	Mitigation measures	Post-development condition	Post-development biodiversity units
Lowland mixed deciduous woodland	0.8 Ha	Moderate	11.62	Livestock excluded	Good	24.75
Plantation deciduous woodland	1.34 Ha	Moderate	10.72	Small (negligible) area lost under footprint of new site access track	Moderate	10.72
Neutral grassland	8.21 Ha	Fairly poor	49.26	2.70 Ha lost under footprint of new development	Fairly poor	43.08
Native hedgerow	0.37 Km	Poor	0.85	Approx. 15m lost under footprint of new site access track	Poor	0.85
Native hedgerow with trees	0.785 Km	Poor	1.81	180m of hedgerow enhanced (livestock excluded and planted up)	Moderate	2.81
Total units:			74.26	Total units:		82.21
Biodiversity net gain:						+11%

Table 2. Summary of changes to biodiversity value of terrestrial habitats over the course of the development.

6 References

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Appendix 1: Site species list

Habitat codes:

H = Hedgerow

W = Lowland mixed deciduous woodland

PW = Plantation deciduous woodland

NG = Neutral grassland

Frequency codes:

D = Dominant

(L)A = (Locally) Abundant

(L)F = (Locally) Frequent

(L)O = (Locally) Occasional

R = Rare

Plants			
Scientific name	Common name	Habitat	Frequency (DAFOR)
<i>Achillea millefolium</i>	Yarrow	PW	R
<i>Agrostis canina</i>	Velvet bent	NG	O
<i>Agrostis capillaris</i>	Common bent	W & NG	F
<i>Agrostis stolonifera</i>	Creeping bent	NG	O
<i>Alliaria petiolata</i>	Garlic mustard	H	O
<i>Alnus glutinosa</i>	Common Alder	H	R
<i>Alopecurus pratensis</i>	Meadow foxtail	NG & PW	O (LA)
<i>Anthoxanthum odoratum</i>	Sweet vernal grass	W & NG	O & F (LA)
<i>Arrhenatherum elatius</i>	False oat-grass	H, PW & NG	O
<i>Arum maculatum</i>	Lords-and-ladies	H & W	O & R
<i>Bellis perennis</i>	Daisy	NG	R
<i>Betula pendula</i>	Silver birch	PW	O
<i>Betula pubescens</i>	Downy birch	H & PW	R & F
Bryophytes	Mosses and liverworts	W	F
<i>Cardamine pratensis</i>	Ladies' smock	NG	R
<i>Carex flacca</i>	Glaucous sedge	NG	R
<i>Carex leporina</i>	Oval sedge	NG	R
<i>Carex remota</i>	Remote sedge	W	R
<i>Cerastium glomeratum</i>	Sticky mouse-ear	NG	R
<i>Cirsium arvense</i>	Creeping thistle	H & NG	O
<i>Cirsium palustre</i>	Marsh thistle	NG	O
<i>Cirsium vulgare</i>	Spear thistle	PW	R
<i>Conopodium majus</i>	Pignut	W	R
<i>Corylus avellana</i>	Hazel	H, W & PW	F, O & R
<i>Crataegus monogyna</i>	Hawthorn	H, W & PW	O
<i>Dactylis glomerata</i>	Cock's-foot	H, PW & NG	O
<i>Dryopteris filix-mas</i>	Male fern	H & W	O & R
<i>Epilobium</i> sp.	Willowherb	W & PW	O

Plants			
Scientific name	Common name	Habitat	Frequency (DAFOR)
<i>Festuca rubra</i>	Red fescue	PW	O
<i>Ficaria verna</i>	Lesser Celandine	H & W	O
<i>Filipendula ulmaria</i>	Meadowsweet	H	O
<i>Fraxinus excelsior</i>	Ash	H	R
<i>Galium aparine</i>	Cleavers	H	F
<i>Geranium robertianum</i>	Herb-Robert	H	O
<i>Geum urbanum</i>	Herb-Bennett	W	O
<i>Glechoma hederacea</i>	Ground ivy	H	O
<i>Hedera helix</i>	Ivy	H & W	LA & O
<i>Holcus lanatus</i>	Yorkshire fog	NG	F
<i>Juncus effusus</i>	Soft rush	NG	LO
<i>Lolium perenne</i>	Perennial rye-grass	NG	O (LA)
<i>Malus sylvestris</i>	Crab apple	H, W & PW	R
<i>Mercurialis perennis</i>	Dog's-mercury	H	O (LA)
<i>Oxalis acetosella</i>	Wood sorrel	W	O (LA)
<i>Picea sitchensis</i>	Sitka spruce	H	R
<i>Plantago lanceolata</i>	Ribwort plantain	NG	R
<i>Poa annua</i>	Annual meadow-grass	NG	LF
<i>Populus tremula</i>	Aspen	W	R
<i>Prunus avium</i>	Wild cherry	PW	F
<i>Prunus spinosa</i>	Blackthorn	H & NG	F & R
<i>Quercus petraea</i>	Sessile oak	H, W & PW	O, F & O
<i>Ranunculus acris</i>	Meadow buttercup	NG	R
<i>Ranunculus repens</i>	Creeping buttercup	H & NG	O & F (LA)
<i>Rosa canina</i>	Dog-rose	H	O
<i>Rubus fruticosus</i>	Bramble	H & PW	O (LA)
<i>Rumex obtusifolius</i>	Broad-leaved dock	NG	O
<i>Salix cinerea</i>	Grey willow	W	O

Plants			
Scientific name	Common name	Habitat	Frequency (DAFOR)
<i>Sambucus nigra</i>	Elder	H	O
<i>Sorbus aucuparia</i>	Rowan	W	R
<i>Stachys sylvatica</i>	Hedge woundwort	PW	R
<i>Stellaria alsine</i>	Bog stitchwort	NG	R
<i>Stellaria holostea</i>	Greater stitchwort	H & PW	O & R
<i>Stellaria media</i>	Chickweed	H	O
<i>Taraxacum</i> sp.	Dandelion	NG	O
<i>Thuja plicata</i>	Western red cedar	H	R
<i>Trifolium repens</i>	White clover	NG	O (LA)
<i>Urtica dioica</i>	Nettle	H	O
<i>Veronica chamaedrys</i>	Germander speedwell	W	O
<i>Veronica serpyllifolia</i>	Thyme-leaved speedwell	NG	O
<i>Viburnum opulus</i>	Guelder rose	H	R
<i>Viola riviniana</i>	Common dog-violet	W	O

Birds	
Scientific name	Common name
<i>Fringilla coelebs</i>	Chaffinch
<i>Cyanistes caeruleus</i>	Blue tit
<i>Numenius arcuate</i>	Curlew
<i>Erithacus rubecula</i>	Robin
<i>Turdus merula</i>	Blackbird
<i>Corvus monedula</i>	Jackdaw
<i>Buteo buteo</i>	Buzzard
<i>Phasianus colchicus</i>	Pheasant
<i>Sylvia atricapilla</i>	Blackcap
<i>Corvus corone</i>	Carrion crow
<i>Phoenicurus phoenicurus</i>	Redstart
<i>Phylloscopus trochilus</i>	Willow warbler
<i>Sylvia borin</i>	Garden warbler
<i>Columba palumbus</i>	Wood pigeon
<i>Phylloscopus collybita</i>	Chiffchaff
<i>Troglodytes troglodytes</i>	Wren
<i>Regulus regulus</i>	Goldcrest
<i>Strix aluco</i>	Tawny owl
<i>Pyrrhula pyrrhula</i>	Bullfinch
<i>Parus major</i>	Great tit
<i>Turdus viscivorus</i>	Mistle thrush

Appendix 2: Photographs



Photo 1. View of regularly trimmed roadside hedgerow.



Photo 2. View of neutral grassland habitat, with plantation woodland and mature hedgerow trees visible in the distance.



Photo 3. Some veteran hedgerow trees have been incorporated into new plantations.



Photo 4. Many of the mature trees on the site have potential bat roost features in them.



Photo 5. View of the lowland mixed deciduous woodland habitat running along the eastern side of the site



Photo 6. The interior of the semi-natural woodland has been grazed for many years, resulting in a lack of shrub layer, no natural regeneration, and a grass-dominated field layer.



Photo 7. Retained fallen stems create invaluable microhabitats for a wide range of wildlife.



Photo 8. Recent spates have scoured the streambed, and possibly removed more extensive riparian and aquatic vegetation.



Photo 9. The only building on the site is the small tin shed pictured above. Its only wildlife value is to provide shelter for roosting birds.

Appendix 3: Method statement for hedgerow relocation

1. Hedgerow relocation will only be undertaken when the trees are dormant, and only if soil conditions are suitable (i.e., not during a drought or when waterlogged);
2. Prior to undertaking the relocation, all existing fences that are adjacent to the hedgerow will be dismantled and removed;
3. The relocation will be carried out using a suitably sized excavator that can at least uproot and lift whole trees without dividing them into smaller sections;
4. A receiving trench shall be excavated to approximately 1m wide and 1m deep. The bottom of this trench will either be cultivated by hand to an additional depth of 150mm, or a 150mm thick layer of loosened soil derived from the excavated hedge line will be spread along the bottom of the receiving trench. The profile of the receiving trench will attempt to replicate the size and shape of the root balls excavated when removing the hedge from its original position.
5. A 1m deep preparatory trench will be excavated on the field side of the section of hedge to be moved immediately prior to relocation. On no account should preparatory trenches be left open overnight or on any other occasion when the works are not in progress – it is anticipated that the relocation will be undertaken within one day;
6. If necessary, the hedge can be cut into 1.5m sections by the cutting of cross-trenches through the hedge using a narrow digging bucket;
7. The hedge will be lifted in sections or tree by tree, attempting at all times to retain an intact root ball, and the lifted trees or sections will be relocated immediately to their final positions;
8. Care will be taken to ensure that the trees or sections of hedge are not rotated by 180° during the relocation operation;
9. Any gaps remaining between the relocated trees or sections will be infilled by hand from the original hedge line as the works progress.
10. The most common cause of failure in the transplantation of trees is a lack of water, so the relocated hedgerow will be watered-in immediately after the relocation operation, and repeatedly watered as and when necessary during any very dry period in the following growing season (i.e., when the trees are in leaf).

Appendix 4: Method statement for tree protection

1. All site traffic (vehicular and pedestrian) and works will be excluded from the root protection areas (RPA's) of retained trees. This exclusion can be achieved by the erection of barriers, which will be fit for purpose and maintained upright and complete (chestnut paling is often used). This will effectively establish a Construction Exclusion Zone (CEZ) which will not be used to stockpile materials and store machinery during the development.
2. If the passage of some site traffic over the RPA's cannot be avoided, ground protection will be installed as follows:
3.
 - i) pedestrian traffic - a single thickness of scaffold planks on top of a compressible layer laid onto a geotextile;
 - ii) vehicular traffic - the ground protection will consist of a geo-cellular confinement system in-filled with graded (20-40mm) aggregate, e.g., CellWeb or Treeguard. Where the new access would cover more than 20% of the RPA, or be wider than 3m within it, it will be constructed so as to allow moisture infiltration and gaseous diffusion.
4. Ground levels will not be lowered within RPA's. If levels must be raised, the fill will be a granular material that does not inhibit vertical gaseous diffusion.
5. New impermeable surfaces within the RPA will be restricted to a maximum width of 3m and situated tangentially to one side of a tree only or confined to an area no greater than 20% of the RPA, whichever is the smaller.
6. Excess water in RPA's will be avoided. Any adjacent landscaping works, although outside the CEZ, will promote drainage away from the trees to prevent ponding and waterlogging.
7. No-dig, trenchless excavation techniques will be used for the installation of underground services within the RPA where possible. As a last-resort alternative to machine-cut trenches, trenches will be hand-dug along the shortest distance across the relevant RPA.
8. Any excavations which have to be undertaken within the RPA will be carried out carefully by hand or by using an air-spade, avoiding damage to the protective bark covering larger roots. While exposed, these roots will be wrapped in dry, clean hessian sacking. Roots smaller than 25mm diameter may be pruned back, preferably to a side branch, using a sharp cutting tool such as secateurs, loppers, or a handsaw. Roots larger than 25mm will only be severed following consultation with an arboriculturist. Prior to backfilling, any hessian wrapping will be removed, and retained roots will be surrounded by sharp sand (not builder's sand) before soil or other material is replaced. This material will be free of contaminants and other foreign objects potentially injurious to tree roots.

For single stemmed trees, the RPA radius = the Diameter at Breast Height $\times 12$.

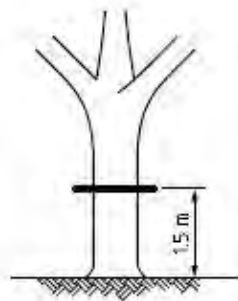
For trees with multiple stems, the RPA radius = the combined DBH $\times 12$. To calculate the combined DBH of a multi-stemmed tree: -

EITHER $\sqrt{(\text{stem diameter } 1)^2 + (\text{stem diameter } 2)^2 \dots + (\text{stem diameter } 5)^2}$ (for up to 5 stems);

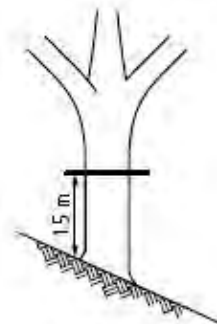
OR $\sqrt{(\text{mean stem diameter})^2 \times \text{number of stems}}$ (for more than 5 stems)

For hedgerows, the RPA will run parallel to the line of the hedge and its width will be 12 times the basal diameter of the average (mean) stem, measured from the centre-line of the hedgerow.

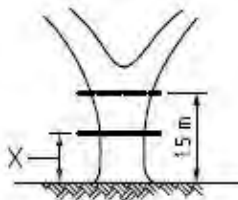
To measure the DBH:



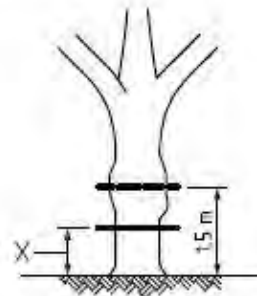
a) Stem diameter measured at 1.5 m above ground level



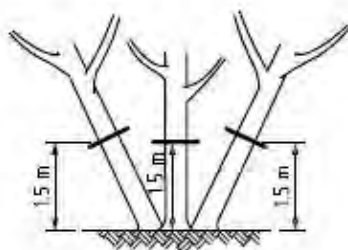
b) Measurement on sloping ground



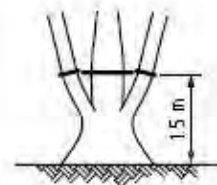
c) Trees with low branching measured at narrowest point below the fork



d) Measurement of stem with irregular swelling made at the narrowest point below the swelling



e) Measurement of a multi-stemmed tree



f) Measurement of a tree with more than one stem at 1.5 m above ground level

Key

X Height varies

(taken from BS5837:2012 'Trees in relation to design, demolition and construction - Recommendations', British Standards Institution)