Preliminary ecological appraisal of Y Felin, Efail Rhyd, Llanrhaeadr-ym-mochnant, Powys, SY10 0DU

Oakwood Ecology

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Summary

A preliminary ecological appraisal was commissioned by Mr & Mrs Perks to inform a planning application for a development on land at Y Felin, Efail Rhyd, Llanrhaeadr-ym-mochnant, Powys, SY10 0DU. The development includes the demolition of the existing dwelling and the construction of a new one, and the installation of all services and infrastructure.

This report includes the results of a desk-study, a habitat survey, 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 any negative impacts, along with suggestions for ecological enhancement. Industry-standard survey methodologies were followed.

There are two statutorily designated sites within two kilometres of the development site, both designated for lesser horseshoe bats. There are 59 historical records of statutorily protected species within the search radius, 56 of which are classified as records of mobile species.

The habitats on the site include neutral grassland, lowland mixed deciduous woodland, river, urban habitats, hedgerows and a canalised leat that used to feed the old mill.. No evidence of protected species was found during the field survey.

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

The development has been designed and located so that the direct impacts are minimised: the entire footprint of the development is restricted to habitats of low ecological value. A range of mitigation and compensation measures will be implemented to alleviate any negative impacts. A range of measures are also proposed that will enhance the ecological value of the site.

1 Introduction

1.1 Overview

1.1.1 This preliminary ecological appraisal was commissioned by Mr Michael Perks to inform the design of a proposed development on land at Y Felin, Efail Rhyd, Llanrhaeadr-ym-mochnant, Powys, SY10 0DU (approximate centroid grid ref. SJ16042653) (**Figures 1 & 2**). The proposed development includes the demolition of the existing dwelling and the construction of a new one, and the installation of all services and infrastructure (including a sewage treatment plant) (**Figures 3 & 4**).

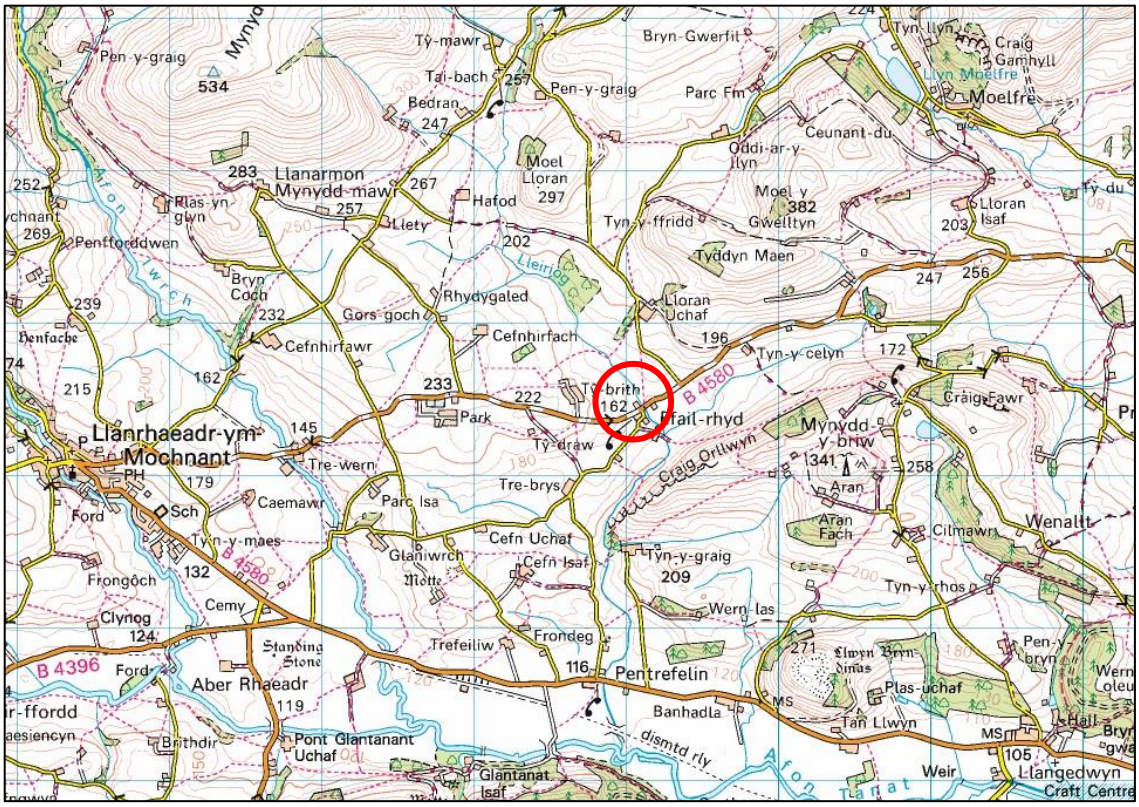

Figure 1. Location map of the proposed development site (circled red).
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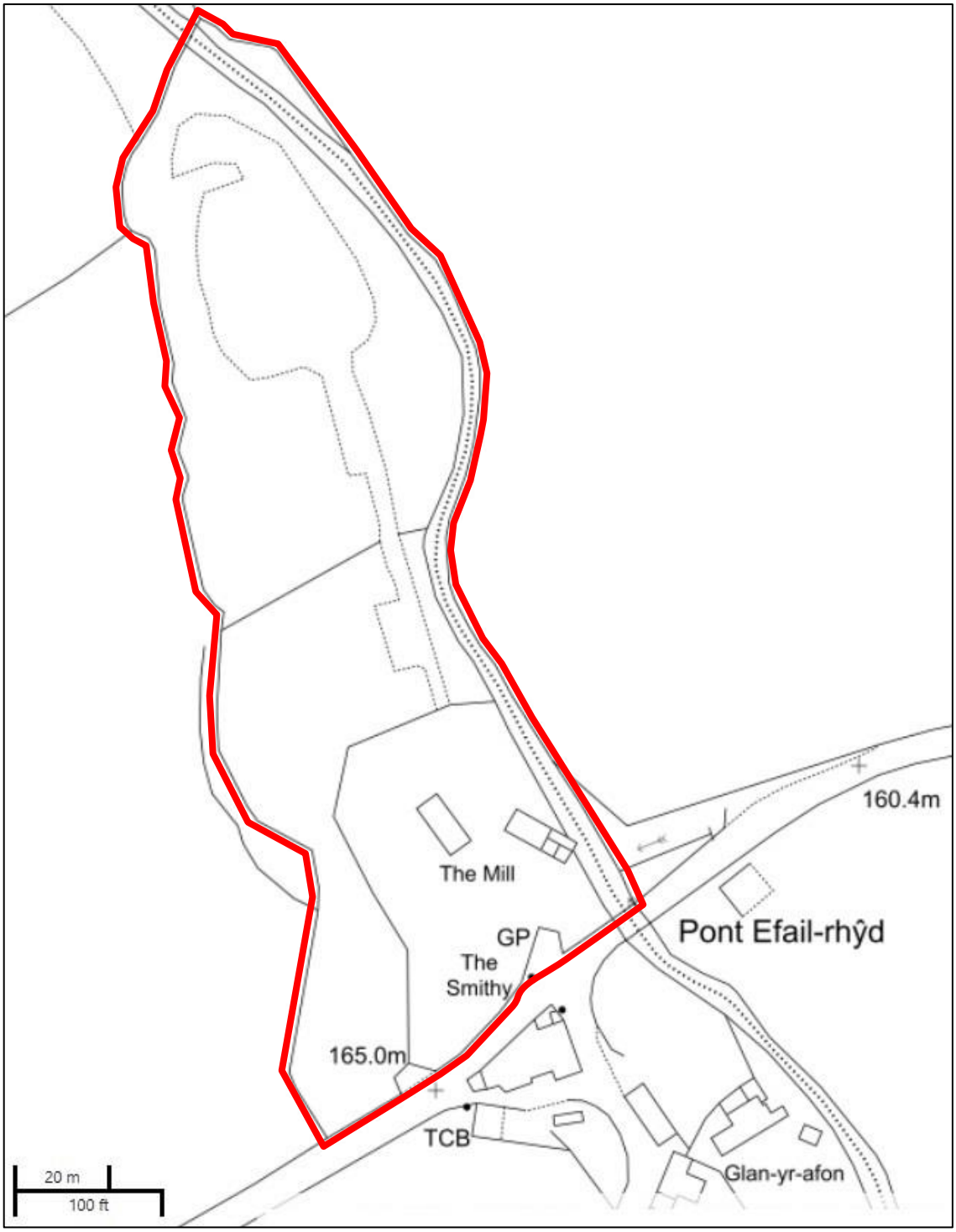

Figure 2. Existing site layout (approximate boundary in red).
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Figure 3. Proposed site layout.

Figure 4. Sketch of proposed new dwelling.

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 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));
- 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 S093078/1 (NRW Bats) and S093082/1 (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 includes a 2km radius for historical records and a 5km radius for designated sites.

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)

2.1.3 Powys BIS lists their historical records in four categories, as follows:

- Category 1: all statutorily protected species plus Section 7 [Environment Act Wales] Species & UK BAP Priority Species;
- Category 2: Species of conservation concern - global red list, British red data book, nationally rare & scarce, Welsh red and amber birds (Stanbury *et al.,* 2021) & Welsh vascular plant red data list where these are not identified in Category 1;
- Category 3: Locally important species - as specified by local experts;
- Category 4: Invasive non-native species.

2.2 Habitat survey

2.2.1 A habitat survey was carried out using the UKhab classification scheme (Butcher *et al.*, 2020) 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). Habitat condition was assessed using the criteria outlined in Crosher *et al.* (2019).

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 (2022). 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 and priority 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.

3 Results

3.1 Desk-study

3.1.1 There are three statutorily designated sites within the 5km search radius (**Figure 5**). This includes two SSSI's: Garth Eryr (a lesser horseshoe bat hibernaculum, approximately 2.74km away) and Hendre, Llangedwyn (a lesser horseshoe maternity roost and hibernaculum approximately 3.95km away), both of which are included in the Tanat and Vyrnwy Bat Sites SAC.

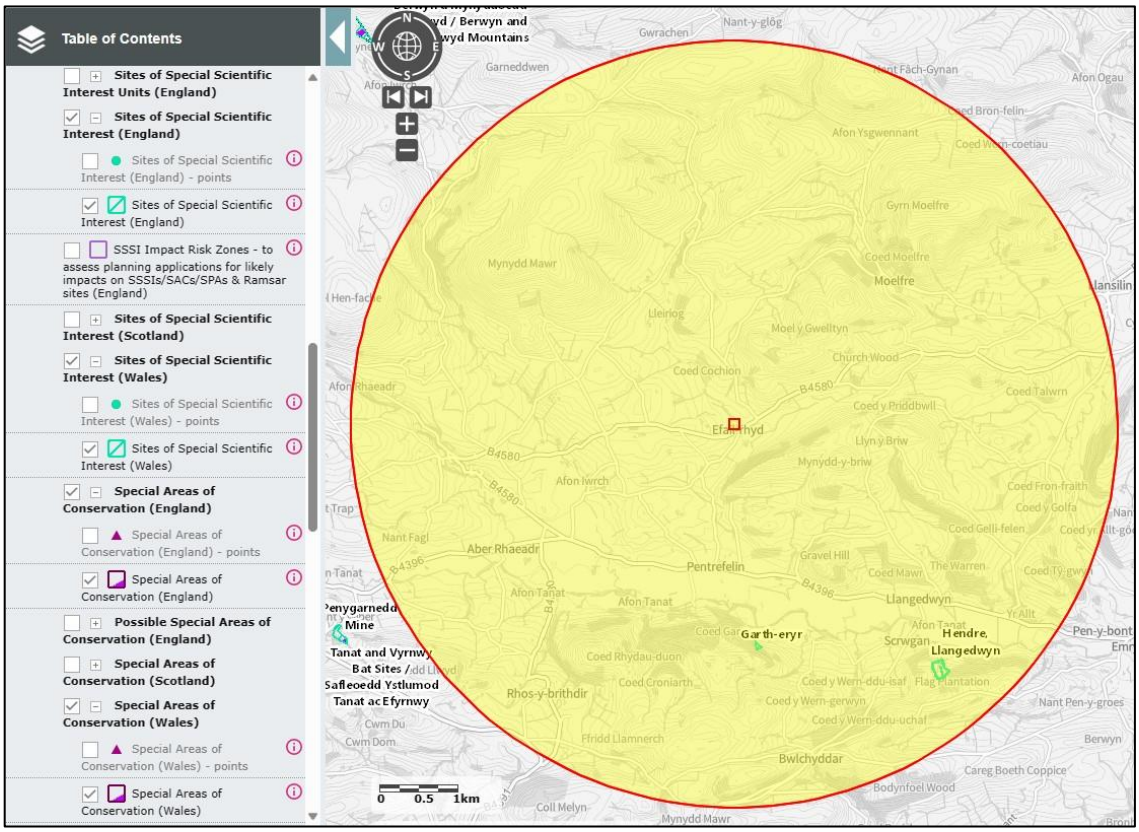

Figure 5. Map showing designated sites within a 5km radius around the site.
(From MAGIC Interactive Maps)

3.1.2 There are 219 historical biological records with the 2km search radius. These include 59 records of Category 1 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. Many of the taxa are likely to be significantly under-recorded, and the historical records do not represent an exhaustive list of species that could occur on the site.

3.1.3 A distinction is made between species considered to be relatively mobile (those with the capability to move on or off the site 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)
Category 1	Badger	1	708	Y
	Lesser horseshoe bat (*Rhinolophus hipposideros*)	1	1,727	Y
	Birds	51	589	Y
	Invertebrates (Butterflies)	2	693	Y
	Polecat (*Mustela putorius*)	1	1,450	Y
	Vascular plants (Bluebell, *Hyacinthoides non-scripta*)	1	1,164	N
Category 2	Birds	61	700	Y
Category 3	Birds	74	700	Y
	Bryophytes	14	580	N
	Fallow deer (*Dama dama*)	1	1,034	Y
	Invertebrates (Butterfly)	1	693	Y
	Vascular plants	1	1,450	N
Category 4 (Invasive non-native species)	Canada goose (*Branta canadensis*)	3	1,055	Y
	Mandarin duck (*Aix galericulata*)	1	1,450	Y
	Wilson's honeysuckle (*Lonicera nitida*)	1	1,450	N
	Yellow archangel cv. (*Lamiastrum galeobdolon argentatum*)	2	1,164	N

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

3.1.4 Mobile Category 1 taxa recorded within the 2km study radius include:

- Badger - occurring throughout the farmed landscape.
- Bats – historical records of lesser horseshoe, plus those recorded during bat surveys on the site, including common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*P. pygmaeus*), noctule (*Nyctalus noctula*), and indeterminate Myotis species.

- Birds - a reasonably wide variety of species, including raptors, waders, and passerine species. Schedule 1 species include peregrine (*Falco peregrinus*), red kite (*Milvus milvus*), and kingfisher (*Alcedo atthis*).

- Brown hare – a woodland edge species, usually lying up in woodland or hedgerows and foraging in more open habitats.

- Invertebrates - one record of wall butterfly (*Lasiommata megera*) and one of small heath (*Coenonympha pamphylus*). Larval foodplants are common grass species, and the adults favour short grassland habitats.

- Polecat (*Mustela putorius*) – a generalist carnivore throughout the farmed landscape. Unlike most of the UK population, polecats in mid-Wales have not undergone widespread hybridisation with domestic ferrets.

3.2 Habitat survey

3.2.1 The field survey was carried out on the 15th of January 2024 by Simon Cope. **Figure 6** shows an aerial photograph of the site, and the distribution of habitats on the site is depicted in **Figure 7**. **Appendix 1** contains a list of species observed during the field survey, and illustrative photographs are presented in **Appendix 2**.

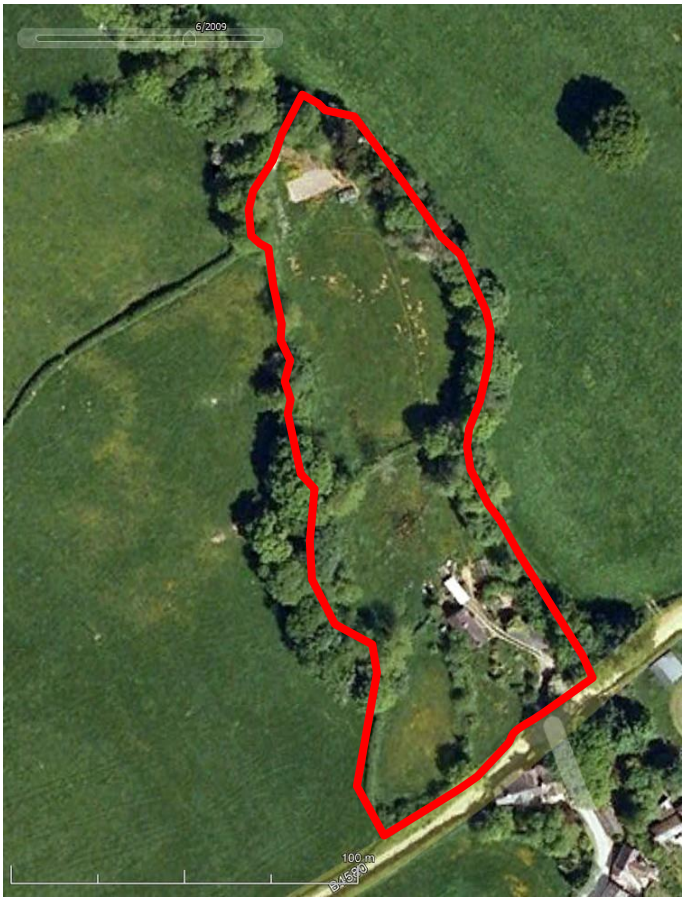

Figure 6. Aerial photograph of the site and it's surroundings.
Courtesy of Google Earth. Image dates from 2009.

3.2.2 All of the fields were bounded by post-and-wire stock fencing, although this was in a poor state of repair in places, and there were no grazing livestock on the site. The following habitats were recorded:

g3c – Other neutral grassland

3.2.3 The sward is fairly species-poor and has been infrequently grazed or cut in the recent past, and the species recorded reflect this, with the coarse grass cock's-foot being locally abundant. Other grass species include frequent Yorkshire fog, rough-stalked meadow-grass, creeping bent, and, locally, common bent, perennial rye-grass, and red fescue. Forbs are only ever occasional in the dry areas, and are mostly confined to the field edges, including broadleaved dock, creeping thistle, white clover, and knapweed. In wetter areas, where groundwater seeps out at the surface, soft rush and creeping buttercup are frequent.

w1e – lowland mixed deciduous woodland

3.2.4 The areas attributed to this habitat are the grown-out double hedgerows along the western boundary, which expand into true woodland in the north of the site. Canopy-forming species include mature and senescent pedunculate oak, ash, sycamore, wild cherry, and alder, and shrubs include frequent or occasional hawthorn, hazel, elder, holly, and field maple that are trimmed with a flail along much of its length, with frequent bramble forming a patchy layer underneath and extending into the adjacent grassland. The field layer is sparse, mostly comprising species drawn from the adjoining grassland, but with limited cover of ancient woodland indicators such as bluebell and dog's mercury.

r2a – rivers (Priority habitat)

3.2.5 The Afon Lleiriog runs along the eastern boundary of the site. At the time of survey, it averaged around 3m wide, although, like most of the streams in the area, it is probably subject to large fluctuations in flow rate due to the degraded, denatured conditions in its catchment. The river has a bed load of cobbles and pebbles; no vascular plant species were observed within it, and aquatic bryophytes were rare. About 20m upstream from the north of the property, a small tributary entered the stream, and this was obviously polluted by excess nutrients, with large amounts of algae covering everything in the smaller watercourse. This pollution would have a significant detrimental effect on the invertebrate community downstream.

3.2.6 Much of the river habitat is shaded by trees and shrubs arising from the neighbouring field to the east, and this occasionally forms dense thickets.

Urban habitats - u1 (built-up areas and gardens), u1b5 (buildings), u1c (artificial unvegetated unsealed surface) & u1f (sparsely vegetated urban land)

3.2.7 These urban habitats include the buildings, the garden area, and a trackway and levelled clearing that was constructed at some point prior to the current ownership.

The driveway and pathways surrounding the house are surfaced with gravel that is relatively clear of vegetation, while the trackway extending to the north has not seen much traffic and has become colonised by grasses similar to those in the adjacent grassland, and by a number of ruderal 'weeds', e.g., groundsel, smooth sow-thistle, wall lettuce, square-stalked willow-herb, wavy bittercress, etc.

3.2.8 The garden is mostly managed as amenity grassland; the species in it are similar to the adjacent semi-natural grassland but grasses are more dominant, and there are a number of exotic shrubs and fruit trees (apple, pear, and plum).

3.2.9 The river exits the property under a road bridge which is made of dressed stone. This structure had no potential bat roost features.

h2a – species-rich hedgerow

3.2.10 Hawthorn is dominant in this habitat, with occasional ash, blackthorn, elder, field maple, hazel, holly, sycamore and wych elm. Rambling and climbing species include occasional ivy, honeysuckle, bramble, dog-rose and field rose, and rare yew. All of the hedgerows have been trimmed with a flail. The herbaceous field layer is also fairly rich in woodland species, some of which are ancient woodland indicators, including bluebell, dog's mercury, greater stitchwort, and common polypody. Other herbaceous species may be apparent during the growing season.

r1e – canalised leat

3.2.11 This built structure is almost completely filled with silt and leaf litter, but it does still carry a small amount of running water. The water enters the site from the field to the west and flows southwards to a drain which carries it to join the river. It is mostly devoid of aquatic vegetation, although it does widen at its southern end, where floating sweet-grass is frequent, and brooklime and hemlock water-dropwort are occasional.

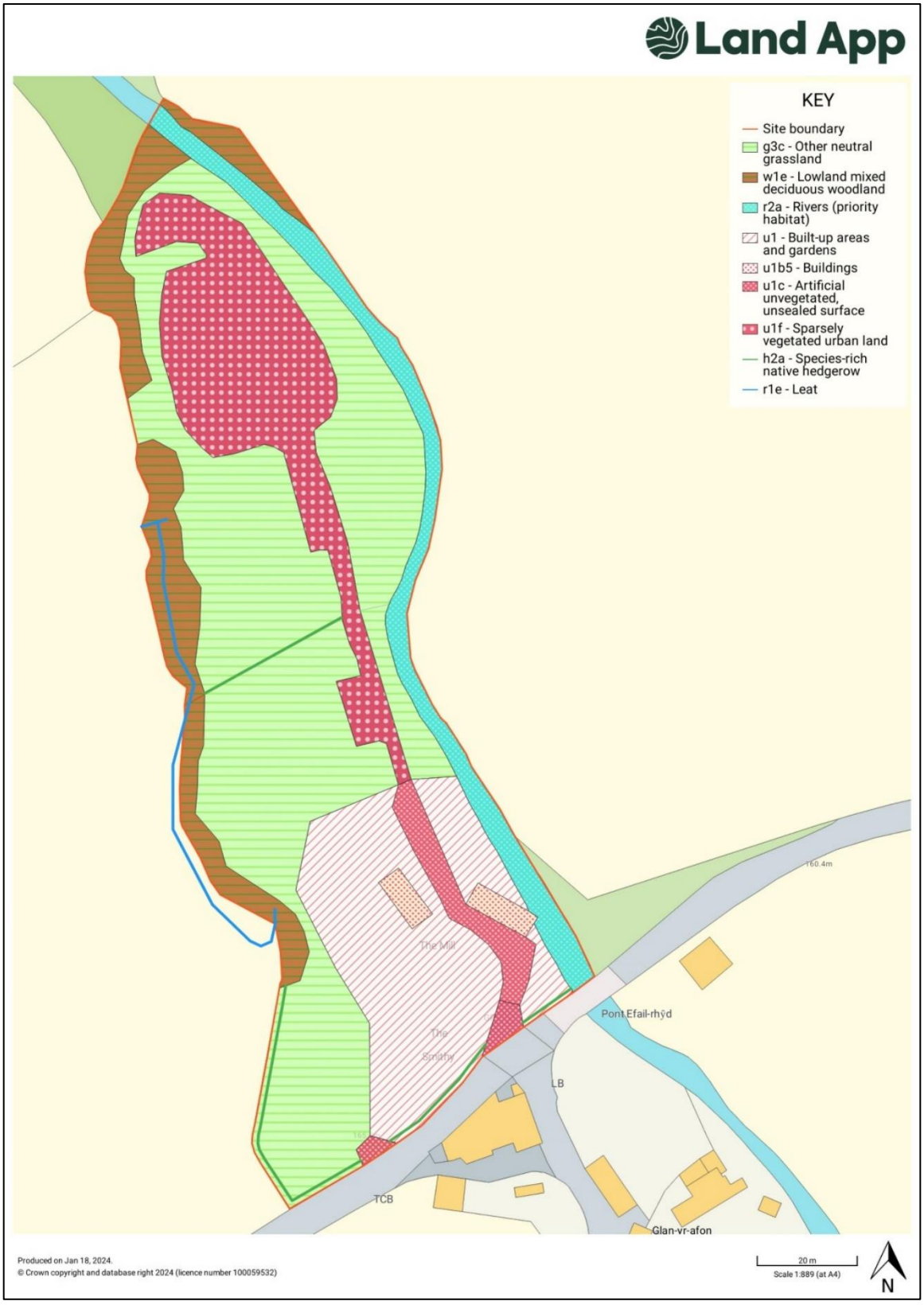

Figure 7. Map of the habitats present on the site.

3.3 Protected species

3.3.1 No field signs of any protected species were recorded during the field survey. 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 In 2023, a series of bat surveys were carried out on the dwelling scheduled for demolition (Anderson, 2023). These surveys included a preliminary roost assessment and three activity surveys (dusk and dawn), which found numerous potential roost features in the house. Bats recorded roosting in the house during the activity surveys included small numbers of common and soprano pipistrelles occupying six day roosts (summer and transitional). The barn opposite was not included in any of the 2023 surveys, but it also has some potential roost features in the form of raised ridge tiles and open flyways into interior voids.

3.3.4 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

3.3.5 The woodlands and hedgerows are highly suitable as nesting, roosting and foraging habitat for a wide range of species; 74 species of birds have been recorded with 2km of the site, including 23 Category 1 species. The grasslands, river and urban habitats may also be used for foraging, at least on a peripatetic basis.

Dormouse

3.3.6 The woodland and hedgerow habitats on the site were moderately suitable as nesting and foraging habitat for this species, although 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 460m away to the north-west. The terrestrial habitats on the site 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 No otter holts were found on the site or within 30m north and south of the site, and no field signs were observed. The river running along the eastern side of the site could ostensibly be utilised by otters for foraging and commuting, but the agricultural effluent polluting the water would reduce its suitability for invertebrates and therefore fish, the main prey item for otters.

Reptiles

3.3.10 The habitats recorded on the site would offer moderate potential for foraging reptiles, but the lack of a southerly aspect and refuges means that these species are unlikely to be present in significant numbers within the construction site footprint.

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 The only statutorily protected plant species recorded on the site is bluebell, and these were restricted to the woodland and hedgerow habitats, which will not be directly impacted by the proposed development.

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 only significant constraint on the field survey was the timing – some plant species may not have been obvious at this time of year, but these species are unlikely to affect the attribution of habitats. 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, nor is it contiguous with any designated sites. The only two designated sites within the 2km search radius are designated for lesser horseshoe bats, which have not been recorded roosting on the site.

4.2.2 Lowland mixed deciduous woodland, hedgerows and rivers are listed as habitats of principal importance under Section 7 of the Environment (Wales) Act 2016. All three habitats are relatively common in the local landscape, the deciduous woodland and the hedgerows are in moderate condition, and the river is in poor condition, so all 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, so are assigned a low ecological value.

4.2.4 With regard to protected species, it is concluded that only bats are resident on the site, and their tree roosts will be restricted to the mature trees in the deciduous woodland. The roosts in the house scheduled for demolition are occupied by low numbers of common species whose populations are stable or increasing at a Welsh and UK level (BCT, 2023); they are valuable at a site level but have negligible value at any wider scale.

4.2.5 Of the mobile Category 1 species recorded historically within two kilometres of the site, it is also possible that badger, lesser horseshoe bats, various bird species, wall and small heath butterflies and polecat could utilise the site, but, apart from the butterflies, 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 to moderate.

4.3 Broad impact assessment

4.3.1 To reiterate, the proposed development includes the demolition of the existing disused dwelling and the construction of a new one, and the installation of all related 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 permanent loss of approximately 0.25Ha of the species poor neutral grassland habitat which is the footprint of the new dwelling plus its immediate surroundings, which will have a negligible negative impact on the ecological value of the site.

4.3.3 The demolition of the existing house will result in the permanent loss of the bat roosts contained within it, which will be a major negative impact at a site level, but a negligible negative impact at any wider scale.

4.3.4 There will be no indirect negative impacts due to the proposed development – the amount of glazing in the new dwelling is approximately equivalent to the existing dwelling, so there will be no substantial increase in light spill. In fact, the low eaves on the front elevation of the proposed dwelling are designed to further reduce light spill on to the adjoining riverside habitats. There will also be no changes to the amount of traffic (vehicular and pedestrian) on the site. Consequently, there will be no extra disturbance to wildlife on the site and therefore no reason to suppose there will be any changes in the behaviour of that wildlife.

4.3.5 Potentially positive impacts of the development will include: the establishment of new plantings of trees and wildflower meadows, the construction of a pond, and the provision of new bat and bird roosting and nesting sites, which will provide new opportunities for a range of wildlife. The proposed dwelling has been designed with deep eaves and spacious soffits to encourage nesting birds and roosting bats in purpose-made niches.

4.3.6 Given the relatively low ecological value of the habitats that will be lost, and the positive impacts outlined above, the overall impact of the development is likely to be a negligible 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 local context. Bats and their roosts could be directly affected by the proposed development, but the overall impact is likely to be a negligible negative one at a landscape scale.

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 and located 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), and the house will be supported on steel legs rather than on more conventional trenched foundations.

Mitigation

5.3.3 The neutral grassland habitat that will be directly impacted by the development does not contain any species that require special mitigation measures.

Compensation

5.3.4 In order to compensate for the loss of bat roosts in the existing dwelling, as outlined in Section 4, Anderson (2023) suggest the implementation of the following measures:

- The provision of seven suitable bat boxes to act as receptors for any bats found during the demolition.
- Compensatory bat roosts integrated within the new dwelling, specifically comprising crevices under fascias, although other types are suggested.

5.3.5 The destruction of the existing bat roosts will be subject to the approval of an EPS license from Natural Resources Wales, and the above compensation may be modified to comply with that process.

Enhancement

5.3.9 In addition to the compensatory measures outlined above, the following enhancement measures are recommended to improve the wildlife value of the site, which will incidentally improve the amenity value for the owners:

- All external artificial lighting will be installed at as low a height, intensity and spacing as practicable; the light will be directed towards the ground and away from the woodland and river along the boundaries 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.
- All existing, and any newly planted hedgerows on the site will be allowed to grow up and produce fruit and seeds for wildlife. Roadside hedgerows can be trimmed on the road side annually.
- The neutral grassland areas will be managed to promote site-native wildflowers. In the absence of any good quality seed sources nearby, this may involve over-seeding, plug planting, or strewing green hay from suitable donor sites.
- At least one pond will be created on the site. It will have an irregular and shallow. sloping edge and could be combined with stone and log piles close by to provide refuges for amphibians. Stocking it with fish would make it attractive to otters, but that would also impact negatively on amphibians and other taxa; two ponds would solve that dilemma.
- With three-week intervals between cuts, the areas of retained amenity grassland could be managed as a flowering lawn, again potentially with some over-seeding.

- 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 provided by the Bat Conservation Trust and the RSPB.

- The garden should be stocked with nectar-rich native planting and native species with nuts, fruits and other seeds within the formal landscaping.

- Tree planting should comprise site-native species and would ideally follow a naturalistic planting pattern, i.e., thorny scrub surrounding areas of taller, canopy-forming trees.

- The pollution in the water course to the north of the site should be tackled. This could be either by liaising with the landowner responsible or, failing that, by reporting it to NRW.

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Appendix 1:
Vascular plant species list

Habitat codes:

g3c = neutral grassland

w1e = lowland mixed deciduous woodland

u1 = built-up areas and gardens

h2a = species-rich hedgerow

r1e = leat

Frequency codes:

D = Dominant

(L)A = (Locally) Abundant

(L)F = (Locally Frequent)

(L)O = (Locally) Occasional

R = Rare

Scientific name	Common name	Habitat	Frequency (DAFOR)
Acer campestre	Field maple	w1e, h2a	R
Acer pseudoplatanus	Sycamore	w1e, h2a	O
Achillea millefolium	Yarrow	g3c, u1	R
Agrostis capillaris	Common bent	g3c, u1	F
Agrostis stolonifera	Creeping bent	g3c, u1	F
Alliaria petiolata	Garlic-mustard	h2a	O
Alnus glutinosa	Alder	w1e, h2a	LO
Anthriscus sylvestris	Cow parsley	g3c, w1e, h2a	LO
Arrhenatherum elatius	False oat-grass	g3c, h2a, w1e	O
Arum maculatum	Lords-and-ladies	w1e, h2a	O
Cardamine flexuosa	Wavy bittercress	u1	O
Centaurea nigra	Knapweed	g3c	LO
Cerastium fontanum	Common mouse-ear	u1	R
Chamerion angustifolium	Rosebay willowherb	r1e	R
Chrysosplenium oppositifolium	Opposite-leaved golden saxifrage	r1e	LF
Cirsium arvense	Creeping thistle	g3c, u1	O
Corylus avellana	Hazel	w1e, h2a	O
Crataegus monogyna	Hawthorn	w1e, h2a	F, A
Crepis capillaris	Smooth hawksbeard	u1	R
Dactylis glomerata	Cock's-foot	g3c, h2a	F (LA)
Digitalis purpurea	Foxglove	g3c, h2a	R
Dryopteris filix-mas	Male fern	w1e, h2a	O
Epilobium tetragonum	Square-stalked willowherb	u1	O (LF)
Festuca rubra	Red fescue	g3c, u1	LF
Ficaria verna	Lesser celandine	w1e, h2a	O
Filipendula ulmaria	Meadowsweet	w1e	R
Fraxinus excelsior	Ash	u1, h2a	R, O
Galanthus nivalis	Snowdrop	w1e, h2a	LF

Scientific name	Common name	Habitat	Frequency (DAFOR)
Galium aparine	Cleavers	w1e, h2a	O (LA)
Geranium lucidum	Shining cranesbill	h2a	R
Geranium robertianum	Herb-Robert	w1e, h2a	O
Geum urbanum	Wood avens	w1e, h2a	O
Glechoma hederacea	Ground-ivy	w1e, h2a	O
Glyceria fluitans	Floating sweet-grass	r1e	LA
Hedera helix	Ivy	w1e, h2a	O
Heracleum sphondylium	Hogweed	g3c, w1e, h2a	O
Holcus lanatus	Yorkshire fog	g3c, u1, h2a	F
Ilex aquifolium	Holly	w1e, h2a	O (LA)
Juncus effusus	Soft rush	g3c	LO
Lactuca muralis	Wall-lettuce	u1	O
Lamiastrum galeobdolon argentatus	non-native yellow archangel	r1e	R
Lolium perenne	Perennial rye-grass	g3c, u1	LF
Lonicera periclymenum	Honeysuckle	w1e, h2a	O
Malus cv.	Apple cultivar	u1	R
Mercurialis perennis	Dog's-mercury	w1e	R
Myosotis sp.	Forget-me-not	h2a	R
Oenanthe crocata	Hemlock water-dropwort	r1e	O
Plantago lanceolata	Ribwort plantain	g3c	O
Poa trivialis	Rough-stalked meadow-grass	g3c, w1e, h2a	O, LF
Polypodium vulgare agg.	Polypody	h2a	R
Prunus domestica cv.	Plum / damson cultivar	u1	R
Prunus spinosa	Blackthorn	h2a	O
Pyrus cv.	Pear cultivar	u1	R
Quercus robur	Pedunculate oak	h2a	F
Ranunculus acris	Meadow buttercup	g3c	O
Ranunculus repens	Creeping buttercup	g3c	O

Scientific name	Common name	Habitat	Frequency (DAFOR)
Reseda luteola	Weld	g3c	R
Rosa arvensis	Field rose	w1e, h2a	O
Rosa canina agg.	Dog-rose	w1e, h2a	O
Rubus fruticosus agg.	Bramble	w1e, h2a	F (LA)
Rumex acetosa	Common sorrel	g3c	LO
Rumex obtusifolius	Broad-leaved dock	g3c	O
Salix cinerea	Grey willow	w1e, r1e	R
Sambucus nigra	Elder	w1e, h2a	R
Senecio vulgaris	Groundsel	u1	O
Sonchus oleraceus	Smooth sow-thistle	u1	O
Stachys sylvatica	Hedge woundwort	w1e	O
Stellaria holostea	Greater stitchwort	h2a	O
Taraxacum agg.	Dandelion	g3c, w1e, h2a	O
Taxus baccata	Yew	h2a	R
Trifolium repens	White clover	g3c, u1	O
Ulmus glabra	Wych elm	h2a	R
Urtica dioica	Nettle	w1e, h2a, r1e	LF
Veronica beccabunga	Brooklime	r1e	O
Vicia sativa	Common vetch	g3c	R
Vicia tetraspermum	Smooth tare	g3c	R

Appendix 2:
Photographs

Photo 1. View of neutral grassland with the thin strip of lowland mixed deciduous woodland in the background.

Photo 2. View of the lowland mixed deciduous woodland, a thin strip along the western boundary of the site.

Photo 3. The partially vegetated track leading north from the buildings that is being slowly colonised by vegetation.

Photo 4. View of the species-rich hedgerow alongside the road.

Photo 5. View from the site entrance of the existing arrangement of buildings and garden.

Photo 6. View of the barn, which has some potential bat roost features under raised ridge tiles and through open flyways into interior voids.

Photo 7. View of the existing dwelling which is scheduled for demolition.

Photo 8. View of the road bridge. This structure did not have any potential for bat roosts.

Photo 9. The leat widens and then disappears down a drain at its southern end. The 'pond' is almost completely silted up and the flowing water makes it unsuitable as great crested newt breeding habitat.

Photo 10. Some of the trees in the lowland mixed deciduous woodland are veterans and have some potential bat roost features.

Photo's 11 & 12. The Afon Lleiriog runs along the eastern boundary of the site. A tributary joining it to the north of the property (pictured below) is clogged with algae as a result of agricultural pollution.

Photo 13. A pile of rocks on the edge of the grassland is suitable as a refuge and potentially a hibernaculum for amphibians.