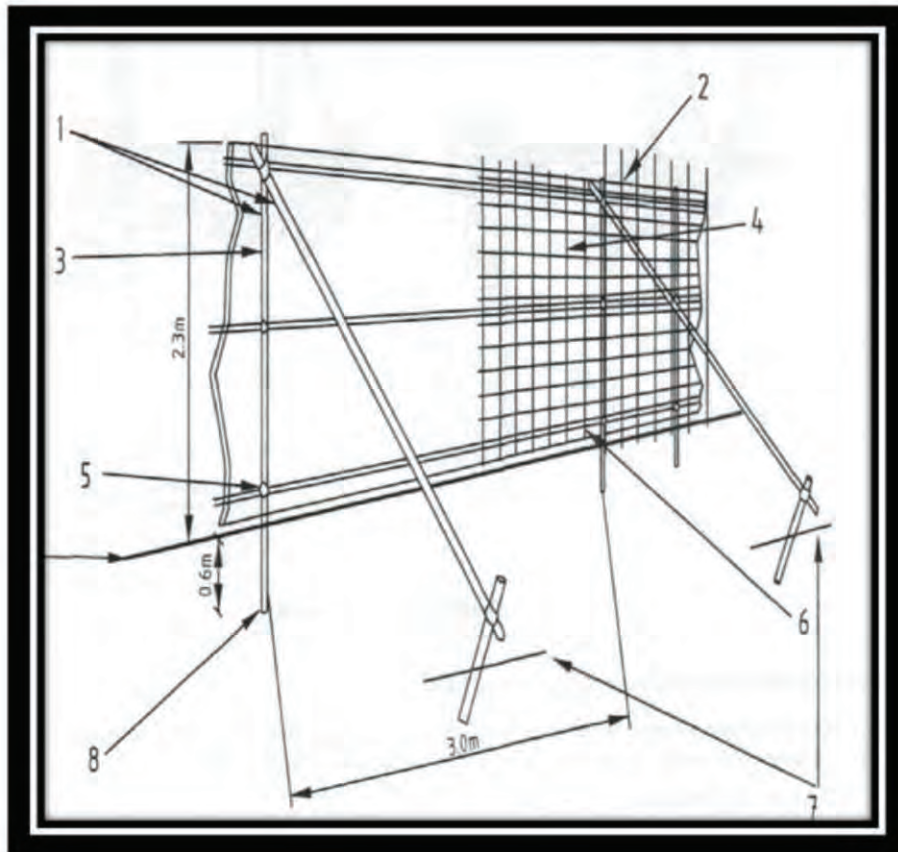






APPENDIX 5 - DENOVAN VILLAGE – TREE PROTECTION MEASURES



- 1 Standard scaffold poles
- 2 Uprights to be driven into the ground
- 3 Panels secured to uprights with wire ties and where necessary standard scaffold clamps
- 4 Weld mesh wired to the uprights and horizontals
- 5 Standard clamps
- 6 Wire twisted and secured on inside face of mesh
- 7 Ground level
- 8 Approx. 0.6 m driven into the ground

Extended Phase I Habitat Survey

Denovan Village Proposal

Denovan Road

Dunipace

Falkirk

FK6 6BJ

March 2016

Baker Ecology
50 Foxdale Drive, Bonnybridge, FK4 2FE, bakerecology@mail.com

Executive Summary

Baker Ecology was commissioned in January 2016 to carry out an extended Phase I habitat survey with protected species walkover survey on land adjacent Denovan Road, Dunipace. The Application Site was a wooded area with constructed access track.

The ecological surveys included a Phase I habitat survey, a desk study, and a walkover protected species survey that considered the potential presence of relevant European Protected Species (bats), Badgers, and breeding birds.

None of the habitats within the study area were notable for their rarity, quality, or extent, and the woodland was dominated by common lime, and non-native species such as sycamore and horse chestnut. However, the woodland ground flora had species present indicative of long-term woodland coverage at this site (bluebell, wild garlic, woodrush and snowdrop). In summary, we consider the woodland to be unremarkable and lacking in native diversity appropriate to this area, although the woodland ground flora is worthy of protection and management to ensure its long-term future. To this end, we recommend the production of a site woodland and biodiversity management plan to not only manage the woodland resource but to enhance its biodiversity value. The conclusion section of this report presents a series of habitat conservation measures as well as recommended enhancements for biodiversity.

Bats

Roosting bats are considered to be a potential ecological constraint for the development due to the presence of trees suitable for use by roosting bats within 30m of the development footprint. The conclusions section of this report presents the required additional survey methodology and effort required to maintain a high due regard for the potential for roosting bats to be present.

Badgers

Badgers are not an ecological constraint within the survey area.

Breeding Birds

The Application Site has a typical woodland guild of breeding bird species, although perhaps lower in variety and numbers than may be expected due to the sparse nature of the ground and shrub layers, coupled with the small area of the woodland. To maintain a high due regard for the potential for breeding birds we recommend that any site preparation works such as vegetation removal or soil stripping is done between late July and mid-March to avoid the bird breeding season. If this is not an option, we recommend that an ecologist check the works area for evidence of breeding birds to determine if works may commence between mid-March and late July. Any active bird nests found or dependent young are protected by national law, and works in any areas that may prevent adult birds from access to nests or dependent young would have to be delayed until the breeding cycle was complete. Given the species present that would only delay works for a matter of a few weeks.

Should the developer and the local planning authority agree our recommendations presented in the Conclusions section of this report we would conclude that the development of the site could in fact bring nature conservation benefit and appropriate enhancement of the biodiversity of the woodland as well as amenity value and potential for natural history education with use of the site and appropriate interpretation. This is seen as essential for an eco-sensitive development of the site to minimise damage of the existing ecological resource while making an economic gain from the site.

Contents

Executive Summary	2
Contents	3
1. Introduction.....	4
2. Scope of Assessment and Survey	4
3. Relevant Policy and Guidance	4
4. Desk Study	10
5. Bats in Scotland	10
6. Survey Methods	12
7. Results	16
8. Conclusions	18
Figure 1. Phase I habitats and target note locations.....	25
Figure 2a. Locations of trees with bat roost potential and locations of birds exhibiting breeding behaviour	26
Figure 2b. Locations of trees with bat roost potential	27
Appendix 1. Plant species list	28
Appendix 2. Plates.....	30

1. Introduction

Baker Ecology was commissioned in January 2016 to carry out an extended Phase I habitat survey with protected species walkover survey on land adjacent Denovan Road, Dunipace (NS 81885 83379). The Application Site was a wooded area with constructed access track, and the proposed development consisted of eight wooden chalets, reception building, access road for service, public car park, and camping pod areas to be established within the woodland setting.

2. Scope of Assessment and Survey

The ecological surveys included the Phase I habitat survey, a desk study, and a walkover protected species survey that considered the potential presence of relevant European Protected Species (bats), Badgers, and breeding birds. Where access was possible (within the land ownership a 50m buffer was also surveyed around the Application Site boundary), which was otherwise viewed from within the site boundary only due to access restrictions.

3. Relevant Policy and Guidance

This ecological assessment has been undertaken with regard to the legislative requirements given in the following:

- The Conservation (Natural Habitats &c.) Regulations 1994 (The Habitats Regulations);
- The Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations as amended (2004, 2007, 2008, 2011, and 2012);
- Nature Conservation (Scotland) Act, 2004;
- Wildlife and Countryside Act 1981 (and subsequent amendment through The Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations 2007, 2009, & 2011);
- Wildlife & Natural Environment (Scotland) Act (2011);
- Protection of Badgers Act, 1992 (and subsequent amendment through The Nature Conservation (Scotland) Act 2004);
- Wild Mammals (Protection) Act, 1996;
- The Convention on the Conservation of European Wildlife and Natural Habitats (The Berne Convention), 1979;
- The Land Reform (Scotland) Act, 2003;
- Scottish Planning Policy (June 2014) replaces NPPG14 and SPP (February 2010);
- The Falkirk Local Biodiversity Action Plan;
- The UK Biodiversity Action Plan (BAP), revised priority list 2007; and the
- Scottish Biodiversity List 2007

3.1. Biodiversity Status

The UK Biodiversity Action Plan (BAP) is the UK Government's commitment to the Convention on Biological Diversity signed in 1992. It is comprised of two types of Action Plans developed to set priorities for nationally and locally important habitats and wildlife:

Habitat Action Plans

- Broad Habitat Statements - summary descriptions of 28 natural, semi-natural and urban habitats and the current issues affecting the habitat and broad policies to address them; and

- UK BAP Priority Habitat Action Plans - detailed descriptions for 45 habitats falling within the Broad Habitat classification and detailed actions and targets for conserving these habitats.

Species Action Plans

- Produced for UK BAP Priority Species: information on the threats facing 382 species and action plan targets to achieve a positive conservation status;
- Grouped Species Action Plans - common policies, actions and targets for similar species, for example for Eyebrights, or Commercial Marine Fish. There are nine grouped action plans;
- Species Statements - overview of the status of species and broad policies developed to conserve them for two groups of species.

Several bat species are UK BAP priority species with action plans. Soprano Pipistrelles are a UK Biodiversity Action Plan priority species but Common Pipistrelle bats have now been removed from the list (2007). Daubenton's bat is a species of UK conservation concern.

Local Biodiversity Action Plans

Each Local Biodiversity Action Plan (LBAP) partnership, usually but not always at the local authority level identifies and establishes actions to conserve local priorities and also link this action to the delivery of national Species and Habitat Action Plan targets wherever possible. Grouped action plans at this level include bats, and Waders, for example.

Soprano and Common Pipistrelle bats are included in a group species action plan for bats in the Falkirk LBAP. Other priority species in the LBAP include Song Thrush and Bullfinch. Species of conservation concern include: Hedgehog, Badger, other bat species, Roe Deer, Buzzard, Tawny Owl, Great Spotted Woodpecker, Dunnock, Coal Tit, Great Tit, and Blue Tit. Bluebell is also a local species of conservation concern because the Scottish resource is part of an internationally important population of the species (the UK has more than 25% of the global resource).

Broadleaved, mixed and yew woods are an LBAP broad habitat.

3.2. Notable Habitats and Plants

Notable habitats in the UK are protected by statutory designation as Special Areas of Conservation if their value is recognised internationally, Sites of Special Scientific Interest (SSSI) if have a national value, or as Local Nature Reserves (LNR) if valued within a local authority area. The Wildlife and Countryside Act 1981 transposes European legislation conferring protection on such habitats: Sections 28 to 33 of Part 2 of the Wildlife and Countryside Act detail the law regarding SSSIs. Sections 34 to 53 deal with other protected areas within Great Britain.

Several plant species are classed as European Protected Species and are listed in Annex IV of the EC Habitats Directive, and in the UK on Schedule IV of the Conservation (Natural Habitats &c.) Regulations 1994 (The Habitats Regulations).

In addition, there are a number of species protected by the Wildlife & Countryside Act 1981, which makes it an offence (subject to exceptions) to pick, uproot, trade in, or possess (for the purposes of trade) any wild plant listed in Schedule 8, and prohibits the unauthorised intentional uprooting of such plants. It also contains measures for preventing the establishment of non-native species which may be detrimental to native wildlife, prohibiting the release of animals and planting of plants listed in Schedule 9. It also provides a mechanism making any of the above offences legal through the granting of licences by the appropriate authorities.

The most problematic invasive, non-native plants were listed on Schedule 9 of the Wildlife & Countryside Act 1981. Under section 14(2) of the Act it was an offence to plant or otherwise cause to grow any species of plant listed on Schedule 9. Due to identification of a whole host of additional

problematic invasive species a draft list of species for addition to the Schedule was prepared in 2007 and consulted on.

Invasive species presence across ownership boundaries raised issues with liability at many sites where any scheduled invasive plant species have knowingly been allowed to spread onto neighbouring properties as it was illegal to allow them to spread thus. The relatively recent Wildlife & Natural Environment (Scotland) Act (2011) significantly amended the Wildlife and Countryside Act in Scotland, and has removed ambiguity on liability by simplifying the issue of invasive non-native species in the wild and avoided the need for addition to a revised list by simply making it an offence to plant or cause any non-native plant species to grow in the wild. This change in policy has brought Scotland to the forefront of invasive species and control by demonstrating a high recognition of the issues invasive plant species are causing including high costs for control and eradication.

Some invasive species are more onerous to deal with than others, for example, Japanese Knotweed may take three or more years to eradicate, and any waste containing Japanese Knotweed is classed as controlled waste, and cannot be used for exemptions under Waste Management Licensing. For off-site disposal it must be buried in a licensed landfill site at a depth of at least 5m. Section 34 of the Environmental Protection Act 1990 places a duty of care on all waste producers to ensure that any wastes are disposed of safely and that a written description of the wastes, and any specific harmful properties, is provided to the site operator. Failure to appropriately dispose of any material containing Japanese Knotweed or several other invasive species may lead to prosecution under Sections 33 and 34 of the Environmental Protection Act 1990 and Section 14 of the WCA 1981. The Nature Conservation (Scotland) Act 2004 increased the penalties available to someone committing a Section 14 offence. Penalties on summary conviction were increased to include imprisonment for up to six months and/or a fine not exceeding £40,000. On conviction on indictment, the penalties are an unlimited fine (i.e. whatever the court feels to be commensurate with the offence) and/or a 2 year prison sentence.

3.3. European Protected Species: The Conservation (Natural Habitats &c.) Regulations 1994 (The Habitats Regulations)

Full consideration of European Protected Species (EPS) must be given as part of the planning application process, not as an issue to be dealt with at a later stage.

Several plant species are classed as European Protected Species and are listed in Annex IV of the EC Habitats Directive, and in the UK on Schedule IV of the Conservation (Natural Habitats &c.) Regulations 1994 (The Habitats Regulations). Full consideration of European Protected Species (EPS) must be given as part of the planning application process, not as an issue to be dealt with at a later stage. The European Protected Species of potential relevance to this survey area were the following nine species of plant:

Creeping Marshwort	<i>Apium repens</i>
Early Gentian	<i>Gentianella anglica</i>
Fen Orchid	<i>Liparis loeselii</i>
Floating-leaved water Plantain	<i>Luronium natans</i>
Lilarney Fern	<i>Trichomanes speciosum</i>
Lady's Slipper	<i>Cypripedium calceolus</i>
Slender Naiad	<i>Najas flexilis</i>
Shore Dock	<i>Rumex rupestris</i>
Yellow Marsh Saxifrage	<i>Saxifraga hirculus</i>

The European Protected Species of animal of potential relevance to this survey area were bat species found in the Central Belt of Scotland.

European Protected Species are protected in Annex IVa in the EC Habitats and Species Directive, which is transposed into UK legislation by the Conservation (Natural Habitats &c.) Regulations 1994 (Schedule II of The Habitats Regulations). The full details of this legislation can be viewed at:

http://www.opsi.gov.uk/SI/si1994/Uksi_19942716_en_4.htm

This legislation was amended on the 14th February 2007 (The Conservation (Natural Habitats &c.) Amendment (Scotland) Regulations 2007.), and explanatory guidance on this was published by the Scottish Government in April 2007. The amendment removed all EPS from Schedule 5 of the Wildlife & Countryside Act 1981. There are therefore now no defences in the WCA 1981 whatsoever for any actions impacting on EPS, and protection is afforded by the following legislation only:

Under Regulation 39 of the Conservation (Natural Habitats &c.) Regulations 1994 (The Habitats Regulations) it is now a criminal offence (subject to specific exceptions) to:

- (a) deliberately or recklessly to capture, injure or kill a wild animal of a European protected species; (only defences are mercy killing, capture for tending a disabled animal or circumstances where the animal is captive bred and lawfully held).
- (b) deliberately or recklessly-
 - (i) to harass a wild animal or group of wild animals of a European protected species;
 - (ii) to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;
 - (iii) to disturb such an animal while it is rearing or otherwise caring for its young;
 - (iv) to obstruct access to a breeding site or resting place of such an animal, or otherwise to deny the animal use of the breeding site or resting place;
 - (v) to disturb such an animal in a manner that is, or in circumstances which are, likely to significantly affect the local distribution or abundance of the species to which it belongs; or
 - (vi) to disturb such an animal in a manner that is, or in circumstances which are, likely to impair its ability to survive, breed or reproduce, or rear or otherwise care for its young;
- (c) deliberately or recklessly to take or destroy the eggs of such an animal; or
- (d) to damage or destroy a breeding site or resting place of such an animal.

It should be noted that only the offence of damaging or destroying a breeding site or resting place of an EPS is a strict liability offence. The remaining offences are offences only where they are carried out "deliberately" or "recklessly".

In Scotland licenses may be granted by Scottish Natural Heritage (SNH) to permit certain activities that would otherwise be illegal due to their potential impact on EPS or their places of shelter/breeding, whether or not they are present in these refuges. This includes for developmental work. Under Regulation 44 of The Habitats Regulations, the provisions in Regulation 39 (protection of animals) do not apply to anything done for any of the purposes defined in Regulation 44 provided that any action is carried out "under and in accordance with the terms of a licence granted by the appropriate authority".

Three tests must be satisfied before a development licence for disturbance of an EPS or damage to a site/destruction of a site used by EPS will be granted. Note: A license application will fail unless all three tests are satisfied.

- Test 1 - the licence application must demonstrably relate to one of the purposes specified in Regulation 44(2). This regulation states that licences may be granted by SNH where the activities

to be carried out under any proposed licence are for the purpose of “preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment”;

- Test 2 - Regulation 44(3)(a) states that a licence may not be granted unless Scottish Natural Heritage is satisfied “that there is no satisfactory alternative”; and
- Test 3 - Regulation 44(3) (b) states that a licence cannot be granted unless Scottish Natural Heritage is satisfied “that the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range”.

Note: Breach of Licensing Conditions

A new regulation 46A came into force on 15th May 2007. This now makes it an offence to breach any conditions attached to a licence. Licence conditions should therefore be adhered to at all times.

3.4. Additional Legal Protection

- Additional protection is afforded through the Bern Convention (1979), enacted in Scotland through the Nature Conservation Act (Scotland) 2004;
- Appendix III, the Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 1980), Appendix 2; and
- The Bonn Convention’s Agreement on the Conservation of Bats in Europe (London, 1991).

It is also a legal obligation in Scotland to consult with SNH before you do anything that might affect bats or their roosts such as:

- Removal of hollow, old, or decaying trees;
- Blocking, filling, or installing grilles over old mines or caves; and
- Building, alteration, maintenance, or re-roofing

In all cases where bats are found to occupy trees or buildings and there is a developmental issue, SNH must be informed before any development takes place. A licence to permit development may then be obtained from SNH if appropriate.

3.5. Badger

In the UK, Badgers are protected under the Protection of Badgers Act 1992 (c.51), which repeals the previous Badgers Acts of 1973 and 1991, and certain sections of other relevant acts such as The Wildlife and Countryside Act 1981, The Environmental Protection Act 1990, The Animals (Scientific Procedures) Act 1986, The Natural Heritage (Scotland) Act 1991, and The Criminal Justice Act 1991. The Protection of Badgers Act 1992 was further amended and strengthened through the Nature Conservation Act (Scotland) 2004.

The 1992 Act makes it an offence to:

- Wilfully kill, injure, catch, or take a Badger from the wild (or attempt to);
- Cruelly ill-treat a Badger, digging for Badgers, using Badger tongs, using a firearm other than permitted (under the exceptions regarding humane dispatch of an injured animal) within the Act;
- Damage, destroy or obstruct access to any part of a Badger sett (whether occupied or unoccupied);
- Disturb a Badger while it is occupying a sett, either by intent or by negligence;

- Dig a Badger sett;
- Cause a dog to enter a Badger sett;
- Sell or offer for sale a live Badger, have possession or control of a live Badger. Be in possession of a live or dead Badger or any part of one; and
- Mark a Badger or attach any ring, tag, or other marking device to a Badger.

Note: A Badger sett is defined within the Act as “any structure or place which displays signs indicating current use by a Badger” where current use means “any sett within an occupied Badger territory regardless of when it may have last been used”.

It is also a legal obligation to obtain a licence from Scottish Natural Heritage before you do anything that might affect Badgers or their setts, for example for:

- Development purposes [as defined under the Town & Country Planning (Scotland) Act 1997]; and
- Alteration or maintenance of existing buildings where Badgers are found.

It is also a legal obligation in Scotland to consult with SNH before you do anything that might impact Badger setts, whether currently occupied or not.

Despite the above legislative protection, Badgers are not a UK Biodiversity priority species for conservation and are only considered of UK conservation concern.

3.6. Legal Protection for Breeding Birds

All breeding birds have basic statutory protection under the Wildlife & Countryside Act 1981. In addition, a number of species that are rare or uncommon are afforded enhanced statutory protection during the breeding season by inclusion on Schedule One of the Wildlife & Countryside Act 1981, which protects adults in places of rest, their eggs, and young.

- All breeding birds in the UK are protected through Sections 1-8 (referring to Schedules 1 to 4) of the Wildlife & Countryside Act [WCA] (enacting the Bern Convention and the Birds Directive), and subsequent amendments through the Nature Conservation (Scotland) Act 2004. With certain exceptions, all wild birds, their eggs and dependent young are protected from intentional killing, injuring and taking; they cannot be in anyone’s possession, whether live or dead, and nests (whilst being built or in use) cannot intentionally be taken, damaged or destroyed. A general licence permits control of some species with landowner consent.
- Schedule 1 of the WCA is a list of nationally rare breeding birds for which all offences carry special (higher) penalties. The legislation also makes it an additional offence to intentionally or recklessly disturb adults or the dependent young of these species, at any stage of their breeding.
- Schedule 2 is a list of traditionally hunted birds for which protection does not apply outside a “close season”.
- European legislation provides additional legal protection as European Protected Species for a number of species of high conservation concern.

‘The Population Status of Birds in the UK’ was originally produced in 2002, and listed the UK status of 247 species of bird. Of these 40 were “red-listed” and 121 “Amber-listed” as species of conservation concern, and 86 species “Green-listed”. This listing did not provide additional legal protection for these species but highlighted those of concern for nature conservation purposes. The lists have been

updated several times and were updated a fourth time in 2015 (Eaton et al. 2015), resulting in re-designation of the UK status of 247 species of bird: 67 are now “red-listed” and 96 “Amber-listed” as species of conservation concern, while only 81 species are “Green-listed”.

4. Desk Study

A desk-based review of sites designated for their nature conservation interest was completed in March 2016.

4.1. Sites with Statutory Designation

Interrogation of the Scottish Natural Heritage SiteLink V3 database determined that the study area contained no sites with a statutory nature conservation designation, and was not within 1km of any such site.

4.2. Sites with Non-statutory Designation

The Local Authority aims to protect locally important natural heritage sites from damaging developments through designation as Sites of Importance for Nature Conservation (SINCS). The LBAP has produced a document entitled “The Biodiversity of Falkirk – An assessment of priority habitats and species” this contains a list of the SINC sites in the Local Authority area. The Application Site is not within any SINC. One SINC site lies within 1km north of the site: Dales Wood (NS 818 851), designated for its broad-leaved woodland.

4.3. Protected Species

The NBN Gateway and the Central Scotland Wildlife Information Centre (CSWIC) were consulted for records of protected species on site and in the wider area.

There were no records of protected species within the Application Site. Thirteen records of bats were noted all from within the urban centres of Dunipace and Denny. A single record of Otter on the River Carron in Denny (pre-2000) was also noted.

5. Bats in Scotland

5.1. Background Information

Five species of bat are relatively widespread in Central Scotland:

- Common Pipistrelle Bat (*Pipistrellus pipistrellus*) 45 kHz;
- Soprano Pipistrelle Bat (*Pipistrellus pygmaeus*) 55 kHz;
- Daubenton’s Bat (*Myotis daubentonii*);
- Brown Long-eared Bat (*Plecotus auritus*);
- Natterer’s Bat (*Myotis nattereri*); and

Another four also occur in Central Scotland but tend to have restricted distributions, or less is known about their distribution:

- Noctule Bat (*Nyctalus noctula*) (more of a southern Scottish distribution but recorded in West Lothian and East Dunbartonshire);
- Nathusius’s Pipistrelle Bat (*Pipistrellus nathusii*) 38 kHz –(Stirlingshire);
- Whiskered Bat (*Myotis mystacinus*) – within the Lanarkshire area; and

- Leislers Bat (*Nyctalus leisleri*) (more of a southern Scottish distribution but known southwest of Glasgow).

5.2. Bat Roost Types

Nine main types of roost have been identified (Collins 2016). These are:

- Day roosts (March – November but more-so in the summer): used for resting during the day, and may be occupied daily by solitary or small numbers of males, or may be used infrequently as part of a chain of roost sites alternated daily but are rarely occupied at night. Whole colonies of some species such the Leisler's bat will change roost during the day including taking young with them;
- Night roosts (March – November): a place where bats rest or shelter during the night but are rarely present during the day. Can be used by solitary bats or entire colonies, and are often indicated by large accumulations of insect remains and some droppings;
- Feeding roosts (May – November): a place where individual bats or small groups may rest or feed during the night between bouts of foraging, in times when weather changes, or just for a temporary rest. May be used by solitary bats to whole colonies but are rarely used during the day;
- Transitional/occasional roosts (spring or autumn generally but may be used April-October): Some roosts may be transitional, when small numbers are present for a limited period, usually during the spring and autumn.
- Swarming sites (August – November) tend to be around caves and mines and may be used for hibernation as well as being important for mating, with large numbers of male and female bats gathering from late summer to autumn.
- Mating roosts (September – October): where mating takes place from late summer and may continue through the winter;
- Maternity roosts (May - August): the most obvious roost type. These consist almost exclusively of females, most of which give birth and raise a single young but sometimes may include males in some species of bats. These colonies usually disperse by the autumn, although some species may remain in one roost all year round;
- Hibernation roosts (October – March); roost sizes may vary from individual to groups but must have a high humidity and constant cool temperature above freezing but generally less than 4°C; and
- Satellite roosts (May – August): alternative roosts near to maternity roosts used by a few breeding females or small groups of females throughout the breeding season.

In Scotland, most species of bats roost by concealing themselves in crevices and are not easy to find. The presence of droppings is a key sign to their presence but numbers of droppings vary widely and even some large roosts have little evidence of droppings to indicate their presence. Hibernating bats however leave little or no trace of their presence. Other possible signs are a characteristic odour like ammonia. In addition, a clean or polished area at a place through which light can enter may suggest an entrance/exit hole.

5.3. Bats and Trees

Trees may provide safe dry places for bats to roost, although some bats prefer to roost in buildings when suitable buildings are present. Some bats remain roost faithful for prolonged periods, while others may have several alternate roost sites, and others may range much further using roosts several kilometres apart as weather conditions, food availability, and seasons change. Potential roost sites in trees may include:

- Crevices in bark;
- Gaps under loose bark on dead branches or trunks;
- Rotted knot holes;
- Hollow trunks;
- Cracks, splits etc. in stems and branches;
- Rotted-out branches;
- Growth deformities, compression forks, cankers;
- Gaps between overlapping branches;
- Dense ivy coverage;
- Woodpecker and Squirrel holes;
- Bird nesting boxes/bat boxes already present; and
- Crow, Magpie, and Buzzard nests.

6. Survey Methods

6.1. Notable Plants, Habitats & Scheduled Invasive Plants

A Phase I Habitat walkover survey following the standard methodology and definitions used to map and describe habitats within the study area as per the Joint Nature Conservancy Committee guidelines (JNCC, 2010) was completed for the Site. Key locations of botanical interest were identified and target notes recorded where appropriate.

The objectives of this Phase I survey were to:

- i. Provide a baseline assessment of habitat distribution and extent within the boundaries of the area;
- ii. Provide a preliminary evaluation of the ecological value of the habitats;
- iii. Record any notable species; and
- iv. Record any non-native plants listed on Section 14(2) of Schedule 9 of the Wildlife & Countryside Act 1981.

6.2. Preliminary Ground Level Assessment of Trees for Roost Potential

All methodology followed Bat Conservation Trust Bat Surveys: Good Practice Guidelines (Collins 2016). Note on the Bat Survey Guidelines from Bat Conservation Trust (January 2016):

“Professional judgement and surveyor experience: The guidelines are not a prescription for professional bat work. They do not aim to override professional judgement and cannot be used to replace experience. Deviations from the methods described are acceptable providing the ecological rationale is clear and the ecologist is suitably qualified and experienced. In some cases it may be necessary to support such decisions with evidence, particularly if they may lead to legal challenge.”

The aim of this survey was to determine if any tree had potential value for use by roosting bats or evidence of any actual bat presence by a detailed inspection of the exterior of the tree from ground level. The survey looked for features that bats could use for roosting (PRFs) and categorised the trees according to their individual potential value for use by roosting bats (Table 6.2. below). Mature trees within the site were checked for PRFs such as crevices, holes, splits, tears, and ivy that could be used by bats to enter roosting sites such as those listed above, along with field signs of bat occupancy such as urine streaking, grease marks, smooth or worn surfaces, or droppings caught on bark or on webs. Where appropriate, inspections were made using binoculars.

Trees with no bat roost potential were not recorded individually.

Table 6.2. Tree suitability assessed according to the Categories listed in the BCT Guidelines (Collins 2016)

Suitability	Description of Roosting Habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions and / or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat.	Continuous, high-quality habitat that is well-connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, treelined watercourses and grazed parkland. Site is close to and connected to known roosts.

6.3. Badgers

Field survey methodology followed Harris et al. (1989). Badgers leave many different signs of their occurrence, so are relatively easy to detect, these include:

- Badger setts may be large networks of connected tunnels and chambers with several entrances that are usually shaped like a flattened arch and 20-30cm high and 25-35cm across, or have a single entrance to either a small burrow or large network of tunnels. Bones in and around the entrance, usually indicate Fox activity (rank fox smell may be noticeable). Fox earths have smaller entrances, but foxes may occupy Badger setts even when Badgers are in residence;
- Scraps of fresh bedding that have been dragged in (often grassy material) may be found around the sett entrance. There may also be scraps of old bedding that has been dragged out;
- Day nests are piles of bedding above ground that are used by Badgers occasionally;
- Badgers are clean animals and create spoil heaps outside the main sett, which may contain old bedding, bits of fur, and perhaps small bones. They also use latrines, and will have one or more that are used until the hole is full, and then they start another;
- Badger droppings are very varied depending on the diet (black and slimy means a diet rich in worms, but cereal grains, seeds, and hard parts of insects may be seen). The smell and texture are very distinctive; as is the usual deposition in small oblong latrines either by the sett or at strategic locations on the territory boundary (different individuals have different home ranges within the clan territory). Occasionally droppings are not deposited in latrines but left lying on the ground;
- Clear footprints will show a prominent central pad, either four or five toes and claw marks, and may be found leading to and from the sett, as well as on Badger trails. The front foot usually has longer claws than the back foot, and the prints may overlap, with the back print partially obscuring the front;
- Badger Hairs may be found caught on fences, on brambles or other thorny plants as well as in old bedding outside setts. The guard hairs are 7.5-10cm long, distinctly wiry to the touch, and are mainly white/off-white with a distinctive black band near the white tip. Shorter belly hairs may also be found but are finer and less wiry so are harder to confirm as Badger unless guard hairs or another field sign is found;
- Scratch marks on trees and rocks, fence-posts, wooden greenhouses, barns, or even garden furniture. Scratch marks often show a series of four or five parallel deep gouges, but sometimes lighter parallel lines of scratches are left where Badger claws have clipped something they have scrambled over (such as logs obstructing a Badger trail);
- Badgers have their own traditional networks of regularly used trails both through woodland and across fields that may have been used for many years, and may be worn to a clearly visible rut in the soil, with any new plant growth flattened. Prints may be evident on these trails and where boundary features or obstacles cross the route, Badger hairs may be found caught (for example, on barbed wire, low thorny branches, wooden fences, etc. Closer to the sett, these trails may be muddy through constant use;
- Ground disturbance from foraging Badgers may include round/oval snuffle holes a few cm deep when they forage for worms (50% of lowland Badger diet (especially on lawns and golf-courses). Signs of digging for roots, bulbs such as pignut, and tubers. Beetles and grubs may also be eaten, and the remains of wasp nests torn out of the ground are a sign of Badgers in an area. Badgers usually dig down through the top to avoid getting stung. Bark ripped from rotting logs or tree trunks may also be signs of foraging and grub extraction; and
- On cold, still, winter days, steam may rise from active Badger sett entrances.

The Application Site was searched for evidence of Badgers during the Phase I habitat survey. Where possible, the adjacent land within 50m of the Application Site was surveyed where in the same ownership as the Application Site but otherwise land within 50m of the Application Site boundary was viewed from within the Application Site for evidence of use by Badgers (no access permission to adjacent land).

6.4. Breeding Birds

A reduced Common Bird Census (CBC) methodology was used to record species and behaviour, with a single walkover survey completed during the extended Phase I Habitat survey in mid-March 2016 rather than the 10-12 surveys recommended by the British Trust for Ornithology, or generally accepted 3-4 surveys between March – June or April - July. Reduced CBC is commonly used for proposed development sites and for general baseline data sets, and is more appropriate for use than the recently developed Breeding Bird Survey (BBS). The locations of all birds observed or heard were mapped and a list of species present recorded. Only birds physically using the site, or close enough at boundaries (within 100m) to potentially use the site were recorded, those flying over were omitted. The survey day was selected to follow survey method guidance, with weather conditions dry, and with light wind to optimise count data (survey completed on 09/03/2016: dry, cloud 3/8, wind 1 and time 0700 – 0800). Casual sightings were also noted.

A variety of cues may be used to assess residency and breeding based on the British Trust for Ornithology Common Bird Census and Breeding Bird Survey methodologies (<http://www.bto.org/birdtrends2004/>).

Class	Category of Evidence
Possible Breeding	Species observed in breeding season in possible nesting habitat Singing males present or breeding calls heard in breeding season – The number of singing males taken to be indicative of the number of breeding pairs Collection of nest material
Probable Breeding	Pairs observed in suitable nesting habitat in breeding season Permanent territory presumed through registration of territorial behaviour (song etc.) on at least two different days, a week apart, at the same place Display and courtship Visiting probable nest site Agitated behaviour or anxiety calls from adults Building nest or excavating nest hole
Confirmed Breeding	Nest containing eggs Used nest or egg shells found (occupied or laid within the survey period) Nest with young seen or heard Adults carrying food for young or faecal sacs Distraction display/injury feigning/alarm calling by adults Downy young/recently fledged young or dependent young

6.5. Limitations

There were no significant constraints on any of the surveys as completed. The tree assessment was primarily designed to identify if any tree had potential for use by roosting bats but could detect actual roosts if evidence was present, so the possibility of finding small numbers of bat droppings was reduced but larger accumulations would still be noticeable, as would any other evidence of bats such as grease marks or wear to the entrance of any hole used by bats. The limitations of surveys of this nature dictate that failure to find evidence of bats does not guarantee that bats have not been present, and further survey work would be required to be conclusive on the presence/absence of roosting bats. This is discussed in detail in the conclusions section below.

Note: Access to adjacent land in other ownership for survey was not possible as access for the collection of biological data for commercial purposes cannot take place without access permission.

7. Results

7.1. Phase I habitats

The survey area had eight Phase I habitat types present (Figure 1.). A total of 42 species of plants were noted (Appendix 1.). Figure 1. illustrates habitats and target note locations).

- A1.1.1 Broad-leaved semi-natural woodland – open mature woodland dominated by common lime and sycamore, with a few scattered specimens of species such as English/pedunculated oak, grey poplar, and horse chestnut;
- A2.2 Scattered scrub – invading hawthorn, bramble, lime, and sycamore scrub woodland in open central area of Application Site;
- B2.2 Semi-improved neutral grassland – grassland in wayleaves is rank and species-poor;
- C1.1 Bracken – small patch along southern boundary wall;
- C3.1 Tall ruderal – brambles, nettles etc;
- J1.3 Ephemeral/short perennial – open ground with colonisation by weedy species and grasses on disturbed ground used for dumping arisings for arbor work and other site maintenance works;
- J1.4 Introduced shrub – rhododendrons along northern boundary of Application Site above existing access roadway; and
- J5. Other habitat: existing access roadway

7.2. Preliminary Ground Level Assessment of Trees for Roost Potential

No evidence of Bats was found within the area surveyed. A number of trees (26) within the woodland ownership had potential roost features of potential value for use by roosting bats (Table 7.2. below, and Figure 2.). Of these, eight trees (T6 – T9, and T12 – T15) highlighted in red in Table 7.2. below) are close enough to the proposed development footprint to require further survey in regard to the potential for bats to roost.

Bat roost potential	Tree ref. #	Tree tag#	Grid ref	Tree species	Feature	Height of feature
Low	T1	0353	NS 81828 83416	Lime	Small hole in branch	20m
Low	T2	0395	NS 81841 83398	Horse Chestnut	Loose bark	15m
Low	T3	0355	NS 81869 83381	Beech	Loose bark	3-6m
Low	T4	No tag	NS 81885 83379	Oak	One rotted branch	
Mod	T5	0392	NS 81888 83370	Oak	Main trunk shattered, rotten branch	5m
	T5				Crevice	8m
Low	T6	0383	NS 81964 83317	Beech	One knot hole in trunk	7m
Mod	T7	0376	NS 81958 83318	Horse Chestnut	One knot hole and large crevices in upper tree	10m

Bat roost potential	Tree ref. #	Tree tag#	Grid ref	Tree species	Feature	Height of feature
	T7				Lots of loose bark	
Low	T8	0375	NS 81958 83301	Grey Poplar	One knot hole in main trunk	10m
Mod	T9	0374	NS 81945 83298	Sycamore	One knot hole in main trunk	5m
Low	T10	0380	NS 81939 83321	Horse Chestnut	Lots of loose bark	
Low	T11	0379	NS 81935 83318	Sycamore	Knot hole in main trunk	15m
	T11				Knot hole in main trunk	20m
Low	T12	0388	NS 81922 83334	Sycamore	Broken branch	10m
Low	T13	0386	NS 81928 83344	Sycamore	Large knot hole in main trunk	12m
Low	T14	0389	NS 81911 83333	Horse Chestnut	Loose bark	1-7m
Med	T15	0390	NS 81908 83339	Lime	Knot hole in main trunk	7m
Mod	T16	0373	NS 81902 83303	Sycamore	Large knot hole	20m
Low	T17	No tag	NS 81874 83313	Horse Chestnut	Large knot hole in main trunk	7m
Mod	T18	No tag	NS 81856 83328	Oak	Crow nest	
	T18				Large knot hole	16m
	T18				Knot hole	10m
Low	T19	No tag	NS 81833 83365	Sycamore	Large knot hole in main trunk	16m
Low	T20	No tag	NS 81822 83386	Lime	Rotten branch at top of tree	
Low	T21	No tag	NS 81819 83392	Oak	Missing bark on branch	10m
Mod	T22	No tag	NS 81832 83404	Lime	Small knot hole in main trunk	7m
Low	T23	0938	NS 81827 83413	Oak	Multiple rotten branches	3-18m
Mod	T24	No tag	NS 81803 83448	Oak	All branches rotten, large crevices	3-15m
Mod	T25	No tag	NS 81792 83465	Sycamore	Small knot hole in main trunk	5m
Low	T26	No tag	NS 81789 83473	Horse Chestnut	Large knot hole	14m
	T26				Lots of loose bark	

It was noted at the time of survey that a number of trees present appeared in poor health with visible signs of decay/fungal pathogens and that a number of mature trees had been removed, indicating some woodland management is being undertaken.

7.3. Badgers

No evidence of Badgers was found within the area surveyed.

7.4. Breeding Birds

The 19 species detected were typical of such habitats (Table 7.4. and Figure 2.): No bird species were detected within the actual developmental footprint, and of those detected only 11 birds of six species

(Blue Tit, Dunnock, Goldfinch, Great Tit, Robin, and Wren) were actually exhibiting any breeding behaviour, while Redwing is a migratory species that does not breed here.

Table 7.4 Bird species detected

BTO Species Code	Common name	UK Status	BTO Species Code	Common name	UK Status	BTO Species Code	Common name	UK Status
B.	Blackbird	G	GS	Great Spotted Woodpecker	G	RE	Redwing	R
BT	Blue Tit	G	GT	Great Tit	G	R.	Robin	G
BF	Bullfinch	A	J.	Jay	G	TO	Tawny Owl	A
BZ	Buzzard	G	LT	Long-tailed Tit	G	TC	Treecreeper	G
CH	Chaffinch	G	MG	Magpie	G	WR	Wren	G
D.	Dunnock	A	GS	Great Spotted Woodpecker	G			
GO	Goldfinch	G	M.	Mistle Thrush	R			

8. Conclusions

8.1. Phase I habitats

None of the habitats within the study area were nationally notable for their rarity, quality, or extent, and the woodland was dominated by the native lime, and a mix of non-native tree species such as sycamore and horse chestnut. The presence of common lime is of interest as this hybrid is rare in the wild, suggesting the origin of the existing woodland is not natural and so the existing woodland may have been planted on the site after clearance of native woodland such as an oak/hazel dominated woodland. However, the woodland ground flora was rich in the western end of the woodland in particular, and had species present indicative of long-term woodland coverage at this site (bluebell, wild garlic, woodrush and snowdrop), with bluebell and wild garlic forming extensive dense stands.

In summary, we consider the woodland itself to be unremarkable in the context of the wider area but the woodland ground flora appears to be largely intact and is worthy of protection and management to ensure its long-term future as it is a habitat of concern highlighted in the Local Biodiversity Action Plan. This need not conflict greatly with the proposed development within the woodland but some compromise and common sense is required to ensure that the development fits into the woodland in a way that minimises the harm to the key ecological interests.

8.2. Impacts of developmental footprint and proposed mitigation

The client has been advised that the current developmental footprint encroaches on some of the more significant areas of ground flora particularly bluebell in several locations (access road, car park, and camping pods) and the significance of the potential unmitigated impact of that on ground flora must be recognised (not all bluebells may have been visible at the time of our survey so the local authority should satisfy themselves during April that the key areas are all identified prior to any site ground preparation works). To minimise the losses of woodland ground flora as a result of development and so avoid a significant negative impact to species of local concern we have recommended that:

1. Bluebell bulbs/plants and seed are recovered from the footprints of the chalets and re-planted elsewhere in the woodland (either adjacent to existing bluebell areas or in areas where bluebells are currently sparse or absent – subject to management of those areas being appropriate for bluebells). Alternatively, the lower chalet designs should be slightly adjusted so that they are the same as the upper ones and would therefore be on taller pilings to leave 1.5m ground clearance so that any bluebells under the cabins can still get enough light to not only grow but to flower and flourish rather than the 0.5m – 1m proposed. Note: construction

should be between October and February to minimise impact on the ground flora around the development footprint but bluebells are best transplanted while in green leaf – the bulbs tend to relatively deep so care must be taken to ensure the bulbs are dug up not just the leaves. Bluebell plants should be kept moist and replanted immediately, so a progressive translocation of bluebells is preferable rather than mass dig up unless they can be planted effectively again at a similar depth to that they were dug up from. The success of any bluebell translocation programme should be monitored to ensure it has been effective and if not successful then additional plantings of stock brought in should take place to mitigate for losses.

2. The proposed access route should also be marked out and the bluebells removed from the route. There should be no tracking of construction vehicles outwith the boundary of the proposed access route, before, during, or after construction, and all chalet materials should be brought in from either the north or the west of the proposed chalet locations. If the existing access track could be utilised it would minimise issues.
3. The proposed car park should be revised and changed to a single row of car parking spaces along the southern boundary of the woodland, adjacent to Denovan Road – this would minimise incursion into either bluebell areas or into tree root protection areas, and where entering tree root protection areas the use of Geogrid should be mandatory to prevent ground compaction and root damage (see section 8.3).
4. The area of most concern is the proposed location for the camping pods as the current proposed placement may impact the best areas of bluebells and other native woodland ground flora. The camping pod areas should be microsituated so that they are not within any stand of bluebells or wild garlic, or woodrush, as the siting of them within stands of native ground flora and subsequent use would significantly damage the stands beyond an acceptable level, and would result in long-term damage, and so be a negative impact on the local biodiversity value of the woodland. It should also be recognised that bluebells produce an extremely viscous sticky sap (**not forgetting that bluebells are actually poisonous**) and trampling them is messy and brings the public into potential contact with sap of a poisonous species. Additionally, wild garlic smells very strong, and when they rot back in late summer the smell is not pleasant. We therefore consider siting camping pods on ground covered by these species as inappropriate on both an ecological and amenity basis, and have recommended that the client move these either eastwards onto open ground, or up above the east-west running existing access road, where their impact on woodland ecology would be negligible, and the public would be safeguarded from potential poisoning.
5. The potential impact of access road and car park construction on tree roots could be significant if not mitigated for. We therefore recommend that the client consults a local chartered tree surveyor and the local authority tree officer for advice on the use of alternative road and car park surfaces to those currently proposed, such as a solid Geogrid or a similar product that if used as a foundation will prevent damage to tree roots – perfect for access roadway and for car parking: Any significant changes in ground levels or compaction that would come within the drip line of retained trees would be likely to result in the damage of significant roots, and Geogrid minimises that. Shallow or minor changes in ground levels are considered to be least damaging, with ground compaction remaining a key concern.
6. We consider that the local ecological value of this woodland site be recognised by the production of a site preparation and construction environmental method statement to ensure the protection of the site ecology. This should detail the proposed access routes to construction areas, use of very-low ground pressure plant if any heavy plant is required, laydown areas, chalet heights above ground (so the commitment to raising chalets is established – if that option is followed), materials and construction of the access road and car parking areas, type of herbicide to be used to kill sycamore and horse chestnut stumps, and the re-siting and construction for the camping pods. This plan must take the tree root protection areas advised

in the tree survey report into consideration to ensure that tree roots are protected as according to BS 5837.

7. Development must provide for the protection of any trees that are retained either within the individual chalet plot or single specimens or stands of trees adjacent to each plot, bearing in mind that the tree root plate may extend twice the height of the canopy out from the tree. It is therefore essential that the guidance in the publication 'British Standard 5837: 2012. Trees in relation to design, demolition, and construction. British Standards Institution' is adhered to for tree protection.

8.3. Tree Root Protection Areas

The root protection area (RPA) of any retained tree may extend out across the ground twice the tree canopy height but is dependent on species, ground conditions, and topography. Tree root protection for any tree to be retained is of high importance to maintain the health and vigour of the tree, with unseen damage to tree roots due to lack of adequate protection measures being a key factor resulting in the gradual deterioration of tree health and subsequent loss. BS5837: 2012 recommends the establishment of tree protection zones prior to site preparation and construction.

Most active tree roots that a tree uses to draw nutrients and moisture tend to be within 600mm of the ground surface and may extend beyond the tree canopy up to a distance of twice the height of the tree (major anchor roots may penetrate much deeper depending on tree species, soils, and topography but have far less spread). It is therefore important to minimise the potential for damage to the active tree root network as well as the anchor root system.

Unseen damage to root systems may weaken the tree either in its ability to draw nutrients or in its stability (can result in tree fall), or allow penetration of pathogens, resulting in the gradual demise of the tree.

Ground compaction and changes in soil levels can also have considerable impact on trees, with compaction damaging roots and potentially leading to waterlogging of soils.

As well as tree roots being a potential constraint, it is essential to consider tree canopy spread, height of branches above the ground and space required for operating plant as further constraints.

It is important to observe the appropriate RPAs prior to site development and to robustly demarcate the RPA areas so that no construction materials are stored within these areas, or ground levels changed: Prior to commencing any works, a 'Root Protection Area' should be set up around the retained tree that will have developmental works within the drip line of their canopy or within 20m of the tree as per BS 5837:2012 Para 4.6, 6.2.1 - 6.2.3.5 and Annex D (Root Protection Area). The root protection areas for each tree suitable for retention has been calculated in the Tree Report. On-site barriers (example illustrated in Tree Report) should be erected to robustly demarcate and protect these indicated RPAs for each tree to be retained. The barriers should be checked by the Local Planning Authority Tree Expert and a qualified tree consultant in advance of any works and on a regular basis during the course of the development works to ensure that the barriers have been maintained and not breached.

Where it is not practical for the development to completely avoid the RPA of any given retained tree a high consideration should be given to tree-friendly engineering solutions to protect the tree roots as far as is reasonably possible.

It is critical to avoid soil compaction within the RPA of any retained tree by robust protection to avoid any developmental impact from activities such as vehicle tracking, storage of materials within the drip-line, physical damage to trees such as branches torn off, broken, or bark damaged by heavy plant, changes to drainage, or changes in soil levels.

NJUC 'Guidelines for the Planning, Installation, and Maintenance of Utility Apparatus in Proximity to Trees' should be consulted by the developer. The default specification should consist of a vertical and horizontal scaffold framework, well braced to resist impacts. A variation to the default specification may be installed with prior agreement of the Planning Department, with alternative ground/surface fixings.

BS5837:2012 Section 4.6 and 'Annex D' sets out advice on determining the 'Root Protection Area' RPA.

Where access space is limited or works must be done within the RPA of any retained tree then ground compaction may be avoided through the use of temporary ground mat protection to minimise the potential for soil compaction.

8.4. Best Practice Measures to Protect Trees

In addition, the following best practice is advised:

1. No storage of mounds of soil within the drip line of any tree during site preparation and excavation of foundations.
2. Ground levels shall not be uplifted above existing ground levels of retained trees within the drip line of their canopies due to impact on root systems.
3. The works area must be clearly demarcated using Heras or similar fencing to prevent machinery from inadvertently tracking within root protection areas or within drip lines of retained trees.
4. Any trees retained where branches may obscure access or works area must be appropriately trimmed by an arbor squad and not have branches broken off by machinery. Canopy lifting is certain to be required on the first sharp corner of the existing driveway into the Clyde House property.
5. Tracking into each building footprint must be minimised and by the same route only.
6. Because trees close to the developmental footprint will be retained it is recommended that ground protection mats are used around the periphery of each developmental footprint to minimise soil compaction and damage to root systems: <http://www.grassform.co.uk/ground-protection-mats.htm>
7. Where possible, raise tree canopies rather than remove trees.
8. The completed development should have appropriate stormwater and groundwater drainage systems such that there is negligible impact on the current groundwater system of the site. It is not only essential to prevent water logging that may result in tree death but also to prevent any long-term drying out of the ground that may impact tree health in the long-term due to over efficient drainage.

8.5. Biodiversity protection and enhancement

To protect and enhance the biodiversity value of the woodland, we recommend the production of a site woodland and biodiversity management plan that should include:

- i. Gradual replacement of non-native tree species with native species of local origin with the aim of producing a native oak-dominated woodland area in the long-term, with other species such as hazel, rowan, ash, holly, and yew to be established and managed;
- ii. Canopy lifting of species such as beech and horse chestnut, which currently limit light penetration so much that areas of ground are bare, and the ultimate aim of reducing the number of both of these species of trees by preventing sapling establishment (part of woodland management and monitoring);

- iii. Protection of the bluebell and wild garlic dominated ground areas through management of public access at times of year when use could result in significant damage to emerging flowering spikes;
- iv. Enhancement of the ground flora through the addition of native species of local origin such as further stands of snowdrop, foxglove, honeysuckle, and red campion. An exemplar mix of commercially available woodland flower seed is available from Scotia Seeds (<http://www.scotiaseeds.co.uk/WoodlandMix.php>). Table 8.5. below contains the species used in this seed mix but we would recommend removal of all species in red from any establishment in this site (Scotia can make specific seed mixes up at request).

Table 8.5. Recommended woodland ground flora seed mix

Species	Common name	% by weight
<i>Ajuga reptans</i>	Bugle	0.2
<i>Allium ursinum</i>	Wild Garlic	0.2
<i>Campanula latifolia</i>	Giant Bellflower	0.5
<i>Circea lutetiana</i>	Enchanters Nightshade	0.4
<i>Digitalis purpurea</i>	Foxglove	1.5
<i>Geranium robertianum</i>	Herb Robert	0.5
<i>Geum urbanum</i>	Herb Bennet	1
<i>Hyacinthoides non-scripta</i>	Bluebell	3
<i>Hypericum pulchrum</i>	Slender St Johns Wort	0.1
<i>Luzula sylvatica</i>	Greater Woodrush	0.3
<i>Primula vulgaris</i>	Primrose	0.8
<i>Scrophularia nodosa</i>	Common Figwort	1
<i>Silene dioica</i>	Red Campion	2.5
<i>Silene flos-cuculi</i>	Ragged Robin	0.2
<i>Stachys sylvatica</i>	Hedge Woundwort	2.2
<i>Teucrium scorodinia</i>	Wood Sage	0.2
<i>Torilis japonica</i>	Upright Hedge Parsley	2.2
<i>Vicia sepium</i>	Bush vetch	2.7
<i>Viola riviniana</i>	Common Dog Violet	0.5
<i>Agrostis capillaris</i>	Common Bent (c)	10
<i>Cynosurus cristatus</i>	Crested Dog's Tail (c)	10
<i>Festuca rubra ssp commutata</i>	Chewings Fescue (c)	20
<i>Poa nemoralis</i>	Wood Meadow Grass (c)	20
<i>Poa pratensis</i>	Smooth-stalked Meadow Grass (c)	20

We would also recommend the addition of snowdrop, skullcap, and more bluebells to this mix.

- v. We also recommend the establishment of native woodland ground flora by planting of a number of plant plugs – Scotia Seeds can advise. Note: It is an offence, without a licence, to plant or cause to grow in the wild any plant listed on Schedule 9 of the Wildlife and Countryside Act.
- vi. Establishment of berry-bearing species along the woodland edges (food resources for insects, small mammals, and birds) such as elder, hawthorn, rowan, alder, guelder rose, dog rose, and holly;
- vii. Woodland management will also result in an increase in canopy cover in the currently exposed central grass and bramble dominated area, where grasses are out-competing the woodland ground flora species (still present but suppressed). Matted grasses will be raked out, bramble cut back, non-native saplings removed, and replacement native trees established;
- viii. At least 15 bat boxes will be erected in the western end of the woodland to provide high quality multi-season roosting habitat that is well away from the Denovan Village footprint;
- ix. Any cleared timber will be used to make habitat piles for invertebrates, small mammals and ground nesting birds such as Robin and Wren;
- x. Fifteen bird boxes will be erected to provide nesting sites for cavity nesting species such as titmice. No bird boxes will be erected for Tawny Owls but if the owner is willing there is potential to erect one or two boxes for Barn Owl along the woodland edges.

Note the client has already committed to some conservation of the bluebell and snowdrop resource on site by the careful translocation of existing bulbs from within the developmental footprint to areas of the woodland where the species are currently scarce.

8.6. Bats

Roosting bats are a potential ecological constraint for the development due to trees suitable for use by roosting bats being within 30m of the development footprint. This is not seen as a significant potential constraint: While bats may roost within the woodland area, most potential roost features are either in the western end of the wood or along its southern margin adjacent to Denovan Road. We therefore consider that bats are highly unlikely to be a major constraint if at all. To ensure a high due regard for the potential presence of roosting bats we recommend that the eleven trees identified earlier in the report as being suitable for bats and within 30m of the development are all surveyed by a licensed bat worker who will climb the trees and check for evidence of use by roosting bats. If any signs of bats were to be found this would then trigger the need for a series of three dusk/pre-dawn bat activity surveys to count bats and identify species. A licence would then be required from SNH to legally disturb roosting bats by the developmental works, and may result in some restrictions imposed on lighting regimes (use of hooded lighting and lighting directed away from roosts). None of this is viewed as insurmountable issues that would prevent development, and this type of investigation is considered routine.

As several of the mature trees identified as having prf are earmarked for removal in the Tree Survey and are absent on the final site plans it is necessary that any mature tree with potential roost features (prf) that is being considered for felling should only be felled with a bat worker on site to supervise works, and any sections with prfs should be cut out of trees and lowered to the ground in a controlled manner where they will be checked by the bat worker to ensure no bats are present. Such soft felling practices are best practice measures for tree works where bats may be a potential consideration.

8.7. *Badgers*

Badgers are not an ecological constraint within the survey area.

8.8. *Breeding Birds*

The Application Site has a typical woodland guild of breeding bird species, although perhaps lower in variety and numbers than may be expected due to the sparse nature of the ground and shrub layers, coupled with the small area of the woodland. To maintain a high due regard for the potential for breeding birds we recommend that any site preparation works such as vegetation removal or soil stripping is done between late July and mid-March to avoid the bird breeding season. If this is not an option, we recommend that an ecologist check the works area for evidence of breeding birds to determine if works may commence between mid-March and late July. Any active bird nests found or dependent young are protected by national law, and works in any areas that may prevent adult birds from access to nests or dependent young would have to be delayed until the breeding cycle was complete. Given the species present that would only delay works for a matter of a few weeks.

Note: there should be no felling of mature trees with cavities or crevices suitable for use by breeding birds between mid-April and mid-July (bird nesting season).

8.9. *Summary*

Should the developer and the local planning authority agree our recommendations presented in the Conclusions section of this report we would conclude that the development of the site could in fact bring nature conservation benefit and appropriate enhancement of the biodiversity of the woodland. It would also bring amenity value and potential for natural history education with use of the site and appropriate interpretation. Wise-use of the resource will be far better for the long-term future of the woodland than the agricultural option of use of the woodland for stock grazing, which would significantly damage the woodland ground flora and prevent regeneration.

9. *References/relevant reading*

- Bang, P. & Dahlstrøm, P. 2001. *Animal Tracks and Signs*. Oxford University Press, Oxford
- Collins, J. (ed.) 2016. *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn.) The Bat Conservation Trust, London. ISBN-13: 978-1-8727459-96-1
- Eaton, M.A., Aebischer, N.J., Brown, A.F., Hearn, R.D., Lock, .L., Musgrove, A.J., Noble, D.G., Stroud, D.A., and Gregory, R.D., 2015. *Birds of Conservation Concern 4: the population status of birds in the United Kingdom, Channel Islands and Isle of Man*. *British Birds* 108, 708–746.
- Fitter, R., Fitter, A., & Farrer, A. 1987. *Collins guide to the grasses, sedges, rushes and ferns of Britain and Northern Europe*. Collins. (publ.).
- Harris, S., Cresswell, P. and Jefferies, D. 1989. *Surveying Badgers*. The Mammal Society, Occasional Publication No.9. Published by the Mammal Society.
- JNCC, 2010, *Handbook for Phase 1 habitat survey - a technique for environmental audit*, ISBN 0 86139 636 7
- Rose. F. 1981. *The wild flower key*. Warne, London.
- Scottish Natural Heritage. 2004. *Badgers and Development*. Environment & Heritage Service Publishing Unit
- Stace, C. 1997. *New flora of the British Isles*. 2nd ed. Cambridge University Press, Cambridge.

Figure 1. Phase I habitats and target note locations

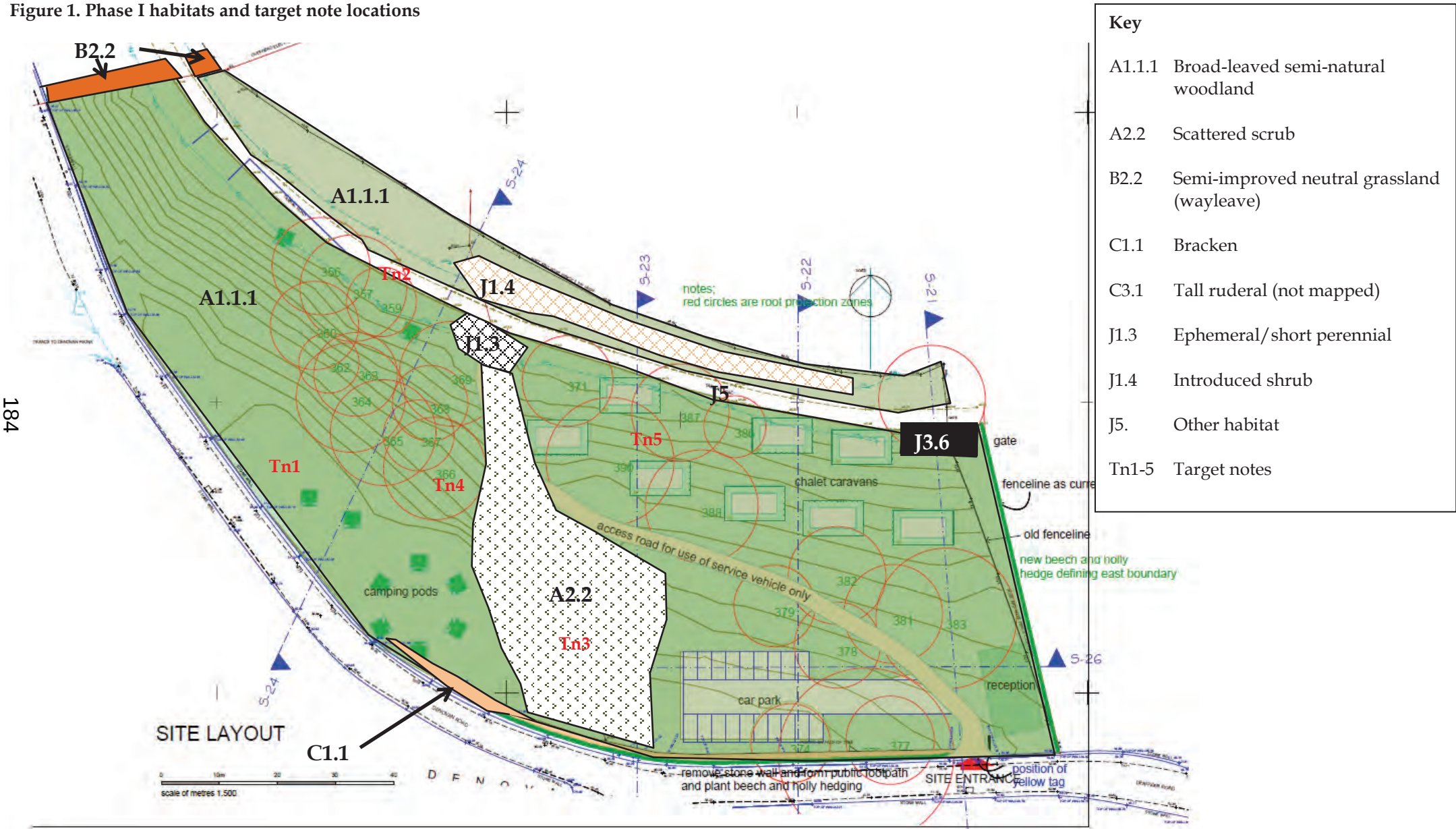


Figure 2a. Locations of trees with bat roost potential and locations of birds exhibiting breeding behaviour

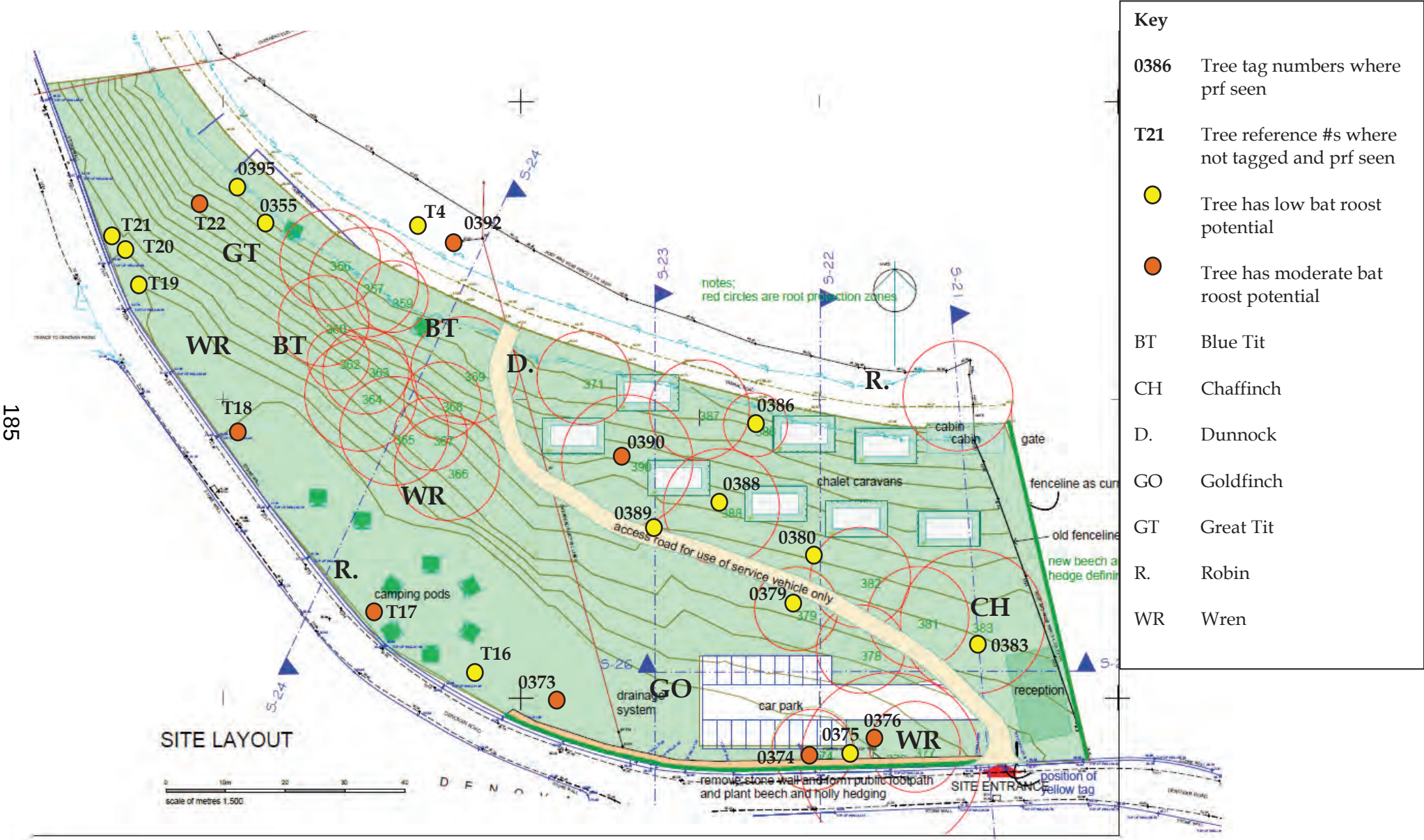
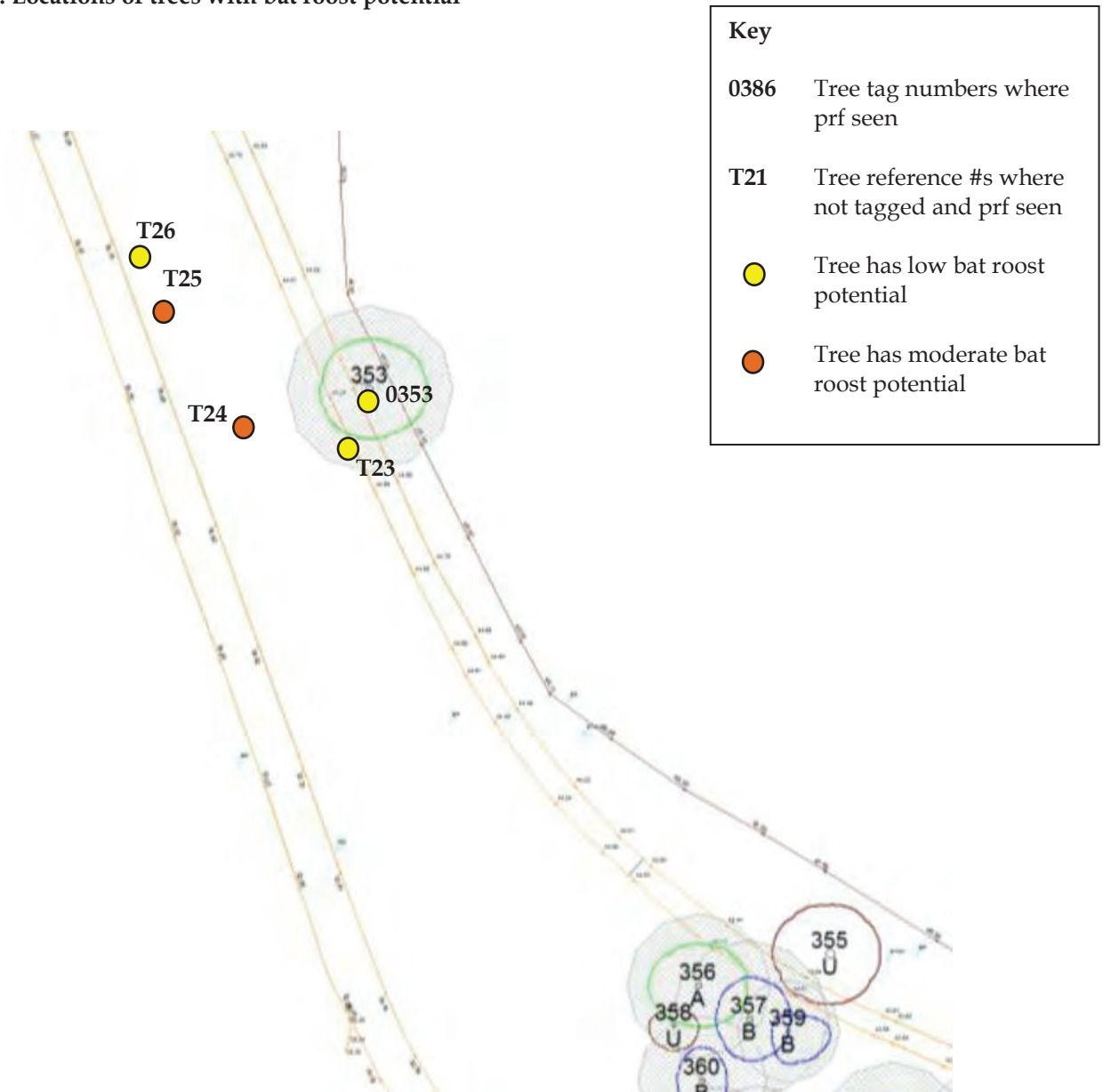


Figure 2b. Locations of trees with bat roost potential



Appendix 1. Plant species list

	Grid reference	Woodland in general	NS 81866 83330	NS 81881 83366	NS 81923 83328	NS 81900 83342	NS 81933 83348
Common name	Scientific name	Trees	Tn1	Tn2	Tn3	Tn4	Tn5
Beech	<i>Fagus sylvatica</i>	1					
Bluebell	<i>Hyacinthoides non-scripta</i>		1		1	1	
Bracken	<i>Pteridium aquilinum</i>		1				
Bramble	<i>Rubus fruticosus</i> agg.					1	1
Broad-leaved Dock	<i>Rumex obtusifolius</i>				1		
Broom	<i>Cytisus scoparius</i>						1
Canary-grass	<i>Phalaris canariensis</i>						1
Cleavers	<i>Galium aparine</i>					1	
Cock's-foot	<i>Dactylis glomerata</i>						1
Common Male Fern	<i>Dryopteris filix-mas</i>				1	1	
Common Nettle	<i>Urtica dioica</i>					1	1
Common Sorrel	<i>Rumex acetosa</i>					1	1
Creeping Bent	<i>Agrostis stolonifera</i>					1	
Creeping Buttercup	<i>Ranunculus repens</i>						1
Daffodil	<i>Narcissus pseudonarcissus</i> ssp. <i>pseudonarcissus</i>			1			
Dog's Mercury	<i>Mercurialis perennis</i>		1				
Elder	<i>Sambucus nigra</i>						1
Figwort	<i>Scrophularia nodosa</i>					1	
Foxglove	<i>Digitalis purpurea</i>					1	1
Great Wood-rush	<i>Luzula sylvatica</i>					1	
Grey Poplar	<i>Populus x canescens</i>	1					
Hawthorn	<i>Crataegus monogyna</i>					1	
Herb-robert	<i>Geranium robertianum</i>						1
Holly	<i>Ilex aquifolium</i>						1
Horse Chestnut	<i>Aesculus hippocastanum</i>	1					
Common Lime	<i>Tilia x europaea</i>	1					
Male Fern	<i>Dryopteris filix-mas</i> agg.						1
Pedunculate Oak	<i>Quercus robur</i>	1					
Raspberry	<i>Rubus idaeus</i>					1	1
Red Campion	<i>Silene dioica</i>					1	
Rhododendron	<i>Rhododendron ponticum</i>						1
Selfheal	<i>Prunella vulgaris</i>						1
Silver Birch	<i>Betula pendula</i>						1
Small-leaved Lime	<i>Tilia cordata</i>					1	1
Smooth Sow-thistle	<i>Sonchus oleraceus</i>				1		
Snowdrop	<i>Galanthus nivalis</i>						1
Spear Thistle	<i>Cirsium vulgare</i>					1	
Sycamore	<i>Acer pseudoplatanus</i>	1					

	Grid reference	Woodland in general	NS 81866 83330	NS 81881 83366	NS 81923 83328	NS 81900 83342	NS 81933 83348
Common name	Scientific name	Trees	Tn1	Tn2	Tn3	Tn4	Tn5
Tufted Hair-grass	<i>Deschampsia cespitosa</i>					1	1
Wild Garlic	<i>Allium ursinum</i>		1				
Wych Elm	<i>Ulmus glabra</i>					1	
Yorkshire-fog	<i>Holcus lanatus</i>					1	1
	Total # species	6	4	1	4	18	20

Appendix 2. Plates

Plate 1. View westwards from east side of site towards open rough grass central area



Plate 2. View eastwards of southeast corner of site showing scrub area in foreground and mature woodland to rear where car park and reception are proposed

