



**BOTANICAL SURVEY AND BIODIVERSITY ENHANCEMENTS AND ECOLOGICAL  
MITIGATION PLAN FOR LAND AT:**

THE RIDGWAY, CUFFLEY, HERTFORDSHIRE

For: Mr. P. Bowler

Issued by: **Wychwood Environmental Ltd**

[www.wychwoodenvironmental.com](http://www.wychwoodenvironmental.com)

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**Report completed by:** Dr. Ryan Walker MCIEEM, CEnv

**Verified by:** Dr. Craig Turner MSc FRGS FLS MCIEEM



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**Contacts:** Dr. Craig Turner - E: [craig@wychwoodenvironmental.com](mailto:craig@wychwoodenvironmental.com)  
T: 07760234934, W: [www.wychwoodenvironmental.com](http://www.wychwoodenvironmental.com)

## 1.0 Introduction

1.1 Wychwood Environmental Ltd was commissioned by Mr. P. Bowler (via Mr. Adam Burgess, Architect) to complete a botanical survey and compile a Biodiversity Enhancements and Ecological Mitigation Plan (BEEMP) for a site at: The Ridgeway, Cuffley, Hertfordshire.

1.2 National Planning Policy Framework (NPPF 2021)<sup>1</sup>, stresses the need to achieve biodiversity enhances, specifically paragraphs, 174, 175, 179 and 180. Summary details are given in Appendix 1. The NPPF states:

*When determining planning applications, local planning authorities should apply the following principles:*

*- if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;*

*- development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists; and*

*- development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to incorporate biodiversity improvements in and around developments should be encouraged, especially where this can secure measurable net gains for biodiversity.*

1.3 The site is located immediately to the north of The Ridgeway (B157) on a stretch of the road between Carbone Hill and Hanyards Lane (see Appendix 2; Figures 1 & 2). The application site is immediately bordered to the east and west by large residential properties and extensive areas of deciduous woodland to the north. The south of the site is fringed by the road (B157). The site consists of approximately 4,000m<sup>2</sup> of deciduous woodland, with a length of cherry laurel *Prunus laurocerasus* hedge spanning approximately 65m of the southern boundary. The site forms part of the Home Wood Local Wildlife Site (LWS). The location of the site and its location in relation to the local landscape is provided within Figures 1 & 2 (Appendix 2).

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<sup>1</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1005759/NPPF\\_July\\_2021.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf)

- 1.4 This report follows an earlier Preliminary Ecological Appraisal (PEA) completed in October 2020, which was updated in April 2022 and a ground level tree assessment for roosting bats in March 2022. These works resulted in a further climbing survey for roosting bats to be prescribed for eight trees, proposed to be impacted by the works and undertaken during April 2022. All eight trees, with the exception of Tree 70 was climbed. However, it was necessary to undertake two emergence surveys upon Tree 70 (Figure 3; Photo 1, Appendix 2). Further to this, this report also documents the results of a botanical survey of the footprint of the proposed development.
- 1.5 Developments proposals include one new residential unit at this site, with green roofs, forest gardens, native species hedge and associated ponds.
- 1.6 This report covers the following: mitigation and enhancement measures of habitats and protected species identified on site. In addition to the results of the botanical survey, it takes account of and relies on information previously published in the preliminary ecological appraisal<sup>2</sup>, ground level tree assessment for bats and climbing survey<sup>3</sup> and bat emergence survey<sup>4</sup>.

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<sup>2</sup> Wychwood Environmental Ltd (2022) Preliminary Ecological Appraisal: Land at The Ridgeway, Cuffley, Hertfordshire.

<sup>3</sup> Wychwood Environmental Ltd (2022) Tree Climb & Potential Roost Assessment (PRA) - letter of report: Land at The Ridgeway, Cuffley, Hertfordshire.

<sup>4</sup> Wychwood Environmental Ltd (2022) Bat Emergence Survey Report: Land at The Ridgeway, Cuffley, Hertfordshire.

## 2.0 Methods for National Vegetation Classification Survey (NVC)

### *Rationale*

- 2.1 This survey was undertaken to assess the full impact of the proposed development upon an area of typical ground flora within the site. This proposed development makes every effort to have the most minimal impact upon the site, through the removal of the minimum number of trees and protection of tree roots through the use of screw pile foundations. Shading from the proposed development and loss of ground cover as a result of the construction of the access, ponds and forest garden may result in a relatively small amount of impact. This has been quantitatively assessed through undertaking the NVC. The Architects design statement outlines how the massing and location of the individual buildings that make up the house have been designed with the sun path in mind, in order to maximise the sunlight that will reach the ground.

### *Field survey*

- 2.2 The botanical survey was carried out by Dr Ryan Walker CEnv, MCIEEM, an ecological consultant with 12 years of experience. The survey was undertaken in line with standard methods outlined by the Joint Nature Conservation Committees (JNCC) (Rodwell, 2006)<sup>5</sup>. National Vegetation Classification (NVC) is a survey method that helps to identify the community of plants in a habitat and likely associations. An NVC survey includes the monitoring of all plants present in similar (homogeneous) stands of plant composition and structure.
- 2.3 This survey was undertaken on 27<sup>th</sup> May 2022, during the optimum survey period. Three 2x2m quadrats were deployed across areas of uniform habitat within the footprint of the proposed development (Figure 1). All floral species recorded and their percentage coverage of the quadrat were noted, using standard methods outlined by the Joint Nature Conservation Committees (JNCC).

### *Analysis*

- 2.4 The three datasets for each quadrat were entered into the freeware computer program; Modular Analysis of Vegetation Information System (MAVIS), developed by the Centre for

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<sup>5</sup> Rodwell, J.S. (2006) NVC Users' Handbook, JNCC, Peterborough, ISBN 978 1 86107 574 1

Ecology and Hydrology<sup>6</sup>. MAVIS brings all the varied classification systems together in one place. Ecologists, vegetation scientists and nature reserve managers all have their own systems, and MAVIS produces a description of the entered species data in terms of each classification. The National Vegetation Classification (NVC) developed at the Unit of Vegetation Science, Lancaster University is used as the output in this situation.

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<sup>6</sup> <https://www.ceh.ac.uk/services/modular-analysis-vegetation-information-system-mavis>

### 3.0 NVC Results

#### *National Vegetation Classification*

- 3.1 A detailed species composition of each quadrant is listed in Appendix 3. However, W6a *Alnus glutinosa-Urtica dioica* woodland, typical sub-community, has been classified at the most likely habitat within the area sampled (Photos 1 &2). This is a rather ill-defined woodland community of eutrophic moist soils, especially where there has been substantial deposition of mineral matter.
- 3.2 NVC classifications are often quite general and typically alder is usually the most common tree, particularly on wetter soils within this habitat. However, this appears not the case within this situation, but Hall et al (2004)<sup>7</sup> suggest that this habitat can be dominated by sycamore *Acer pseudoplatanus*, ash *Fraxinus excelsior* and pedunculate oak *Quercus robur*, consistent within this site. Unlike other damper woodland habitats, the field layer generally lacks tall swamp and fen species. The most typical species is *Urtica dioica*, which can form virtual monocultures, as is the case here. The few other typical species show a rough transition from wetter to drier habitats. Where soils are moist towards the surface, *Poa trivialis* and *Galium aparine* are frequent as in this case.
- 3.3 Seventeen species were recorded during the course of the survey (Appendix 6).



<sup>7</sup> J.E. Hall, K.J. Kirby and A.M. Whitbread (2004) National Vegetation Classification: Field Guide to Woodland (JNCC National Vegetation Classification Field Guide Series). Joint Nature Conservation Committee, 2001. ISBN 10: 1861075545

## 4.0 Mitigation

- 4.1 Taking account of all ecological assessments (including the NVC data in this report) a number of mitigation measures are advised.

### *Mature Trees*

- 4.2 Best practice should be followed (i.e. S5837:2012 Trees in Relation to design, demolition and construction – Recommendations) to ensure individual trees are not adversely affected. Any trees over 100 mm trunk diameter, and/ or of significant ecological value, should be protected by barriers. Minimum distance between tree trunk and barriers must (where possible) be either the distance of branch spread or half tree height, whichever is the greater. In all cases trees must be protected from direct impact and from severance or asphyxiation of the roots.
- 4.3 It is understood that only two trees will be removed as part of the proposed development (Appendix 2; Figure 3), in addition a number of other ash trees may need to be removed as part of ash dieback management (see arboriculturist report<sup>8</sup>).
- 4.4 It is proposed that any planting within the site as part of the proposed development will use native trees species that will enhance the biodiversity of the site. See Appendices 4 and 5 for details of tree planting.

### *Badgers*

- 4.5 Badgers and their setts are protected under the Protection of Badgers Act 1992. Under this legislation it is an offence to deliberately kill or injure a badger, or to cause damage to, destroy, obstruct access to a sett, or disturb a sett when occupied by a badger.
- 4.6 No setts or obvious field signs were identified on site, but badgers are most likely active in the wider area on account of the woodland habitat.
- 4.7 It is proposed that the building works will not be constructed using conventional foundations in an effort to minimize impacts upon roots and woodland flora. However, to ensure that there is no contravention of the Act, any excavations should be covered

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<sup>8</sup> Verdant Ecology (2020) Arboricultural Assessment: Land at The Ridgeway, Cuffley, Hertfordshire.



overnight, with a means of escape provided, to avoid trapping any animals. A plank of wood placed into any trench normally provides a suitable means of escape.

*Other terrestrial mammals (e.g. Hedgehog)*

4.8 The site has the potential to support hedgehog. Hedgehogs are a Species of Principal Importance, making them a material consideration for planning, and as such should be protected as part of the development and habitats enhanced for these species.

4.9 The proposed removal of the boundary cherry laurel hedge, to make way for the native species hedge should be undertaken outside of the hibernation period (November – March inclusively) and during the hedgehog active season. This will ensure any hedgehogs present are not hibernating and therefore reduce the risk of death or injury if disturbed. This vegetation clearance should be carried out following a toolbox talk from a suitably qualified ecologist and should be carried out in stages.

*Nesting bird mitigation*

4.10 The trees and boundary hedgerow on site potentially supports several woodland nesting bird species. Almost all of the vegetation upon the site is proposed to be retained. However, the boundary cherry laurel hedge and a small number of trees are proposed to be removed or coppiced. Therefore, it is recommended that this works occurs outside the bird nesting season, which is generally accepted to extend from March - August inclusive (although dates vary by species and are subject to prevailing weather conditions). If this is not feasible, a watching brief for nesting birds must be implemented by a suitably qualified ecologist. Any removal will be compensated for by additional planting (Appendix 4).

*Bats*

4.11 All British species of bat are listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended). Under this legislation it is an offence to deliberately capture, kill, disturb and damage or destroy a bat roost.

4.12 No confirmed roosts were identified on site through a combinations of ground level tree assessment for bat roost, climbed surveys for roosting bats and emergence surveys. However, it was established that the site is used by the following species as foraging

habitat; common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *P. pygmaeus* and serotine *Eptesicus serotinus*<sup>5</sup>. Two trees on site were assessed as having potential to support roosting bats. Tree 37 (oak) and 70 (ash) are the only trees that was assessed as supporting a high bat roosting potential after the combination survey work. However, tree 37 tree is being retained and sufficient distance from the proposed works that it is considered to not be at any disturbance risk<sup>4,5</sup>. Tree 70 will most likely be removed for safety reasons, however emergence surveys did not identify a roost, but as a precaution measure this tree will be subjected to a soft fell under the supervision of an ecologist<sup>5</sup>.

- 4.13 Based on habitats present and that bats are using the site for foraging/commuting. External artificial lighting will be completely controlled within the site, with no external lighting proposed with the exception of a single low level LED light above the front door on a timed motion sensor, to allow safe access into the house during the winter months.

**Table 1** - Timetable setting out details of the protective measures to be implemented at each phase of construction.

Action	Reasoning	Timing
<b>Mitigation</b>		
<i>Habitat protection</i>		
Erection of heras fencing around retained trees.	Protect trees during site hedge clearance and the minimal tree felling to ensure individual retained trees are not adversely affected (e.g. root damage).	Throughout construction period.
Mitigation for nesting birds (tree and hedge clearance).	To avoid disturbance/harm to nesting birds.	October-February (otherwise checked for by an ecologist).
Mitigation for badgers	Maintain access points for badgers if any digging is required.	Throughout construction period.
Mitigation for roosting bats	The results of the bat survey work revealed that tree 70 does not support roosting bats. However, bats are often transient species, therefore as a precautionary measure the tree will be subjected to a soft fell, supervised by and ecologist.	September – October (to avoid hibernating bats and nesting birds)
Mitigation for priority species.	To avoid disturbance/harm to hedgehogs.	Avoid hibernation periods.

*Compliance*

- 4.14 The above recommendations should be considered in conjunction with those detailed in the PEA report and bat emergence survey report for the site.
- 4.15 The client will be responsible for compliance with legal consents, planning conditions, installation of protective measures, inspection and maintenance.

## 5.0 Enhancements

### Habitats

- 5.1 The details the locations of ecological enhancements within the site are given in Figure 5, Appendix 2. Any subsequent landscaping plan should take account of both the mitigation requirements and enhancements proposed in this report.

### *Landscaping – Intensive green Roof*

- 5.2 An intensive green roof is proposed for the roof of the dwelling (Figure 5). This living roof will comprise of a species rich grassland habitat, with a species composition dominated by shade tolerant and woodland species. This will increase the floral biodiversity of the footprint of the development.
- 5.3 Intensive green roofs are those made up of lush vegetation and based on a relatively nutrient rich and deep substrate.
- 5.4 Any green roof installed should follow both the Green Roof Code<sup>9</sup> and Guide for Good Practice<sup>10</sup>. The proposed dwelling will be raised off the ground upon screw piles, protecting the woodland ground flora and tree roosts. This will create a habitat whereby the most shade tolerant woodland species will be able to persist and the migration of wildlife will unimpeded

### *Ponds*

- 5.5 It is proposed that two wildlife ponds will be created within the site to the north of the dwelling, within a natural woodland clearing (Figure 5). These ponds will be fed through rainwater diverted, draining from the green roof. Native and shade tolerant species will be used, within and around the pond, following advice of the Freshwater Habitats Trust<sup>11</sup>. The RSPB provides a planting list for native floating, submerged and emergent species<sup>12</sup>. All landscaping should seek to avoid non-native species.

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<sup>9</sup> <https://livingroofs.org/code-practice-green-roof-organisation/>

<sup>10</sup> <https://livingroofs.org/wp-content/uploads/2016/03/grocode2014.pdf>

<sup>11</sup> <https://www.rhs.org.uk/advice/profile?pid=839>

<sup>12</sup> <https://www.rspb.org.uk/birds-and-wildlife/advice/gardening-for-wildlife/water-for-wildlife/stocking-a-pond/>

### *Woodland management*

- 5.6 Consideration should be given to the former hornbeam coppice, within the centre of the site. This coppice has not been managed for 50-100 years and the trees appear to be becoming top heavy. In the near future, the trees will start to split and loose limbs. Under the guidance of an arboriculture specialist, it is proposed that the crown of these trees is thinned/reduced in order to take the weight out of the top of the trees.
- 5.7 The sycamore trees within the woodland could be felled and the stumps treated with herbicide to reduce the spread of this non-native, introduced and invasive species. This will promote biodiversity on site via native species regeneration. All arisings from these works and other tree works should be retained on site and stacked at the base of trees as deadwood habitat piles to encourage invertebrate, small mammal and amphibian species.
- 5.8 Arboricultural advice for the site should be followed with regard to the management of the mature ash trees within the site that are affected with ash dieback disease. Any coppicing/tree thinning/sycamore removal will open up the woodland floor and encourage the development of a more diverse ground floral community within this woodland.
- 5.9 There is a small area of rhododendron *Rhododendron ponticum* fringing the northern border of the site, within the boundary of the garden of a property to the north of the site. This rhododendron should be monitored and if encroachment happens further into the site, it should be controlled using a professional contractor.

### *Forest gardens*

- 5.10 Two forest gardens are proposed for the site. These gardens offer another opportunity for biodiversity enhancement on site; and they will include shade tolerant, native pollenating species in addition to food crops. A forest garden is a designed agronomic system based on trees, shrubs and perennial plants. These are mixed in such a way as to mimic the structure of a natural forest. Forest gardens can improve levels of biodiversity comparatively to conventional domestic horticultural systems<sup>13</sup>. The specification for this planting is provided in Appendix 3.

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<sup>13</sup><https://www.agroforestry.co.uk>

- 5.11 Good horticultural practice should be utilised, including the use of peat-free composts, mulches and soil conditioners, native plants with local provenance and avoidance of the use of invasive species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) will be strictly adhered to.

#### *Hedgerow enhancement*

- 5.12 It is proposed that the cherry laurel hedge fringing the site and bordering The Ridgeway, will be removed and replaced with a species rich native hedge. Species to use, include blackthorn *Prunus spinosa*, and common hawthorn *Crataegus monogyna*, field maple *Acer campestre*, guelder rose *Viburnum opulus*, dog rose *Rosa canina*, hazel *Corylus avellana*, Wild privet *Ligustrum vulgare* and domestic apple *Malus sylvestris*. All species are native and known to the local area. Species are beneficial to insects and birds, and the fruits of the apple trees can be harvested by residents. A planting guide is provided in Appendix 4. Further guidance is provided by the Woodland Trust<sup>14</sup>. A shade tolerant seed mix should be sown at the base of the hedge to improve the flora biodiversity of the hedge, such as Emoresgate Mix (EH1)<sup>15</sup>.

#### **Protected Species**

##### *Provision of boxes for nesting birds and roosting bats*

- 5.13 The provision of bird and bat boxes will provide nesting/roosting habitat to support/enhance the local populations of both species' groups. The PEA details the following boxes to be used within the site:
- 5.14 Ten nest boxes for different species of bird, should be erected around the site in areas of good cover and out of the reach of domestic cats, to include the following: 1B Schwegler tit boxes x3, JC Wildlife Open fronted Eco Robin nest boxes x2, JC Wildlife Tawny Owl, Jackdaw and Stock Dove Nest Box x1, JC Wildlife Little Owl Apex Nest Box x1, Wildlife World Woodpecker Box x2 (Figure 4, Appendix 2).
- 5.15 Additionally, six bat boxes should be installed on site following completion of the development, to include; 2F Schwegler Bat Box (General Purpose) x5 and 1FW Schwegler Bat Hibernation Box x1 (Figure 4, Appendix 2).

<sup>14</sup> <https://www.woodlandtrust.org.uk/plant-trees/advice/>

<sup>15</sup> Emoresgate Mix (EH1) - <http://wildseed.co.uk/mixtures/category/hedge-and-woodland>

- 5.16 These boxes can be placed on mature trees on southerly elevations of trees at least 6m above ground level. These bird and bat boxes should be fitted by a suitably qualified ecologist using tree climbing gear.
- 5.17 Two Integrated Eco Bat Box will be integrated within south facing and west facing walls upon the proposed dwelling. These boxes will be fitted high up upon the wall and away from windows (Figure 4; Appendix 2)

#### *Invertebrates*

- 5.18 Bespoke insect habitat will be incorporated into the design of the elevations of the building. These can be ordered and pre-made<sup>16</sup>. These create habitat for a variety of invertebrate species that can enhance existing populations and provide a food source for other species such as birds and bats. These should be incorporated into all aspects of the dwelling, therefore providing suitable refugia for a number of invertebrate species throughout the year as exposure changes throughout the seasons.
- 5.19 The inclusion of a small number of (<5) 'bee bricks'<sup>17</sup> should be considered for a variety of aspects on the new dwelling. These products are made of compressed, recycled plastic so can be integrated into brick or timber structures easily.

#### *Hedgehog shelter and access points*

- 5.20 A purpose-built hedgehog house<sup>18</sup> should be installed under the proposed new dwelling. This will complement the natural dead wood habitat piles within the woodland that also create valuable hedgehog and small mammal refugia within the site.

#### *Information for residents*

- 5.21 It is recommended that new residents are provided with information detailing that the site has been designed to enhance biodiversity and an example of the integration of biodiversity into domestic dwellings. Such information will also provide additional information on how to best manage the site for biodiversity.

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<sup>16</sup> <http://greenroofshelters.co.uk/habitat-panels/>.

<sup>17</sup> <https://greenandbluebuild.co.uk>

<sup>18</sup> <https://www.britishhedgehogs.org.uk/hedgehog-homes/>

### Personnel responsible for the implementation

- 5.22 The landowner / developer will be responsible for the implementation of the biodiversity enhancements and ecological mitigation plan.

**Table 2** – Timetable setting out details of the enhancements measures to be implemented at during/post-construction.

Action	Reasoning	Timing
<b>Enhancements</b>		
<i>Hedgerow planting</i>	To improve habitat to enhance biodiversity and habitat connectivity.	November – March.
<i>Green roof</i>	To improve native floral diversity and provide foraging opportunities for birds, bats and invertebrates.	October – March
<i>Pond creation</i>	To improve native floral diversity and provide foraging opportunities for birds, bats and invertebrates.	October – March
<i>Woodland Management</i>	To improve woodland diversity and remove invasive species.	October – March
<b>General</b>		
Enhancements for bats/birds/hedgehog/invertebrates (box erection habitat creation)	To improve nesting/roosting opportunities.	To be incorporated into the fabric of buildings and within woodland. Boxes in trees to be erected during October – March in order to be available during the summer, roosting/nesting season for bats and birds.
Provide enhancement leaflet to residents.	To improve knowledge and habitat to enhance biodiversity	N/A



## 6.0 Conclusion

- 6.1 If the mitigation measures outlined are taken into account pre-development and during construction, then disturbance to protected species and sensitive habitats should be kept to a minimum and no offences should be committed under UK or European Law.
- 6.2 A number of options are put forward for providing ecological enhancement to the development proposals. The implementation of these, or other ecological gains, provided as part of the development, will ensure that the provisions of the National Planning Policy Framework (NPPF, 2021) and local Planning Policies are upheld.

**APPENDIX 1 – Extracts relating and National Planning Policy Framework (NPPF)**

Section 15. Conserving and enhancing the natural environment with paragraphs 174, 175, 179 and 180 specifically referring to biodiversity:

174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

(a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);

(b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;

(c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;

d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

(e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

(f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

175. Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework 58 ; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries.

178. Within areas defined as Heritage Coast (and that do not already fall within one of the designated areas mentioned in paragraph 176), planning policies and decisions should be consistent with the special character of the area and the importance of its conservation. Major development within a Heritage Coast is unlikely to be appropriate, unless it is compatible with its special character.

Habitats and biodiversity

179. To protect and enhance biodiversity and geodiversity, plans should:

(a) Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity 61 ; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation 62 ; and

(b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.

180. When determining planning applications, local planning authorities should apply the following principles:

(a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;

(b) development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;

(c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons 63 and a suitable compensation strategy exists; and

(d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate.

Based on the previous PEA report and if the details within this BEEMP are followed, there would be no significant harm to local biodiversity, and overall the biodiversity of the site would be enhanced. Thus, in terms of biodiversity, the proposal is considered to be compliant with the relevant paragraphs of the NPPF.

## APPENDIX 2 – Figures

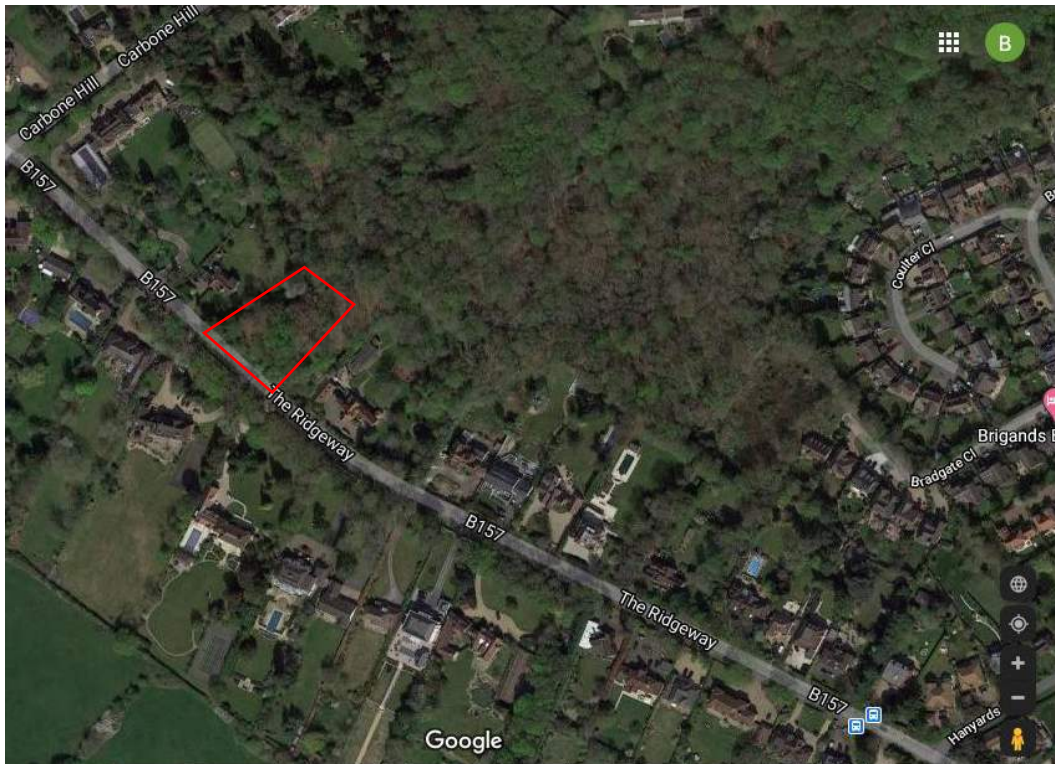


Figure 1 – Approximate location of the site (red outline). Image taken from Google Earth.

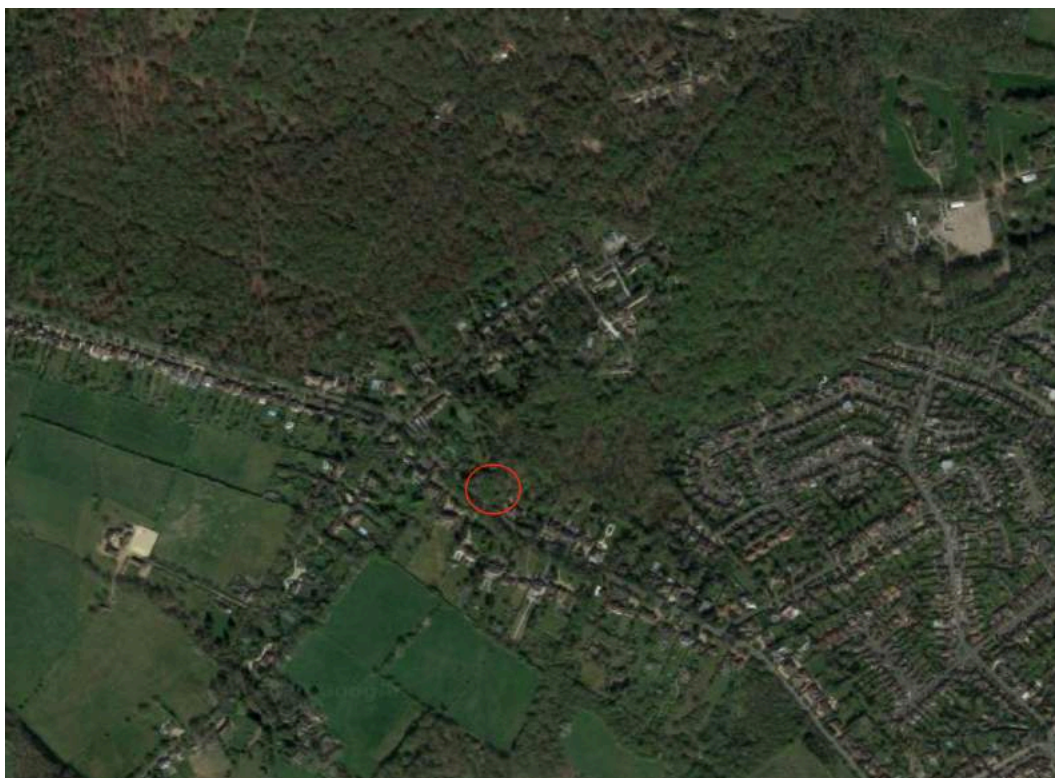


Figure 2 – Approximate location of the site (red outline) within the wider landscape. Image taken from Google.



Figure 3 – Red outline boundary of the site, showing proposed ponds, forest gardens and green roof areas upon the proposed dwelling.



**Figure 4** – Locations of proposed bird and bat boxes within the site, 1B Schwegler tit boxes x3 (red), JC Wildlife Open fronted Eco Robin nest boxes x2 (brown), JC Wildlife Tawny Owl, Jackdaw and Stock Dove Nest Box x1 (yellow), JC Wildlife Little Owl Apex Nest Box x1 (black), Wildlife World Woodpecker Box x2 (purple), 2F Schwegler Bat Box (General Purpose) x5 (gray) and 1FW Schwegler Bat Hibernation Box x1 (light blue), Integrated Eco Bat Box x2 (dark blue). Location of hedgehog box (red star) .

## APPENDIX 3 – Green roof composition

Wildflower Turfs – Source: Wildflower Turf Ltd			
<p>Example species mix for areas of green space and border areas – see Figure 3.  <a href="http://www.wildflowerturf.co.uk/Products/species-rich-lawn-turf.aspx">http://www.wildflowerturf.co.uk/Products/species-rich-lawn-turf.aspx</a></p>			
<h3>Species Mix</h3>			
Grasses			
<b>Sweet vernal grass</b> <i>(Anthoxanthum odoratum)</i>	<b>Slender creeping red fescue</b> ( <i>Festuca rubra trichophylla</i> )	<b>Chewing's Fescue</b> ( <i>Festuca rubra subsp. commutata</i> )	
<b>Dwarf cultivar</b> ( <i>Lolium perenne</i> )	<b>Smaller Cat's Tail</b> ( <i>Phleum bertolonii</i> )	<b>Common Meadow grass</b> ( <i>Poa pratensis</i> )	
Flora			
<b>Daisy</b> ( <i>Bellis perennis</i> )	<b>Betony</b> ( <i>Stachys officinalis</i> )	<b>Birdsfoot Trefoil</b> ( <i>Lotus corniculatus</i> )	
<b>Black medick</b> ( <i>Medicago lupulina</i> )	<b>Common Knapweed</b> ( <i>Centaurea nigra</i> )	<b>Harebell</b> ( <i>Campanula rotundifolia</i> )	
<b>Lady's Bedstraw</b> ( <i>Galium verum</i> )	<b>Meadow Buttercup</b> ( <i>Ranunculus acris</i> )	<b>Meadow Vetchling</b> ( <i>Lathyrus pratensis</i> )	
<b>Salad Burnet</b> ( <i>Sanguisorba minor</i> )	<b>Self Heal</b> ( <i>Prunella vulgaris</i> )	<b>Smooth bedstraw</b> ( <i>Galium mollugo</i> )	
<b>Suckling Clover</b> ( <i>Trifolium dubium</i> )	<b>White Clover</b> ( <i>Trifolium repens</i> )	<b>Wild Marjoram</b> ( <i>Origanum vulgare</i> )	
<b>Wild Basil</b> ( <i>Clinopodium vulgare</i> )	<b>Wild Red Clover</b> ( <i>Trifolium pratense</i> )	<b>Yarrow</b> ( <i>Achillea millefolium</i> )	
<h3>Specification</h3>			
Maintenance	Product Weight	Width & Length	
<b>Cutting Cycle:</b> Regular mowing, Occasional fertilising	<b>Typical per m<sup>2</sup>:</b> 18kg	<b>Turf size:</b> 0.64 x 1 (0.64m <sup>2</sup> ).	
<b>Watering:</b> For the first 2 to 4 weeks to prevent turf from drying out.	<b>Typical Saturated per m<sup>2</sup>:</b> 22kg	Arrives slabbed stacked flat on a pallet or provided in 2 x 20m (40m <sup>2</sup> ) large rolls on request.	
		<i>All dimensions are approximate.</i>	
Min / Max Established Height	Delivery		
<b>Min:</b> 3cm	<b>Delivery Method</b>	<b>Pallet Size</b>	<b>m<sup>2</sup> Per Pallet</b>
<b>Max:</b> 10cm	Bespoke - Haulier	1.5m x 1.2m	80m
<i>Heights subject to seasonal variations.</i>	Courier	1m x 1.2m	50m
	Collection	Optional	-

## APPENDIX 4 – Hedge Planting Guide

- 1 Indicative planting is shown on Figure 3, Appendix 1.
- 2 Before planting, each strip will need to be measured in order to calculate the number of trees required. Trees (60 cm whips) will be planted in staggered double rows approximately 50 cm apart with a 40-45 cm gap between each tree in the row.



Example of staggered tree spacing

- 3 Plants must be obtained from specialist nurseries/online suppliers and preferably of local genetic stock. Trees can also be supplied by the woodland trust<sup>19</sup>.
- 4 Planting is best conducted in the autumn or spring.
- 5 Native hedging species and their composition are shown in Table 1 below. At least five woody species should be used for each hedge.

**Table 1. Hedgerow species and composition.**

<b>Common name</b>	<b>Latin</b>	<b>Composition</b>
Hawthorn	<i>Crataegus monogyna</i>	50 %
Blackthorn	<i>Prunus spinosa</i>	30%
Beech	<i>Fagus sylvatica</i>	2-4%
Dog rose	<i>Rosa canina</i>	2-4%
Gelder rose	<i>Viburnum opulus</i>	2-4%
Field Maple	<i>Acer campestre</i>	2-4%
Hazel	<i>Corylus avellana</i>	2-4%

- 6 *Planting* - dig a pit several cm wider and deeper than the tree roots; generally a spade's depth is sufficient.
- 7 Whilst planting ensure the roots don't dry out. If they do dry they can be soaked in a bucket of water just prior to planting.
- 8 Place the tree in the pit and check the depth. The roots should all be below the soil surface level.
- 9 The turf can be cut in half and placed upside down in the bottom of the tree pit and then carefully backfill the soil around the tree while holding it upright.
- 10 Firm the top layer of soil around the tree with your heel.
- 11 *Protection* - place a supporting cane in the ground next to the tree. Push in the ground so it is firm, taking care not to damage the tree roots. Place a tree shelter over the cane and the tree, taking care not to damage branches as it goes down. Firm the shelter into the ground.

<sup>19</sup> <http://www.woodlandtrustshop.com/category/62-native-trees.aspx>



- 12 Mulching - Adding a layer of mulch around the base of the tree is very beneficial. It retains soil moisture and helps to suppress grass and weed growth. Suitable mulches include wood chips, grass clippings or straw.
- 13 *Tree Care* – keep the mulch topped up for the first two summers to ensure the trees don't have competition for water and keep the soil moist in dry spells. After a couple of seasons' growth, the small trees will quickly start to bush out. The hedge species can be left to grow to the size that best suits the location and then be cut back at the end of winter before birds start nesting. Check any trees that haven't survived the summer and replace them the following winter.
- 14 The Hedgerows can be under-sown with the following:

**Wildflower seed for hedgerows** (seed/plug plants)

**Seed** - Emoresgate Mix (EH1) - <http://wildseed.co.uk/mixtures/category/hedge-and-woodland>

**Plug plants** - <http://plantwild.co.uk/woodland/>

## APPENDIX 5 – Gardening for Bats

**GARDENING FOR BATS**

**All sixteen species of bats in the UK eat insects, and need a good supply of these from spring through to the autumn. By growing flowers attractive to a range of insects, our gardens can become important feeding stations for bats, birds and other wildlife.**

**Many plants depend on insects**

We grow flowers in our gardens for our own enjoyment. But colour and perfume are really the plants' way of advertising themselves to insects. Sweet nectar and protein-rich pollen are bait to encourage insects to visit. In return, pollen is carried from one flower to another on their bodies so the flowers are fertilised.

**Bats need insects**

Flying uses a lot of energy, so bats have huge appetites. All our UK bats eat insects. Five species, including the long-eared bat, prefer moths, but most bats rely more heavily on flies as food than any other insect group. Especially important are craneflies, and a range of midge families and their relatives. Pipistrelles, the bats most likely to visit your garden, depend on catching very large numbers of tiny insects, some of which are pests.

**Flower shape and insect tongues**

Flowers with long narrow petal tubes, such as evening primrose and honeysuckle, are visited by moths and butterflies. Only their long tongues can reach deep down to the hidden nectar. Short-tongued insects include many families of flies and some moths. They can only reach nectar in flowers with short florets. By planting a mixture of flowering plants, vegetables, trees and shrubs, you can encourage a diversity of insects to drop in and refuel.

**Follow these general rules**

- ? Plant flowers varying not only in colour and fragrance, but also in shape.
- ? Daisies and daisy-like flowers are open with a mass of shallow florets.
- ? Pale flowers are more easily seen in poor light.
- ? Single flowers have more nectar than double varieties
- ? Native wild flowers or those closely related are most useful
- ? Flowers with landing platforms and short florets such as daisy or carrot family attract many insects.
- ? Many flowering vegetables such as beans and courgettes are also good for insects.

**Plant trees and shrubs**

These are important in providing

- food for insect larvae
- food for adult insects
- shelter for flying insects

- roosting opportunities for bats.

In a small garden, choose trees that can be coppiced – cut down to the ground every few years - to allow new shoots to spring from the base. Young shoots and leaves will support leaf-eating insects, even if they do not produce flowers. Hawthorn and elder are useful small trees.

**Create a wet area**

A pond, a marshy area, even a half-tub made into a mini-pond can attract insects. Many of the tiny flies favoured by bats start life in water as aquatic larvae.

**Say NO to insecticides**

Chemical pesticides kill natural predators and so may do more harm than good. They reduce bats' insect prey, and surviving insects carry traces of poison.

**Encourage natural predators**

Hoverflies, wasps, ladybirds, lacewings, ground beetles and centipedes are the gardener's friends. As natural predators they help keep the balance, eating many pests.

- ? Allow some weeds to grow to provide ground cover for natural predators
- ? Grow favourites of hoverflies and other predators close to the flowers and vegetables that tend to become infested.
- ? Leave hollow-stemmed plants to overwinter as shelter for ladybirds.
- ? Leave heaps of dead leaves and brushwood undisturbed for hedgehogs.
- ? Most garden birds are effective predators. Provide them with regular food and water.

**Prevent a CATastrophe**

Many bats and other small mammals fall prey to Britain's most dangerous four-legged predator, the domestic cat. Cats do not need to stay out all night. Bring your cat in an hour before sunset so bats can emerge undisturbed.

*(Send for our special leaflet on cats and bats.)*

The Bat Conservation Trust, 15 Cloisters House  
8 Battersea Park Road, London SW8 4BG  
Tel 0845 1300 228 Fax 020 7627 2628  
[enquiries@bats.org.uk](mailto:enquiries@bats.org.uk) [www.bats.org.uk](http://www.bats.org.uk)  
Registered Charity no 1012361 Company limited by guarantee, registered in England no 271282

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**Gardening for bats**

Aim at having flowers in bloom through the year, including both annuals and herbaceous perennials.

Below are some suggestions, but this is by no means an exhaustive list. See what grows well in YOUR garden, and what seems most attractive to insects. Flowering times are approximate, varying in different areas. Regular dead-heading extends flowering period in many flowers. A=annual, HA=hardy annual, HHA=half-hardy annual, P=perennial, W=wild flower.

Flowers for borders			
St John's Wort	Hypericum	P	March-
marigolds	Calendula	H/A	March – Oct.
aubretia	a. deltoidea	P	March-June
honesty	Lunaria rediviva	HB	March
forget-me-not	Myosotis sp.	A/P	March - May
elephant ears	Begonia	P	April
Wallflowers	Erysimum	B	April - June
Cranesbills	Geranium sp	P	May – Sept.
Yarrow	Achillea	P	May -
Poppies	Papaver sp.	A	May - July
Dames violet	Hebeveria matronalis	P	May - August
Red Valerian	Centranthus ruber	P	May – Sept.
Poached egg plant	Limnanthes	HA	June – Aug.
Knapweed	Centaura nigra	P	June- Sept.
Phacelia		HA	June – Sept.
Ox-eye daisy	Leucanthemum vulgare	P	June – Aug.
Evening primrose	Oenothera biennis	B	June-Sept.
Candytuft	iberis umbellata	HA	June – Sept.
Sweet William	Dianthus barbatus	B	June - July
Blanket flowers	Gaillardia	P	June -
Verbena	V. bonariensis	HHA	June – Oct.
Scabious	knautia arvensis	P	July-Aug.
Night-scented stock	matthiola bicolora	HA	July-Aug
Pincushion flower	Scabious sp.	A/P	July – Sept.
Cherry pie	hebeveria	HHA	July – Oct.
Mexican aster	Cosmos sp.	A/P	July – Oct.
Cone flower	Rudbeckia sp.	A/P	August-Nov.
Mallow	lavatera sp.	P	August-Oct.
Michaelmas daisy	Aster sp.	P	August-Sept.
Ice plant 'Pink lady'	Sedum spectabile	P	Sept.
Herbs – both leaves and flowers are fragrant			
Fennel	Foeniculum vulgare		July – Sept.
Bergamot	Morantia cloyana		June - Sept
Sweet Cicely	Myrrhis odorata		April - June
Hyssop	Hyssopus officinalis		July - Sept
Feverfew	Tanacetum parthenium		June – Sept.
Borage	Borago officinalis		May – Sept.

Rosemary	Rosemary officinalis	March - May
Lemon balm	Melissa officinalis	
Coriander	Copranum sativum	June - August
Lavenders	Lavendula sp.	
Marjoram	Origanum sp	
Trees, shrubs and climbers important to insects		
Oak	Quercus sp.	large gardens only
Silver birch	Betula pendula	
Common alder	Alnus glutinosa	Suitable for coppicing
Hazel	Corylus avellana	Suitable for coppicing
Elder	Sambucus nigra	Small
Pussy willow	Salix caprea	Suitable for coppicing
Hawthorn	Crataegus monogyna	Suitable for coppicing
Honeysuckle	Lonicera sp.	grow a variety for succession.
Dog rose	Rosa canina	Climber
Bramble	Rubus fruticosus	Climber
Ivy	Hedera helix	Climber
Buddleia	Buddleia davidii	shrub
Guelder rose	Viburnum opulus	shrub
Gorse	Ulex sp.	shrub
Plants for pond edges and marshy areas		
Purple loosestrife	Lythrum salicaria	W June – Aug.
Meadow sweet	Filipendula ulmaria	W June – Sept.
Lady's smock	Cardamine pratensis	W April - June
Water mint	mentha aquatica	W July – Sept.
Angelica	Angelica sylvestris	W July – Sept.
Hemp agrimony	Eupatorium cannabinum	W July – Sept.
Marsh marigold	Caltha palustris	W March – May
Creeping Jenny	Lysimachie nummularia	W May - August
Fringed water lily	Nymphoides peltata	W June – Sept.
Water forget-me-not	Myosotis scorpioides	W June – Sept.

Allow part of your lawn to grow long in summer and cut in autumn, removing the clippings. Avoid using fertilizers.  
Compost heaps are good producers of insects too.

Add a seat to watch your garden come to life!

**Native Plant Species Recommended**

Hedging/shrubs (60cm whips)	
Blackthorn	<i>Prunus spinosa</i>
Hawthorn	<i>Crataegus monogyna</i>
Common Dogwood	<i>Cornus sanguinea</i>
Guelder Rose	<i>Viburnum opulus</i>
Holly	<i>Ilex aquifolium</i>
Elder	<i>Sambucus nigra</i>
Field Maple	<i>Acer campestre</i>
Hazel	<i>Corylus avellana</i>
Spindle	<i>Euonymus europaeus</i>
Trees (regular standard size)	
Apple	<i>Malus spp.</i>
Cherry	<i>Prunus spp.</i>
Field Maple	<i>Acer campestre</i>
Hornbeam	<i>Carpinus betulus</i>
Rowan	<i>Sorbus aucuparia</i>
Wild Service	<i>Sorbus torminalis</i>
English Oak	<i>Quercus robur</i>
Shrubs/Herbacous plants (formal beds)	
Use species attractive to pollinators e.g. bees, butterflies, moths. See this selection of RHS plants for pollinators: <a href="http://www.rhs.org.uk/Gardening/Sustainable-gardening/Plants-for-pollinators">http://www.rhs.org.uk/Gardening/Sustainable-gardening/Plants-for-pollinators</a> (see Appendix 4)	
<b>Note</b> – all specimens should be of British native stock from reputable suppliers.	

**APPENDIX 6 – Species composition of each quadrant within NVC survey**

<b>Quadrant 1</b>	<b>Quadrant 2</b>	<b>Quadrant 3</b>
<p>Target Species List</p> <p>Alliaria petiolata 3%  Rumex obtusifolius 1%  Rubus [spp] 1%  Veronica hederifolia 8%  Carpinus betulus 2%  Fraxinus excelsior (c) 2%  Galium aparine 9%  Carex pendula 2%  Urtica dioica 2%  Ranunculus acris 0%  Trisetum flavescens 15%  Hedera helix 1%</p>	<p>Target Species List</p> <p>Trisetum flavescens 60%  Rumex obtusifolius 5%  Veronica hederifolia 4%  Carex pendula 8%  Galium aparine 15%  Primula vulgaris 1%  Ilex aquifolium 1%  Myosotis scorpioides 1%  Geranium robertianum 1%</p>	<p>Target Species List</p> <p>Alliaria petiolata 4  Rumex obtusifolius 5  Rubus [spp] 2  Veronica hederifolia 4  Carpinus betulus 2  Fraxinus excelsior (c) 2  Galium aparine 5  Carex pendula 4  Urtica dioica 4  Ranunculus acris 2  Trisetum flavescens 5  Hedera helix 2  Primula vulgaris 2  Ilex aquifolium 2  Myosotis scorpioides 2  Geranium robertianum 4  Arrhenatherum elatius 2</p>