Snowdon Aviary, London Zoo, Regent's Park, London NW1 4RY

Phase 1 Ecology Survey Report

May 2015

on behalf of **The Zoological Society of London**

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Report Contents

1 Summary

- An extended Phase 1 habitat survey of the Snowdon Aviary, London Zoo was undertaken by Edward Bodsworth *MA PhD MCIEEM* on 24th April 2015.

- Habitats were described and evaluated and notes were made on features of ecological interest.

- The site comprises an aviary, areas of bare ground (within the aviary), hard-standing, shelter buildings, areas of amenity grassland and tall ruderal vegetation. These habitats are considered to be of negligible/low ecological value.

- There are several mature and semi-mature trees within the site, as well as young trees and patches of scrub. Many of these trees are non-native and have been planted as part of the overall landscaping of the site. The mature and semi-mature trees are considered to be of high ecological value within the context of the site.

- Three trees have been identified as having the potential to offer shelter to roosting bats.

- The buildings are considered unsuitable for roosting bats.

- Trees and shrubs offer potential nest sites for common bird species. Starlings were noted within and around the aviary and this species is a priority for conservation action under the UK Biodiversity Framework (formerly the UK Biodiversity Action Plan).

- No reptiles were observed during the survey. Aesculapian snakes are known to occur along the Regent's Canal within Regent's Park.

- The site is not considered to be suitable habitat for other protected/notable species.

- No further ecological surveys are considered necessary at this stage. Surveys of trees with bat roost potential are recommended if these trees are to be removed/felled as part of the proposals.

- Recommendations are made with regard to habitat enhancement measures and features such as bat and bird boxes.

2 Introduction

2.1 Site Description & Context

The Snowdon Aviary is situated to the north-western side of London Zoo within Regent's Park in London. The study site (indicated within the red line boundary Job No. 199, Drawing No. 004 A prepared by Ray Hole Architects) is located to the south of Prince Albert Road (A4205) and to the north side of the Regent's Canal. The approximate Ordnance Survey grid reference for the site is TQ 278 835.

The site comprises an aviary of metal and mesh construction, on a bank to the north side of the canal. The aviary is in active use and houses several birds. The ground within the aviary is bare, with a number of trees and shrubs. To the north of the aviary is an area of hard-standing used for access, which connects to a bridge spanning the canal at the north-eastern corner of the site, providing access to the main campus. To either side of the structure are areas of ruderal vegetation with tree and shrub planting. To the south of the aviary is the tow path of the Regent's Canal and the canal itself.

London Zoo is located within Regent's Park, which is located towards the centre of London. Landuse surrounding the park is largely urban and dominated by built development, roads and hard-standing. London is located within the London Basin Natural Area, as defined by Natural England. Approximately one-third of the Natural Area is covered by Greater London, with only fragments of semi-natural habitats remaining. These habitats include areas of woodland, wood pasture and parklands, as well as notable areas of heathland. The basin is drained by the River Thames and its extensive network of tributaries. Other wetland habitats include canals, flooded gravel pits and reservoirs that support important populations of waterfowl.

2.2 Proposed Works

There is a proposal to redevelop the Snowdon Aviary; the exact nature of the redevelopment is not known.

2.3 Aims of Study

The aims of this study are to describe and evaluate the habitats within the site and to assess the potential for the site to support protected/notable species. This report discusses the findings of an extended Phase 1 habitat survey and makes recommendations with regard to potential ecological impacts of redevelopment works. Recommendations are made with regard to mitigation, compensation and enhancement measures, as well as the need for any further, species-specific surveys.

3 Methodology

3.1 Extended Phase 1 Habitat Survey

An extended Phase 1 habitat survey was undertaken on 24th April 2015 by Edward Bodsworth *MA PhD MCIEEM*. A walkover of the site was conducted and a description of the habitats present was prepared using standard Phase 1 habitat survey methodology (JNCC 2010). Target notes were also prepared on features of particular ecological interest and an assessment was made of the site's potential to support protected and/or notable species (such as species listed within the UK Biodiversity Framework and Section 41 of the NERC Act 2006).

3.2 Initial Survey of Trees for Bats

An initial bat survey of trees was also undertaken in order to look for evidence of bats (such as droppings, staining and scratch marks) and to assess the potential of the trees to support roosting bats. Trees were assessed from ground-level as either having Category 1* (high), Category 1 (medium), Category 2 (low) or Category 3 (no) potential to shelter roosting bats according to the criteria shown in Table 1.

Table 1. Criteria for the assessment of trees for roosting bats (Hundt 2012)

Potential	Features of tree
Category 3 (No)	Trees with no potential to support roosting bats i.e. No loose bark, ivy, splits, cracks or holes.
Category 2 (Low)	Trees with no obvious potential, although the tree is of a size and age that elevated surveys may result in cracks or crevices being found; or the tree supports some features which may have limited potential to support bats i.e. Sparse ivy covering, minor branch splits, small sections of loose or flaking bark.
Category 1 (Medium)	Trees with definite bat potential, supporting fewer suitable features that Category 1* or with potential for use by single bats. Dense ivy, more significant branch splits, downward developing holes, small cavities.
Category 1* (High)	Trees with multiple, highly suitable features capable of supporting larger roosts i.e. Upward developing holes and/or deep splits and cracks, dense ivy, woodpecker holes, lifting bark or multiple features in the same tree.

4 Results

4.1 Ecological Context

There are no Sites of Special Scientific Interest (SSSI) within a 1km radius of the study site and no internationally designated sites of nature conservation importance are present within a 5km radius. The site is located within Regent's Park, adjacent to the Regent's Canal. The wider landscape is dominated by urban development within Greater London and the park and canal are likely to be the most significant areas of semi-natural habitat within the local area. Trees and shrubs provide potential nest sites for breeding birds and the parkland and canal are likely to support foraging bats.

In particular, the canal offers a potential foraging and dispersal route for bats that favour wetland habitats, such as the common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus* and Daubenton's bat *Myotis daubentonii*. Urban areas are considered to be largely unsuitable for bats and other protected species, although certain bird species may use buildings and other structures as nesting sites.

A population of the Aesculapian snake *Zamenis longissimus* has been found in and around Regent's Park near Regent's Canal in London. The snake is not native to the British Isles but it found on mainland Europe. The population in Regent's park has escaped captivity and has become naturalised within suitable habitats along the Regent's Canal. The species has been observed close to the Snowdon Aviary in the past.

4.2 Habitats

Appendix 1 presents a number of photographs of the site. A plan and an aerial photograph of the site's location are presented in Appendix 2.

4.2.1 *The Aviary*

The aviary is constructed from a metal frame with a covering of mesh and dates from the 1960s. There is a concrete walkway through the structure, as well as a concrete retaining wall and pond. The area within the aviary is heavily disturbed by birds and there is little or no ground vegetation; the area comprises bare ground with some trees and shrubs. The pond is lined with concrete and supports no aquatic vegetation.

Semi-mature trees within the aviary include crack willow *Salix fragilis*, sycamore *Acer pseudoplatanus* and hybrid black poplar *Populus nigra canadensis*. Shrubs include elder *Sambucus nigra*, cherry laurel *Prunus laurocerasus*, *Lonicera nitida*, *Cotoneaster* sp. and *Euonymus* species.

4.2.2 *Other Buildings*

Other buildings within the study site include a number of flat-roofed shelters to the north side of the aviary and a pheasantry to the north-eastern corner of the site. These buildings offer no potential shelter to roosting bats.

4.2.3 *Trees*

There are a number of young and semi-mature trees outside of the aviary. It is considered that these trees have been planted as part of the overall landscaping of the park and zoo. These include a line of elm trees *Ulmus* sp. along the boundary with Prince Albert Road, weeping willow *Salix babylonica*, Scots pine *Pinus sylvestris*, sycamore *Acer pseudoplatanus*, acacia *Acacia pseudoacacia*, silver birch *Betula pendula*, cherry *Prunus* sp., rowan *Sorbus aucuparia*, hawthorn *Crataegus monogyna* and ash *Fraxinus excelsior* as well as certain non-native trees of unknown species.

4.2.4 *Tall Ruderal Vegetation*

The aviary is located on a south-facing bank to the north side of the Regent's Canal. The majority of the bank comprises an area of tall ruderal vegetation with scattered young scrub. The vegetation includes stinging nettle *Urtica dioica*, cleavers *Galium aparine*, dandelion *Taraxacum officinale*, cow parsley *Anthriscus sylvestris*, green alkanet *Pentaglottis sempervirens*, dock *Rumex obtusifolius*, bramble *Rubus fruticosus*, white dead nettle *Lamium album*, creeping buttercup *Ranunculus repens*, sterile brome *Bromus sterilis*, ivy *Hedera helix*, ash and sycamore seedlings.

There are a number of brash and log piles within the ruderal vegetation where previous scrub clearance has been undertaken.

4.2.5 *Shrubs*

There are a number of planted shrubs and shrubberies around the aviary including *Lonicera nitida*, *Sarcococca* sp., *Symphoricarpos albus* and bamboo (unknown species).

4.2.6 *Hedge*

A hedge forms the northern boundary with Prince Albert Road. The hedge is dominated by garden privet Ligustrum ovalifolium, with hawthorn, elm, rose *Rosa* species also present. To the north-western corner of the site is an area of newly dug ground and a small lawn.

4.2.7 *Canal*

To the south side of the site is the Regent's Canal. The tow path runs along the northern side of the canal, adjacent to the south side of the site. The northern side of the canal comprises a concrete path and concrete bank, with no aquatic vegetation.

4.3 Species

4.3.1 *Bats*

The structure of the aviary is not suitable for roosting bats and there are no accessible chambers or buildings that bats could use for roosting. The concrete retaining wall of the aviary is also considered to be unsuitable for roosting bats due to the lack of suitable roost features and the heavy levels of disturbance by birds inside the aviary.

Three trees were noted as having features that roosting bats could use for shelter and these are detailed within Table 2. Please refer to Appendix 3 for a plan showing the approximate locations of these trees. The three trees are a weeping willow to the south-western side of the aviary, a silver bird to the eastern side of the aviary and a black poplar within the aviary itself. All other trees are assessed as being Category 3, with no potential to offer shelter to roosting bats.

Table 2. Results of assessment of trees for roosting bats (Hundt 2012). Refer to Appendix 3.

Tree No.	Tree Species	Features of tree	Roost Potential
1	Weeping willow	Two rot holes in boughs Scar with dead wood	Category 1 * (High)
2	Silver birch	A small number of rot holes	Category 1 (Medium)
3*	Black poplar	A number of rot holes and woodpecker holes	Category 1 * (High)

**Tree 3 is located inside the aviary. The mesh of the aviary and the presence of many birds may deter bats from entering and roosting within the aviary.*

4.3.2 *Birds*

Starlings *Sturnus vulgaris* were noted inside the aviary. The starling is listed as a priority species under the UK Post-2010 Biodiversity Framework.

Very few other birds were observed during the survey and these included blackbird *Turdus merula*, feral pigeon *Columba palumbus* and rose-ringed parakeets *Psittacula krameri*.

4.3.3 *Japanese Knotweed*

A small stand of Japanese knotweed *Fallopia japonica* was noted to the south-eastern corner of the aviary. This is a non-native and highly invasive plant species, the spread of which is prevented under the Wildlife and Countryside Act 1981 (as amended).

4.3.4 *Other Species*

No other protected or notable species were noted during the survey. In particular, no reptiles were observed along the south-facing bank to the north of the Regent's Canal. However, brash and log piles may offer shelter and hibernation opportunities to reptile species.

4.4 Relevant Legislation & Policy Guidance

4.4.1 *Bats*

As with many animal species within the UK, declines in the abundance and distribution of many bat species have been documented through recent decades. The reasons for these declines are various and complex but it is considered that the major factors are changes in landuse and agriculture, the loss of woodlands and hedgerows and the loss of suitable roosting sites.

Bats are particularly sensitive to human activity due to the fact that they roost within buildings, trees and underground structures such as mines, and the availability of suitable roost sites is considered to be a key factor in the conservation of bats within the UK. As a consequence, all species of bat and their roost sites are protected under the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000) and under The Conservation of Habitats and Species Regulations 2010. Taken together, these make it an offence to:

(a) Deliberately capture or intentionally take a bat
(b) Deliberately or intentionally kill or injure a bat
(c) To be in possession or control of any live or dead wild bat or any part of, or anything derived from a wild bat
(d) Damage or destroy a breeding site or resting place of such an animal or intentionally or recklessly damage, destroy or obstruct access to any place that a wild bat uses for shelter or protection
(e) Intentionally or recklessly disturb any wild bat while it is occupying a structure or place that it uses for shelter or protection
(f) Deliberately disturb any bat, in particular any disturbance which is likely
- to impair their ability;
(i) to survive, breed, reproduce or to rear or nurture their young; or
(ii) in the case of hibernating or migratory species, to hibernate or migrate; or

- to affect significantly the local distribution or abundance of the species to which they belong

A bat roost may be any structure a bat uses for breeding, resting, shelter or protection. It is important to note that since bats tend to re-use the same roost sites, current legal opinion is that a bat roost is protected whether or not the bats are present at the time.

Although the law provides strict protection to bats, it also allows this protection to be set aside (derogation) under The Conservation of Habitats and Species Regulations 2010 through the issuing of licences. Where a lawful operation is required to be carried out but which is likely to result in one of the above offences, a licence may be obtained from Natural England (the statutory body in England with responsibility for nature conservation) to allow the operation to proceed. However, in accordance with the requirements of The Conservation of Habitats and Species Regulations 2010, a licence can only be issued where the following requirements are satisfied:

- The proposal is necessary 'to preserve 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';
- 'There is no satisfactory alternative';
- The proposals 'will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range'.

4.4.2 *Reptiles*

All British species of reptile are protected by the Wildlife and Countryside Act 1981. Part of Section 9(1) and all of Section 9(5) apply. This means they are protected against intentional killing and injuring (but not taking). The Aesculapian snake is a non-native species and receives no legal protection in England.

4.4.3 *Nesting Birds*

Nesting birds are protected under the Wildlife and Countryside Act 1981 (as amended), which makes it an offence to intentionally kill, injure or take any wild bird or take, damage or destroy its nest whilst in use or being built, or take or destroy its eggs. The nesting season for most species is between March and August inclusive.

4.4.4 *Japanese Knotweed*

Japanese knotweed is listed on Schedule 9 (Part 2) of the Wildlife and Countryside Act (1981) which makes it an offence to plant or cause this foreign invasive plant to grow in the wild (effectively making it illegal to spread Japanese knotweed). The presence of this plant constrains development if spreading of the plant is to be avoided. It may be necessary to remove the affected areas prior to any earth works within this area of the site.

Any excavated soil from areas where this plant has established may have to be disposed of at a licensed landfill site and not re-used for landscaping or further construction. When disposing of the soil it is essential the landfill operator is made aware of the presence of Japanese knotweed. Further information can be gained from the Environment Agency.

4.4.5 *The Natural Environment and Rural Communities Act 2006*

Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006 places a duty on the Secretary of State to publish, review and revise lists of living organisms and types of habitat in England that are of principal importance for the purpose of conserving English biodiversity. It also requires the Secretary of State to take, and promote the taking of, steps to further the conservation of the listed organisms and habitats. The current list of species and habitats is the same as those listed under the UK Post-2010 Biodiversity Framework.

4.4.6 *National Planning Policy Framework (NPPF)*

The National Planning Policy Framework (NPPF) published in March 2012 forms a key part of the Government's reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth. The NPPF states that the planning system should contribute to and enhance the natural and local environment by:

- protecting and enhancing valued landscapes, geological conservation interests and soils;
- recognising the wider benefits of ecosystem services;
- minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity.

Local planning authorities should set criteria based policies against which proposals for any development on or affecting protected wildlife (or geodiversity sites or landscape areas) will be judged. To minimise impacts on biodiversity planning policies should:

- identify and map components of the local ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity, wildlife corridors and stepping stones that connect them and areas identified by local partnerships for habitat restoration or creation;
- promote the preservation, restoration and re-creation of priority habitats, ecological networks and the protection and recovery of priority species populations, linked to national and local targets, and identify suitable indicators for monitoring biodiversity in the plan.

When determining planning applications, local planning authorities should aim to conserve and enhance biodiversity. Of relevance to this assessment, this includes applying the following principles:

- if significant harm 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;
- opportunities to incorporate biodiversity in and around developments should be encouraged.

The Government will "now embark on a new exercise to consider what underpinning guidance continues to be needed" with the outcome of this process being "an appropriate and easy to use set of guidance, focussing on issues that require national expression, to support implementation of the National Planning Policy Framework." The Government has "not established the process or set a timetable" for this yet and "until such time as the guidance review is complete, the existing guidance where relevant can still be used." Regarding what guidance is still relevant, "Annex 3 of the NPPF indicates that ODPM Circular 06/2005: *Biodiversity and Geological Conservation - Statutory Obligations and their Impact within the Planning System* (Circular 06/05) is still relevant. This Circular provides administrative guidance on the application of the law relating to planning and nature conservation as it applies in England.

4.4.7 *The UK Post-2010 Biodiversity Framework*

The UK Post-2010 Biodiversity Framework succeeds the UK Biodiversity Action Plan (BAP) and 'Conserving Biodiversity - the UK Approach'. The Framework continues the conservation work initiated by the UK BAP following the establishment of the Convention on Biological Diversity in 1992. The purpose of the Biodiversity Framework is to set a broad enabling structure for conservation action across the UK until 2020, in summary:

- To set out a shared vision and priorities for UK-scale activities, in a framework jointly owned by the four countries, and to which their own strategies will contribute.
- To identify priority work at a UK level which will be needed to help deliver biodiversity targets and the EU Biodiversity Strategy.
- To facilitate the aggregation and collation of information on activity and outcomes across all countries of the UK, where the four countries agree this will bring benefits compared to individual country work.

- To streamline governance arrangements for UK-scale activity.

Many of the tools developed under UK BAP remain of use, for example, background information about the lists of priority habitats and species and the plans for the priority species and habitats agreed under UK BAP still form the basis of the Framework.

There are considered to be no habitats listed under the Biodiversity Framework that are relevant to the site. Priority species listed under the Biodiversity Framework that are considered to be potentially relevant to the site include:

- Starling *Sturnus vulgaris*
- Noctule *Nyctalus noctula*
- Soprano pipistrelle *Pipistrellus pygmaeus*
- Brown long-eared bat *Plecotus auritus*

These three bat species can use trees as roost sites and may be present within Regent's Park and along Regent's Canal.

5 Discussion

5.1 Habitats

Overall, the habitats within the site are considered to be of low ecological value, with areas of bare ground, buildings (including the structure of the aviary) and hard-standing being of negligible ecological value. Tall ruderal vegetation is dominated by common and widespread 'weedy' species and is considered to be of low ecological value.

Many of the trees and shrubs are non-native and have been planted as part of the landscaping of the park and zoo. However, mature and semi-mature trees are considered to be the features of highest ecological value within the site. This is on account of their age and the potential habitats that they provide for species such as birds and bats.

Habitats that are of value within the wider context include the canal. Although the northern bank of the canal is concrete and supports no vegetation, the aquatic habitat is likely to support species of fish and invertebrate and the canal is also likely to be an important wildlife corridor for bats, birds and other species through the urban habitats of London.

5.2 Species

5.2.1 *Bats*

Bats are likely to be active within the park and along the canal. Given the urban nature of the surroundings, the bat assemblage is likely to be limited to those species that are more tolerant of urban habitats and disturbance by human activity, such as the common and soprano pipistrelle. Rare or uncommon bat species are unlikely to be present. The most likely scenario is that small numbers of common species are present within the park and that these bats use trees and buildings within the local area for roosting.

Three trees have been identified as having the potential to offer shelter to roosting bats within features such as rot holes. It is recommended that these trees are retained and protected. If the trees were to be removed, there is the potential for roost sites to be destroyed and for bats to be killed or injured during the works. These types of impacts would be significant under the legal protection that is afforded to all bat species.

5.2.2 *Birds*

The bird assemblage is likely to comprise common and widespread species that are typical of urban habitats. The overall number of species is likely to be relatively low and no rare species are likely to be present. The bird assemblage is likely to be of low ecological value.

However, starlings were observed within and around the aviary and this species is listed as a priority under the UK Biodiversity Framework (formerly the Biodiversity Action Plan). Under the Framework, actions include ensuring that developers, and others, consider needs of, and action for starlings in building design/maintenance and garden/green space management.

5.2.3 *Japanese Knotweed*

As previously mentioned, Japanese knotweed is a non-native, invasive species. Its presence within the site is considered to be of no ecological value and its eradication is recommended.

5.2.4 *Other Species*

It is considered that other protected/notable species are absent from the site. Although Aesculapian snakes are known to occur within the area, no snakes were observed during the survey and this species is non-native and of no conservation significance.

It is considered that native reptile species are likely to be absent. This is due to the sub-optimal nature of the habitats for reptile species and the urban context of the site.

6 Recommendations

6.1 Further Survey

No further surveys are recommended at this stage. However, if there are proposals to remove trees that have been identified as having the potential to offer shelter to roosting bats, it is recommended that a full bat survey of those tree/trees is undertaken in order to determine the presence or likely absence of roosting bats.

This may include tree-climbing surveys to look for bats and evidence of bats, as well as dusk/dawn activity surveys to look for bats exiting and entering the trees. These types of survey are best undertaken from May to August so as to encompass the bat activity period.

6.2 Habitats

It is recommended that all mature and semi-mature trees are retained, including those trees that have been identified as having bat roost potential. Retained trees should be protected in accordance with British Standard 5837:2012.

Other habitats, such as hard-standing, buildings and tall ruderal vegetation are considered to be of negligible/low ecological value and loss or alteration to these habitats is unlikely to result in any significant ecological impacts.

It is recommended that new areas of landscape or ornamental planting are designed, planted and managed to maximise their value to wildlife. One key element of this would be the species used within the planting, which should comprise native species where possible, as well as ornamental plants of known value to wildlife. The key will be to provide a variety of flowers and fruits throughout the year in order to provide food for insects and birds, as well as providing potential nest sites through the planting of trees and shrubs. Native tree and shrub species which are considered suitable for the site include:

- Dogwood *Cornus sanguinea*
- Hawthorn *Crataegus monogyna*
- Blackthorn *Prunus spinosa*
- Field maple *Acer campestre*
- Buckthorn *Rhamnus cathartica*
- Wild cherry *Prunus avium*
- Crab apple *Malus sylvestris*
- Spindle *Euonymus europaeus*

- Dog rose *Rosa canina*
- Wayfaring tree *Viburnum lantana*
- Guelder rose *Viburnum opulus*
- Hazel *Corylus avellana*
- Holly *Ilex aquifolium*
- English oak *Quercus robur*

Ash and sycamore should be avoided as these species tend to produce many seeds and can become over dominant. Appendix 4 recommends a number of other suitable species for landscape and garden planting schemes, including non-native species for more formal areas, although the species mix should by no means be limited to this list.

Planting should aim to provide ground cover for animals such as hedgehogs and invertebrates, and so low-growing ground cover should be encouraged. Native species such as bugle, ivy and periwinkle could be used for this purpose, or ornamental species such as lady's mantle, elephant's ears or perennial geraniums may also be suitable for formal areas of ornamental planting. A diversity of structure should also be encouraged through the planting of small trees, with shrubs and herbaceous plants below.

6.3 Species

6.3.1 *Bats*

As previously mentioned, it is recommended that the three trees that have been identified as having bat roost potential are retained within the proposals.

Conventional bat boxes could be installed; these could be traditional wooden boxes, or longer-lasting woodcrete boxes (Schwegler box) specifically designed for buildings and houses (e.g. the Schwegler 1FQ or 1WQ bat boxes). If these boxes are adopted, it is recommended that they are installed as high as possible on the exterior walls, just under the eaves. The boxes and/or bricks should be orientated to face existing areas of scrub, trees and woodland planting wherever possible and south-facing façades should be favoured.

Certain 'tree-hollow' bat boxes have also been designed specifically for mounting on trees, such as the Schwegler 2F, 1FD and 2FN, and these should be erected at around 3.5-4m (around the height that can be reached from the top of a ladder) on a variety of trees and on a variety of aspects. Suitable trees would be those within woodland, on a woodland edge or located along a habitat feature such as a hedgerow. If a tree is particularly suitable, several boxes could be erected on the one tree. Traditional wooden bat boxes would also be suitable for erection on trees, although these tend to be less long-lasting. Oak or other hard-wood boxes should be favoured for longevity.

External lighting should be minimised within the development proposals, unless it is necessary for reasons of security and safety. In particular, lighting and light spillage should be avoided along the canal. Avoidance of external lighting will ensure that bat activity within the site and local area is not adversely affected.

If lighting is required, it should be kept at low level and at low intensity, with hoods and baffles used to direct the light to where it is required (Bat Conservation Trust 2008, Emery 2008). To minimise the impact on bats, the use of low pressured sodium lamps is recommended in preference to mercury or metal halide lamps which have a UV element that can affect the distribution of insects and attract bats to the area, affecting their natural behaviour (Bat Conservation Trust 2008).

6.3.2 *Birds*

Removal of woody vegetation should only be undertaken outside of the breeding bird period, avoiding March to August inclusive. This will protect active nests from damage and destruction and prevent the killing and injury of young and eggs.

Planting of new trees and shrubs within new landscaping should compensate for the loss of a small number of shrubs and young trees under the footprint of the new development. As already mentioned, any new planting should include native trees and shrubs that fruit profusely in order to provide winter food for birds (such as hawthorn, guelder rose and dog rose).

The erection of bird nesting boxes should also be considered in order to provide suitable nest sites for species within the local area, as nest boxes can be excellent substitutes for the holes found in old trees. Over 60 species are known to adopt nest boxes including blue tits, great tits, starlings, robins and sparrows. The location and nature of the nest box depends on the species it is designed for; boxes for tits, sparrows or starlings should be fixed two to four metres up a tree or a wall; open-fronted boxes for robins and wrens need to be low down, below 2m, and well-hidden in vegetation. Unless there are trees or buildings which shade the box during the day, boxes should be faced between north and east, thus avoiding strong sunlight and the wettest winds.

Nest boxes for house sparrows *Passer domesticus* and starlings could also be erected on the new building to encourage nesting by this species. Although house sparrows were not observed during the survey, the species is likely to use surrounding gardens as a foraging habitat. House sparrows are listed on the UK Biodiversity Action Plan on account of population declines and a reduction in distribution throughout the UK and Europe. The species uses buildings for nesting and forages within gardens and parks where there is a diversity of shrubs and trees for shelter and forage. Nest boxes specifically for nesting by house sparrows can be obtained pre-fabricated and the interior is sub-divided into separate nesting compartments for use by several pairs, as the species tends to nest in small communal groups. The boxes should be erected in such a way as to avoid prevailing weather conditions to provide warm and suitable nesting sites.

6.3.3 *Japanese Knotweed*

It is recommended that Japanese knotweed is eradicated from the site prior to the commencement of any groundworks. Eradication and removal should be undertaken by a specialist consultant/contractor.

6.3.4 *Other Species*

Although there are no predicted impacts on other protected species, it is recommended that the tall ruderal vegetation is cut to ground level and the arisings removed prior to the commencement of works. Disturbance to the ground should be avoided. This will encourage small mammals and invertebrates to move away from the area.

In addition, existing brash and log piles should be removed by hand outside of the reptile hibernation period, avoiding October to March, inclusive.

7 References

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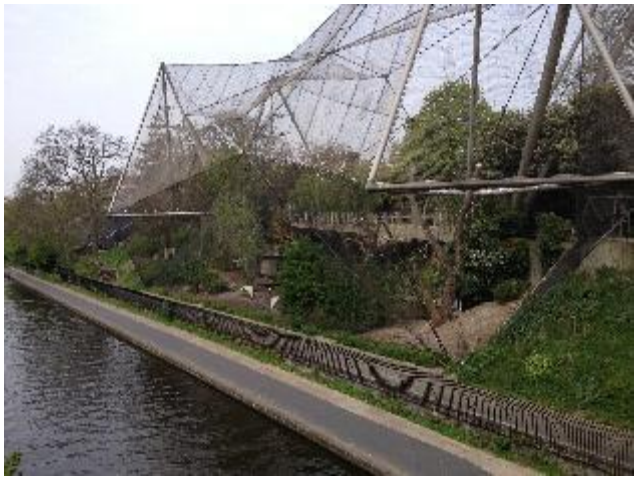
Gent,T. & Gibson S., 2003. *Herpetofauna Workers Manual.* JNCC

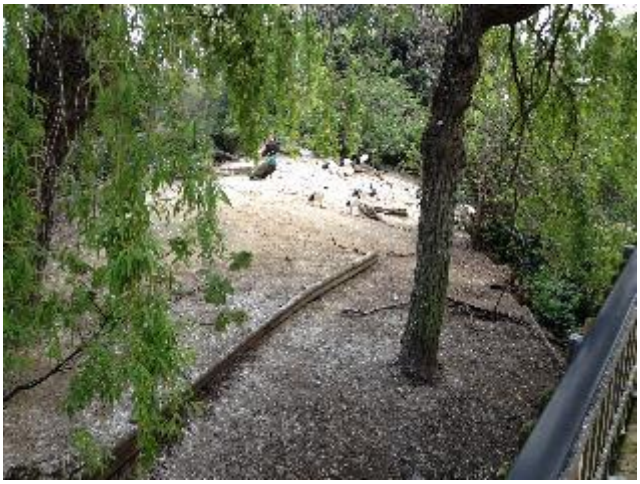
Hundt L., 2012. *Bat Surveys: Good Practice Guidelines.* Bat Conservation Trust.

JNCC, 2010. *Handbook for Phase 1 Habitat Survey - a technique for environmental audit*. JNCC First published 1990; reprinted in 2010.

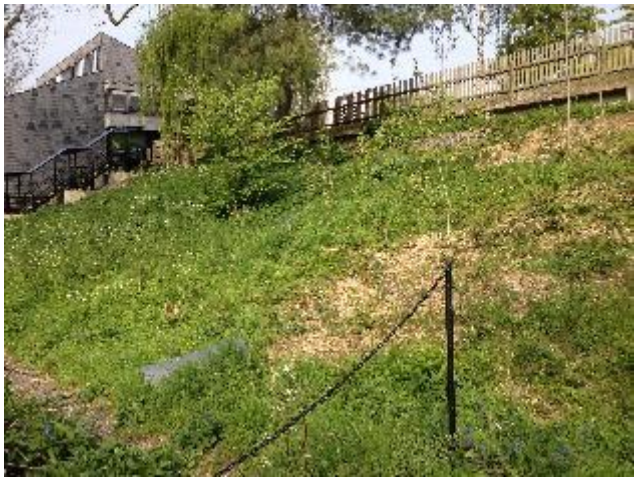
8 Appendix 1. Photographs



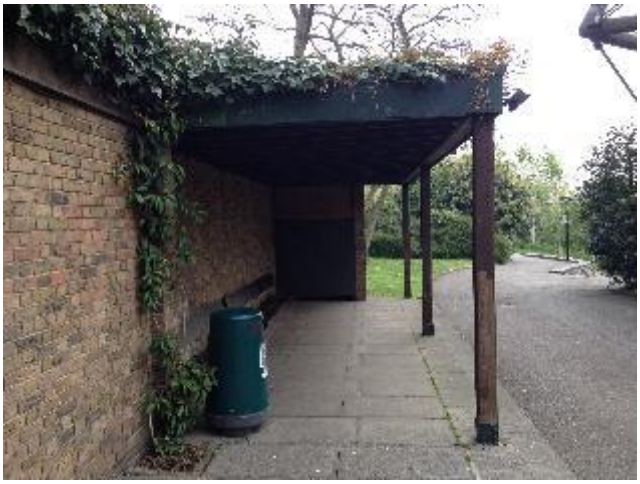
Photograph 1. A general view of the Snowdon Aviary.



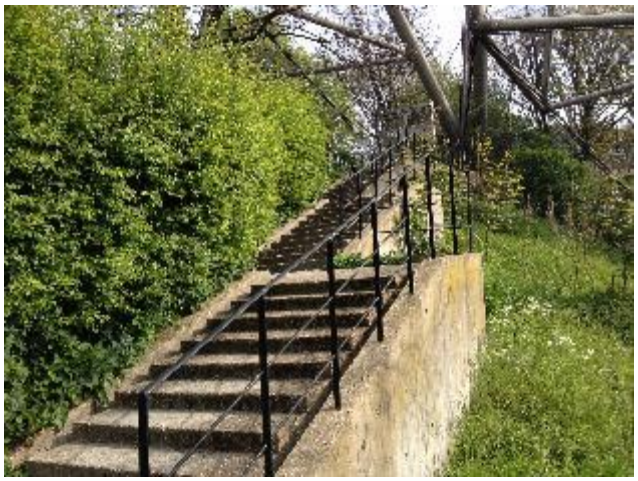
Photograph 2. Bare ground and trees within the aviary.



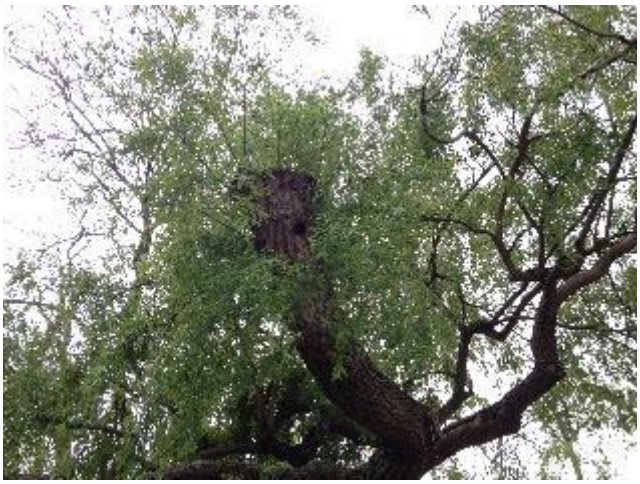
Photograph 3. Tall ruderal vegetation to the west side of the aviary.



Photograph 4. Shelters to the north side of the aviary.



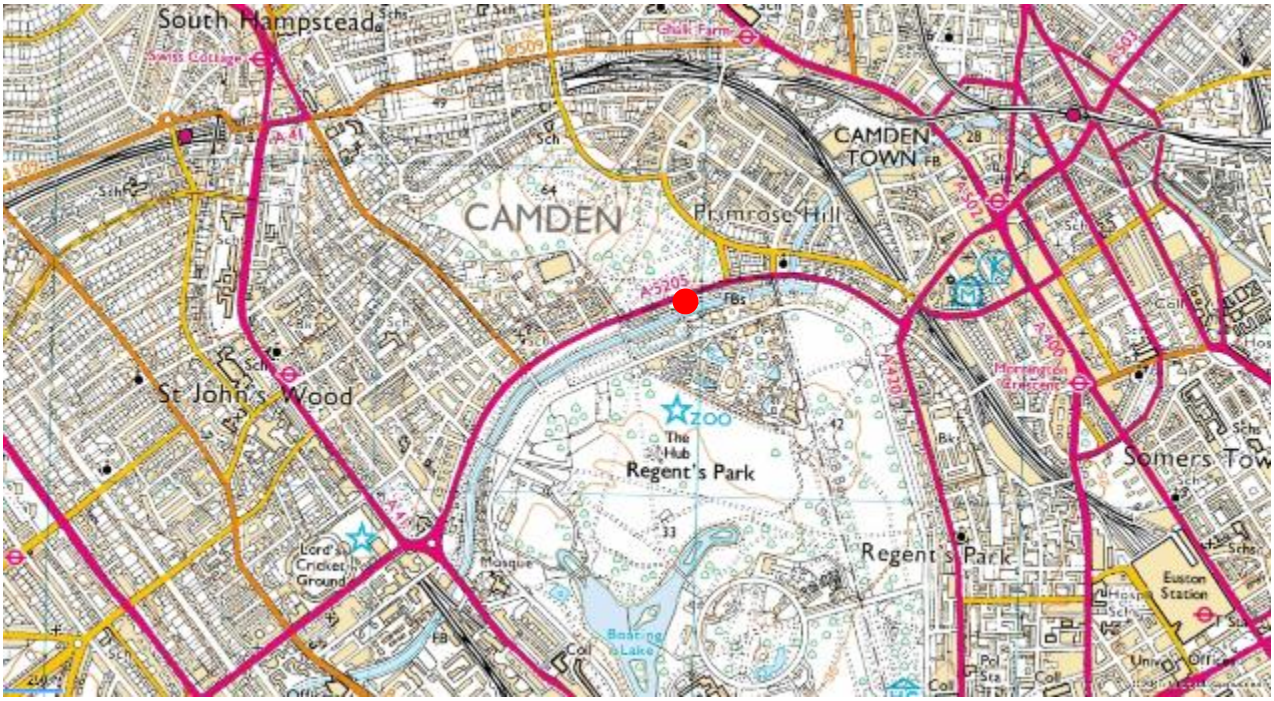
Photograph 5.Concrete staircase.



Photograph 6. Weeping willow tree with rot hole. Tree categorised as having high potential to offer shelter to bats.

9 Appendix 2. Site Location Plans

Aerial photograph showing the location of the survey site (outline in red). *Source:* https://earth.google.com/



Ordnance Survey map showing the approximate location of the site (red dot) within the local area. *Source: http://www.bing.com/maps/*

10 Appendix 3. Existing Site Plan

Tree with bat roost potential

11 Appendix 4. Plant Species for 'Wildlife Planting'

Common Name	Botanical Name
Trees	
Field maple*	*Acer campestre*
Beech*	*Fagus sylvatica*
Hornbeam*	*Carpinus betulus*
Willow*	*Salix sp.*
Silver birch*	*Betula pendula*
Rowan*	*Sorbus aucuparia*
Whitebeam*	*Sorbus aria*
Alder*	*Alnus glutinosa*
Wild cherry*	*Prunus avium*
Flowering cherry	*Prunus sp.*
Flowering pear	*Pyrus calleryana*
Crab apple*	*Malus sylvestris*
Fruiting apple	*Malus sp.*
English oak*	*Quercus robur*
Elm*	*Ulmus sp.*
Small-leaved lime*	*Tilia cordata*
Shrubs	
Holly*	*Ilex aquifolium*
Hazel*	*Corylus avellana*
Wayfaring tree*	*Viburnum lantana*
Wild service tree*	*Sorbus torminalis*
Buckthorn*	*Rhamnus cathartica*
Guelder rose*	*Viburnum opulus*
Hawthorn*	*Crataegus monogyna*
Hebe	*Hebe sp.*
Rosemary	*Rosmarinus*
Ceanothus	*Ceanothus sp.*
Weigela	*Weigela sp.*
Dog rose	*Rosa canina*
Dogwood*	*Cornus sanguina/alba*
Rose (single flowered varieties)	*Rosa sp.*
Wild privet*	*Ligustrum vulgare*
Garden privet	*Ligustrum ovalifolium*
Lilac	*Syringa vulgaris*
Escallonia	*Escallonia sp.*
Lavender	*Lavandula sp.*
Flowering currant	*Ribes sp.*
Honeysuckle*	*Lonicera periclymenum*
Mexican orange blossom	*Choisya sp.*
Spiraea	*Spiraea sp.*
Amelanchier	*Amelanchier lamarckii/canadensis*
Cotoneaster	*Cotoneaster sp.*
Yew*	*Taxus baccata*
Broom	*Cytisus sp.*
Rose of Sharon	*Hypericum calycinum*

Common Name	**Botanical Name**
Firethorn	*Pyracantha sp.*
Butterfly bush	*Buddleia davidii*
Clematis	*Clematis sp.*
Perennials	
Elephant's ears	*Bergenia cordifolia*
Sage	*Salvia sp.*
Lamb's ears	*Stachys byzantia*
Periwinkle*	*Vinca major & Vinca minor*
Ivy*	*Hedera helix*
Bugle*	*Ajuga reptans*
Lady's mantle	*Alchemilla mollis*
Geraniums	*Geranium sp.*
Globe thistle	*Echinops ritro*
Monk's hood	*Aconitum sp.*
Yarrow*	*Achillea millefolium*
Teasel*	*Dipsacus fullonum*
Oriental poppy	*Papaver orientalis*
Michaelmas daisy	*Aster sp.*
Bear's breeches	*Acanthus spinosus*
Montbretia	*Crocosmia sp.*
Purple coneflower	*Echinacea purpurea*
Ornamental onion	*Allium sp.*
Catmint	*Nepeta sp.*
Verbena	*Verbena sp., Verbena bonariensis*
Marjoram	*Origanum majorana*
Thyme	*Thymus sp.*
Crocus	*Crocus sp.*
Daffodil	*Narcissus sp.*
Snowdrop	*Galanthus nivalis*
Winter aconite	*Eranthis sp.*
Bluebell*	*Hyacinthoides non-scripta*
Primrose*	*Primula veris*
Forget-me-not*	*Myosotis sp.*
Grape hyacinth	*Muscari botryoides*
Hollyhock	*Althaea rosea*
Lenten rose	*Helleborus orientalis*
Foxglove*	*Digitalis purpurea*
Greater knapweed*	*Centaurea scabiosa*
Great mullein*	*Verbascum thapsus*
Toadflax*	*Linaria vulgaris*
Meadow crane's-bill*	*Geranium pratense*
**indicates native species*	