Elite Ecology

Passionate about Ecology

Dower House,

Harlington

Bat Ground Level Assessment

May 2023

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03/05/2023	V1	Final Report	Proofread

0. Executive Summary

0.1 This report has been prepared at the request of Mr. Michael Edwards (Komfort Services). Elite Ecology was commissioned to undertake a Ground Level Assessment at Dower House, High Street, Harlington, Greater London, UB3 5DH (OS Grid Reference: TQ 08846 77323). The survey effort involved both a desktop study and field survey.

0.2 Under the current proposals, the plans are to rebuild the listed building and create thirteen residential dwellings with new access.

0.3 The majority of the trees onsite have **negligible** potential for roosting bats. Five trees are of **low** potential and one tree is of **moderate** potential to roosting bats onsite.

0.4 Summary

Bat Presence or Absence

In summary, it can be concluded that there are five trees are of **low** potential (**T3**, **T4**, **T8**, **T9**, and **T13**) and one tree is of **moderate** potential (**T14**) to roosting bats onsite. All other trees are **negligible**. Trees were deemed to be of **low** potential to support roosting bats.

T13 and **T14** are to be retained by the scheme of works, meaning no further action is required for these specimens.

There are four trees set for removal on site that have **low** bat roosting potential (**T3**, **T4**, **T8**, and **T9**), due to the potential roosting features present. The absence of bats roosting within these trees cannot be confirmed from this survey visit alone.

Additionally, the surrounding habitats have been identified to as having the potential to support bat species.

0.5 Recommendations

The recommendations for Dower House, Harlington, can be summarised as follows (please refer to **Section 5 – Recommendations** for a more in-depth description):

- Trees of **low** roosting potential are to be removed by soft felling during winter months.

or

- Undertake one activity survey between May and September. Two surveyors per tree will be required to cover all elevations.

- Creation of an artificial lighting plan.
- Incorporate a bat friendly floral planting scheme.

Contents

1. Introduction

1.1 Report Rationale

This report has been prepared at the request of Mr. Michael Edwards (Komfort Services). Elite Ecology were commissioned to undertake a Ground Level Assessment at Dower House, High Street, Harlington, Greater London, UB3 5DH (OS Grid Reference: TQ 08846 77323). The survey effort involved both a desktop study and field survey.

1.2 Site Description

The site is located within in an urban setting in the village of Harlington, found within the London Borough of Hillingdon.

The site contains a number of habitats. These include broadleaved scattered trees, buildings, coniferous scattered trees, fence, hard standing ground, scattered scrub, tall ruderal, wall, and other (waste piles). The habitats on site have the potential to support a number of protected species. This report relates to broadleaf scattered trees located across the site that are set for removal under the proposed scheme of works.

Within the wider landscape, further habitats are present. These come in the form of amenity grassland, arable land, buildings (and their associated gardens/yards), hard standing ground, hedgerows, scattered trees, standing water, and woodland. The habitats that surround the site also have the potential to be utilized by a variety of protected species.

Figure 1: An aerial map showing the boundary of the site at Dower House, Harlington (as shown by the red outline)

Figure 2: An aerial map showing the boundary of the site at Dower House, Harlington (as shown by the yellow star) in relation to some of the local landscape.

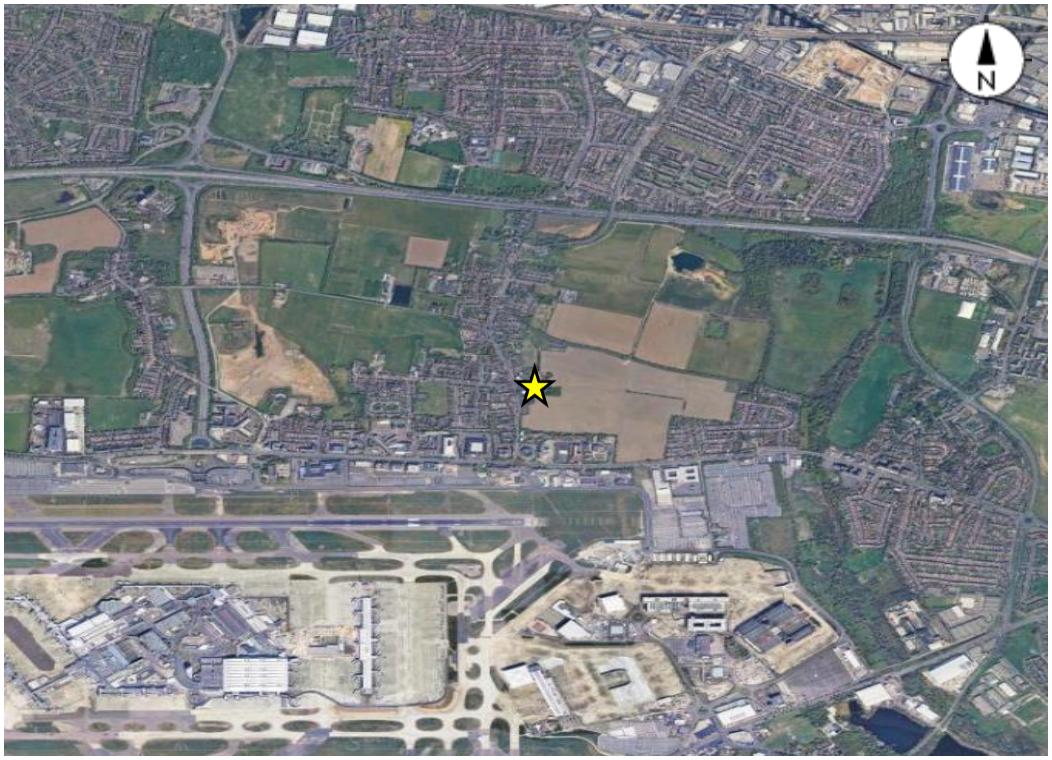
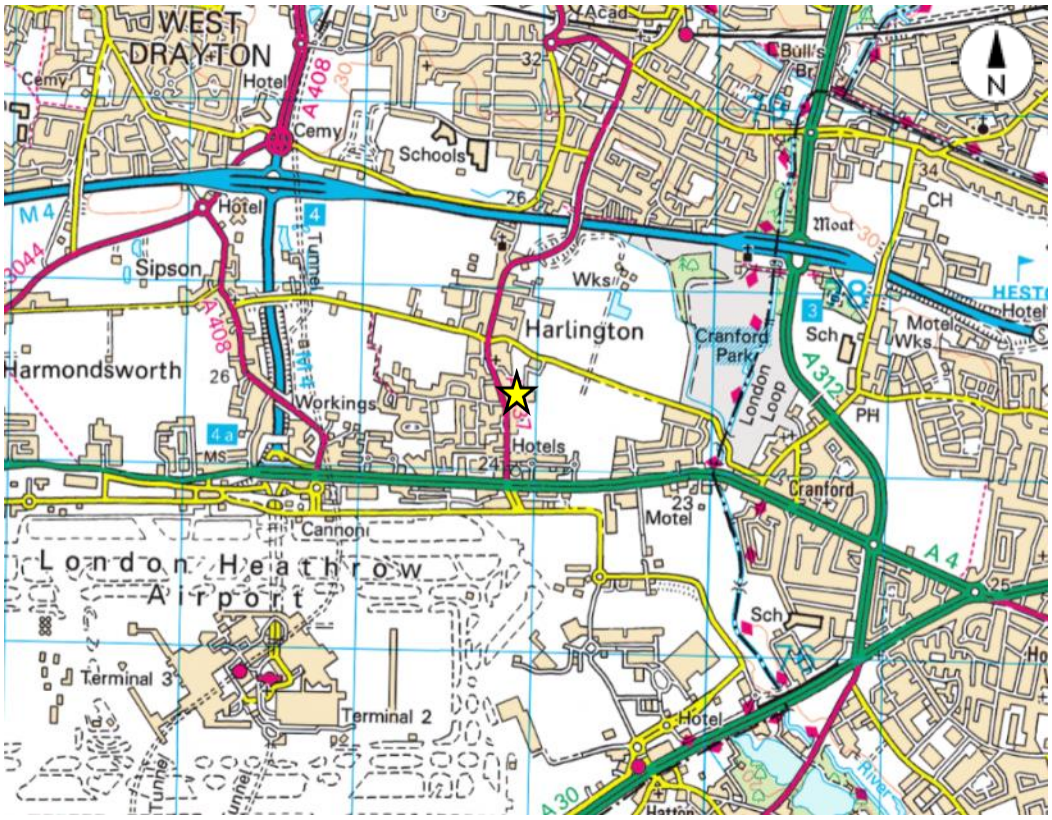


Figure 3: An OS map obtained from Bing showing the location of Dower House, Harlington (yellow star).



1.3 Proposed Works

Under the current proposals, the plans are to rebuild the listed building and create thirteen residential dwellings with new access.

1.4 Aims of Surveys

The aims of the surveys were to undertake an assessment of the building(s), vegetation and surrounding area to establish whether any bats and birds may be present and, if so, in what way they are using the site. The actions of the surveyors on the site and during the production of this report were conducted in accordance with Bat Conservation Trust (BCT) guidelines (3rd edition).

1.4.1 This survey effort considered the potential for all **bat and bird species (including barn owls)** onsite:

- To establish the possibility of bat roosts and bird nests being present at the proposed development site.
- To assess any roost/nest status (i.e., what type and numbers of individuals).
- To assess suitable food, resources, and habitat requirements on site and in the local landscape.

1.4.2 The information will subsequently be used in conjunction with the knowledge of the proposed works at the site to determine the potential need for further survey effort, the impacts of the proposed scheme of works, to establish whether a Natural England Development Licence is required along with species-specific mitigation and compensation. This is done in order to keep any protected species at a favourable conservation status on site.

2. Survey Methodology

2.1 Desktop Survey Methodology

2.1.1 A variety of resources were independently consulted to assess the known local records within the nearby area and the importance of the site within the local landscape from an ecological perspective. The resources used were the Local Records Centre, www.naturalengland.org.uk, www.ordnancesurvey.co.uk, Google Maps, Google Earth, and Bing Maps. A search of other relevant nature conservation information was made through the use of the Multi-Agency Geographic Information for the Countryside (MAGIC) database.

2.1.2 The local records centre was contacted to provide data on all protected species and designated sites within 2km of the proposed development site. Greenspace Information for Greater London (GiGL) was the relevant local record centre for this project.

2.2 Field Survey Methodology

All field surveys are undertaken on survey areas follow the guidelines stipulated in the Bat Conservation Trust (BCT) Good Practice Guidelines (2016).

2.2.1 Ground Level Assessment

This is where trees are assessed from ground level through the aid of equipment such as torches, binoculars, and endoscopes. This process is undertaken on all trees located on the proposed works area to identify any features of interest to the local bat populations. These include, but are not limited to, the following features:

- Bat or bird boxes.
- Cankers – these features are caused by localised bark death causing cavities to develop.
- Compression of forks with included bark, forming potential cavities.
- Cracks/Splits in stems or branches that have been cut either horizontally or vertically.
- Crossing stems or branches with suitable roosting space between.
- Ivy stems with diameters in excess of 50mm with suitable roosting space behind or where roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk.
- Man-made Holes – these are created when cavities develop from flush cuts or when cavities have been created by branches tearing out from parent stems.
- Natural Holes (such as knot holes) – these arise from previously shed branches and branches that have been pruned back to the branch collar.
- Other hollows or cavities such as butt rots.
- Other suitable places of rest and/or shelter.
- Partially detached, loose, or bark plates.
- Woodpecker Holes – these are holes that have been excavated by a woodpecker.

Other factors were also taken into consideration upon inspection of the trees on the survey site. This includes orientation of the feature, the height above ground level, the adjacent land use, and its location within the local landscape. The positioning of the trees is important in establishing the potential for a feature to be in use by the local bat populations.

2.2.2 **Building/Vegetation Classification**

A building/vegetation classification will be assigned to each surveyed feature that is proposed to be impacted by the scheme of works. This classification is based on the features potential to support roosting bats. The rating is also influenced by the location of the structure(s) in the local landscape, along with the number of suitable alternative roosting features, the type of features present in the landscape and the surveyor's experience.

The amount of additional survey effort required for each feature will depend on its rating:

- **Negligible** – No further survey effort is required.
- **Low** – No further survey effort is required, but a precautionary working method statement may be required.
- **Moderate** – A combination of an aerial assessment by tree climbing bat workers and/or two activity survey on the trees.
- **High** – A combination of an aerial assessment by tree climbing bat workers and/or three activity survey on the trees.

2.2.3 **Potential Roost Feature (PRF) Survey (Aerial)**

These surveys, if required, are undertaken on trees that have been deemed to be of either **moderate** or **high** potential to support roosting bats. This survey effort involves a thorough inspection of bat roosting features located on the tree being surveyed. Features are inspected using equipment such as torches, endoscopes, and extendable mirrors. These surveys are undertaken by suitably qualified tree climbers that have Natural England bat survey licences. All climbing methodology follows the Arboriculture and Forestry Advisory Group (AFAG) Tree Climbing Operations Leaflet. This survey effort aims to identify any anecdotal evidence of bat presence (e.g., bat droppings, the physical presence of bats, urine staining etc.).

2.2.4 **Roost Categories**

Any structures with evidence of bats will be further evaluated to assess which of the following roost categories may be present onsite:

- **Day Roost:**

  A place where individual bats, or small groups of males, rest or shelter during the daytime. These bats are rarely found at night at these sites.

- **Feeding Roost:**

  A place where individual bats rest or feed during the night but are rarely present in the day.

- **Hibernation Roost:**

  A place where bats may be found either individually or together during the winter months. These roosts often have a constant cool temperature and high humidity.

- **Maternity Roost:**

  A place where female bats give birth and raise their young to independence.

- **Mating Roost:**

  A place where mating/copulation takes place between male and female bats. These can continue through the winter months.

- **Night Roost:**

  A place where bats rest and/or shelter during the night but will rarely be found here during the day. These can be used colonially or individually by the bats.

- **Satellite Roost:**

  These are alternative roosting sites that are found within close proximity to the main nursery colony within the maternity roost. These are used throughout the breeding season by individual or small groups of female bats.

- **Swarming Site:**

  A place where large numbers of bats come together during the latter summer months through until autumn. These sites are classed as being important mating areas.

- **Transitional/Occasional Roost:**

  A place that is used by individuals or small groups of bats for a small period of time. These are used by the bats prior to hibernation and/or shortly after hibernation.

2.2.5 **Bat Detector Survey (presence/absence survey)**

If required, the object for this survey method is to detect any bats leaving or returning to their roost sites within the surveyed features. This is achieved by undertaking dusk and dawn activity surveys under the following protocol:

- Commencing the survey fifteen minutes before sunset (dusk survey) and two hours before sunrise (dawn survey).
- Listening for any social calls at potential roost sites using bat detectors.
- Standing at different survey points around the building(s) and/or vegetation using bat detectors to hear the bat echolocation.
- The survey will attempt to witness the first bats emerging (dusk) and the bats returning (dawn) to their roosts.
- Standing at different transect points at foraging/commuting areas around the site.
- Carrying out this survey methodology for up to two hours after sunset (dusk) and up to fifteen minutes after sunrise (dawn). This will cover the emergence and re-entry of the bats at the potential roost site, for some bat species.

2.2.7 In order to comply with the required legislation, the results from the surveys will be collated to establish whether a European Protected Species (EPS) development licence will be required. If required, project appropriate species-specific compensation and mitigation measures will be devised to ensure the species remains at a favourable conservation status at the impacted site.

2.3 Surveyors Information

2.3.1 The survey was undertaken by licensed bat ecologist/s, members of the Chartered Institute of Ecology & Environmental Management (CIEEM) and Elite Ecology staff members:

Ground Level Assessment

Miss. Lucy Talbot: BSc (Hons), Ecologist, Accredited Agent

Mr. David Whitehead: FdSc, Assistant Ecologist

2.4 Field Surveys

2.4.1 **Site Surveys**

A Preliminary Ecological Appraisal was undertaken by Elite Ecology on the 6th of March 2023 by **Miss. Lucy Talbot:** BSc (Hons), Ecologist and **Mr. Dave Whitehead:** FdSc, Assistant Ecologist.

Elite Ecology were not made aware of any previous surveys on the trees pertaining to this report.

2.4.2 **Roost Surveys**

The trees and Dower House, Harlington, were inspected for the presence of bats and birds with the use of various types of equipment (including binoculars, torches, endoscopes, and ladders) in full daylight.

Environmental variables	Ground Level Assessment of the trees 18/04/2023 Daytime
Temp Start:	12 °C
Temp Finish:	11 °C
Humidity Start:	57%
Humidity Finish:	63%
Cloud Cover Start:	95%
Cloud Cover Finish:	100%
Wind Speed Average:	22 km/hr
Precipitation:	None

3. Results

3.1 Desktop Survey Results

Within the ecological data search provided by GiGL, one species of bat was revealed within the 1km search radius. This was unidentified bat (Chiroptera). An accurate location of this record could not be given due to the four-figure grid reference provided by GiGL.

3.2 Field Surveys

3.2.1 Ground Level Assessment

The ground level assessment identified six trees with bat potential on site. For the purposes of this report, the trees have been referred to as **T1** and onwards, with groups of trees referred to as **G1** onwards.

Figure 4: Annotated drawing illustrating the tree locations for those with bat roosting potential.

Figure 4: Locations of trees **T1-T14** and groups **G1** & **G2**.

Tree Number	Tree Species	Latin Name	Potential Roosting Features (PRF's)	Bat Roosting Potential
T1	Holm Oak	*Quercus ilex*	Ivy present on stem, not dense enough to facilitate roosting bats.	**Negligible**
T2	Copper Beech	*Fagus sylvatica f. purpurea*	➢ Dead ivy on stem. ➢ Two bird nests within canopy. ➢ Dead wood with a split on its northern elevation, not deep enough and too exposed to facilitate roosting bats.	**Negligible**
T3	Yew	*Taxus baccata*	➢ Compress faults. ➢ Deep fissures in bark. ➢ Dead wood wit small cavities at breast height.	**Low**
T4	Yew	*Taxus baccata*	➢ Compress faults. ➢ Deep fissures in bark. ➢ Dead wood with small cavities at breast height. ➢ Ivy present on stem, not dense enough to facilitate roosting bats.	**Low**
T5	Sycamore	*Acer pseudoplatanus*	Ivy present on stem, not dense enough to facilitate roosting bats.	**Negligible**
T6	Oak	*Quercus robur*	Dead ivy on stem, no PRF's.	**Negligible**
T7	Lawson's Cypress	*Chamaecyparis lawsoniana*	Ivy present on stem, not dense enough to facilitate roosting bats.	**Negligible**
T8	Elm	*Ulmus procera*	➢ Dutch elm disease present. ➢ Dense ivy on stem.	**Low**
T9	Elm	*Ulmus procera*	➢ Dead standing wood. ➢ Dutch elm disease present. ➢ Dense ivy on stem.	**Low**
T10	Eucalyptus	*Eucalyptus sp.*	Exfoliating, peeling bark at base, no PRF's.	**Negligible**
T11	Elm	*Ulmus procera*	➢ Ivy present on stem, not dense enough to facilitate roosting bats. ➢ Early signs of Dutch elm disease.	**Negligible**
T12	Common Lilac	*Syringa vulgaris*	➢ Flaky bark. ➢ Tight fissures on the western elevation. ➢ One small cavity present on the western elevation, ~1/2 deep, not deep enough to facilitate roosting bats.	**Negligible**
T13	Elm	*Ulmus procera*	➢ Dead standing wood. ➢ Two bird nests. ➢ Dense ivy on stem.	**Low**
T14	Robinia	*Robinia pseudoacacia*	➢ Dead standing wood. ➢ Platy bark. ➢ Cavities present on the northern elevation.	**Moderate**
G1	5x Lawson's Cypress	*Chamaecyparis lawsoniana*	No PRF's.	**Negligible**

G2	80% Elm 10% Ash 10% Sycamore	*Ulmus procera* *Fraxinus excelsior* *Acer pseudoplatanus*	➢ Spinney. ➢ Young to semi-mature individuals. ➢ Ivy present on stem, not dense enough to facilitate roosting bats. ➢ Dutch elm disease present.	**Negligible**

A significant portion of trees on site have **negligible** potential for roosting bats. This was due to the lack of potential roosting features present.

Five trees have been identified as having **low** roosting potential. These are **T3**, **T4**, **T8**, **T9**, and **T13**. This was due to the number of potential roosting features present across the trees.

One tree was identified to have **moderate** roosting potential, which was **T14**. This was due to the number of potential roosting features present on the tree.

G1 and **G2** were both found to have **negligible** potential for roosting bats. This was due to the lack of potential roosting features present within the groups.

Under current proposals, most of the trees containing **low** bat roosting potential are being removed. Considering the **low** potential to support bat species, no further survey effort was required. **T14,** which was found to have **moderate** bat roosting potential, is to be retained by the proposed scheme of works. Therefore, no further survey effort was required for this tree.

4. Impact Assessment

4.1 Constraints

Constraints on:	Survey Information	Equipment Used
Constraint (Yes or No):	Yes	No
Explanation of Constraints:	Ivy limited visibility of the trees for presence of features (such as cavities, rot holes).	N/A
Action Taken:	As trees **T3**, **T4**, **T8** and **T9** set for removal were only **low** potential, soft felling is recommended. **T13** and **T14** are to be retained by the scheme of works, meaning no further action is required for these specimens.	N/A

4.2 Potential Impacts of the Removal of the Trees

Under the current proposals, the plans are to rebuild the listed building, and create thirteen additional residential dwellings with new access and community woodland. This will result in both the permanent and temporary loss and/or alteration of some of the habitats located on the proposed redevelopment site.

4.2.1 Designated Sites

No designated sites that were revealed by the ecological data search provided by GiGL fell on or adjacent to the proposed re-development site itself. As the proposed works are due to remain within the site boundary, the presence of any designated sites nearby is not applicable to this project. This, therefore, means that any building works would be of no detriment to the surrounding habitats and landscape.

4.2.2 Bat Roosts

Impact	**Short-term Impacts: Disturbance**	**Long-term Impacts: Roost Modification**	**Long-term Impacts: Roost Loss**
Classification:	Unknown	Unknown	Unknown
Justification:	Trees **T3**, **T4**, **T8**, **T9**, and **T13** were deemed to be of **low** potential to support roosting bats. Additionally, **T14** was found to be of **moderate** bat roosting potential. Therefore, the impacts on bats cannot be determined from this survey effort alone.	Trees **T3**, **T4**, **T8**, **T9**, and **T13** were deemed to be of **low** potential to support roosting bats. Additionally, **T14** was found to be of **moderate** bat roosting potential. Therefore, the impacts on bats cannot be determined from this survey effort alone.	Trees **T3**, **T4**, **T8**, **T9**, and **T13** were deemed to be of **low** potential to support roosting bats. Additionally, **T14** was found to be of **moderate** bat roosting potential. Therefore, the impacts on bats cannot be determined from this survey effort alone.
Any further action:	Removal of trees should be done through soft felling, under the supervision of a licensed ecologist. Soft felling should be undertaken during the winter months when bats are less likely to be roosting within the trees. If this is not an option, then: Undertaking a minimum of one activity survey during the optimal bat activity survey season of mid-May to August, inclusive. **T13** and **T14** are to be retained by the scheme of works, meaning no further action is required for these specimens.	Removal of trees should be done through soft felling, under the supervision of a licensed ecologist. Soft felling should be undertaken during the winter months when bats are less likely to be roosting within the trees. If this is not an option, then: Undertaking a minimum of one activity survey during the optimal bat activity survey season of mid-May to August, inclusive. **T13** and **T14** are to be retained by the scheme of works, meaning no further action is required for these specimens.	Removal of trees should be done through soft felling, under the supervision of a licensed ecologist. Soft felling should be undertaken during the winter months when bats are less likely to be roosting within the trees. If this is not an option, then: Undertaking a minimum of one activity survey during the optimal bat activity survey season of mid-May to August, inclusive. **T13** and **T14** are to be retained by the scheme of works, meaning no further action is required for these specimens.

4.2.3 Foraging and Commuting Habitat

It is considered that the re-development of the site would have a **low** effect on potential foraging and commuting habitat. The habitats on site are not uncommon within the local landscape, and the removal of the trees will not impose any significant impacts. The proposed scheme of works will be of no detriment to the wider landscape, and should an artificial lighting plan be incorporated, the impacts will be minimal.

5. Recommendations

In summary, it can be concluded that there are five trees are of **low** potential (**T3**, **T4**, **T8**, **T9**, and **T13**) and one tree is of **moderate** potential (**T14**) to roosting bats onsite. All other trees are **negligible**. Trees were deemed to be of **low** potential to support roosting bats.

T13 and **T14** are to be retained by the scheme of works, meaning no further action is required for these specimens.

Considering **T3**, **T4**, **T8**, and **T9** being removed by the scheme of works are of **low** potential to support bat species, no further survey effort is required. Instead, a precautionary working method is recommended. This involves the removal of trees through soft felling, under the supervision of a licensed ecologist. Soft felling should be undertaken during the autumn or spring months when bats are less likely to be roosting within the trees.

If soft felling cannot be undertaken during the autumn or spring months, then one activity survey per tree with **low** potential will be required between the optimal survey months of mid-May to August. Two surveyors per tree will be required to cover all elevations.

Methodology

This method involves gently lowering branches and trunks that have any bat potential to ground level and leaving any timber with crevices open on the ground for forty-eight hours to allow any bats inside to exit overnight. This will ensure that any potential roosting bats are safe and have a chance to escape before the felled tree is sawn and/or chipped.

Timings of the Works

Works on the trees should only take place in conditions that are deemed suitable for bat activity (temperature above 7^{o}C and avoiding heavy rain). This will reduce any impacts on bats should they be found during the work.

Works on the trees should only take place out of the bird nesting season, which falls between March and August inclusive. If works on trees are required to be undertaken during the nesting season, then a competent ecologist must be present on site to undertake a detailed check of vegetation for active bird nests immediately before vegetation clearance and provide written confirmation that no birds will be harmed and/or that there are appropriate measures in place to protect nesting birds on site. Any such written confirmation must be submitted to the Local Planning Authority prior to any work first commencing.

Avoidance Measures

At the start of the proposed works, a licenced bat ecologist is required to be on site to conduct a toolbox talk prior to works commencing. On the morning prior to the commencement of the works, two Vivara Pro Large Multi Chamber WoodStone® Bat Boxes are required to be installed on nearby trees facing north for emergency purposes.

If bats or evidence of bats are found during the site visit, works must cease, and a European Protected Species Mitigation Licence will be required from Natural England. If any bats are harmed or injured during the works, the local bat group will be contacted.

Post-development

No artificial lighting is to be shone on any scattered trees, shrubs, linear features, woodland, or waterways. For the site itself, an artificial lighting plan is required. All lighting must avoid the features of interest for the local bat populations. This is required due to the habitats within the local landscape meaning there is likely to be foraging and commuting bats within the local landscape.

Enhancements

A bat friendly planting scheme should be incorporated into the proposed scheme of works. The table below outlines some species that are of most benefit to wildlife and are considered to be 'bat attracting' flora. These species could be included in the soft landscaping of the survey site. This could involve the planting of a variety of the following floral species.

Flowers for borders		Trees, shrubs & climbers	Herbs
Aubretia	Night-scented stock	Common alder	Angelica
Candytuft	Ox-eye daisy	Dogrose	Bergamot
Cherry pie	Phacelia	Elder	Borage
Corncockle	Poached egg plant	English oak	Coriander
Corn marigold	Primrose	Gorse	English marigolds
Corn poppy	Red campion	Guelder rose	Fennel
Echniacea	Red valerian	Hawthorn	Feverfew
English bluebell	Scabious	Hazel	Hyssop
Evening primrose	St. John's Wort	Honeysuckle (native)	Lavenders
Field poppies	Sweet William	Hornbeam	Lemon balm
Honesty	Tobacco plant	Ivy	Marjoram
Ice plant 'pink lady'	Verbena	Jasmine	Rosemary
Knapweed	Wallflowers	Pussy willow	Sweet Cicely
Mallow	Wood forget-me-not	Rowan	Thyme
Mexican aster	Yarrow	Silver birch	
Michaelmas daisy			

6. Summary

6.1 Bat Presence or Absence

In summary, it can be concluded that there are five trees are of **low** potential (**T3**, **T4**, **T8**, **T9**, and **T13**) and one tree is of **moderate** potential (**T14**) to roosting bats onsite. All other trees are **negligible**. Trees were deemed to be of **low** potential to support roosting bats.

T13 and **T14** are to be retained by the scheme of works, meaning no further action is required for these specimens.

There are four trees set for removal on site that have **low** bat roosting potential (**T3**, **T4**, **T8**, and **T9**), due to the potential roosting features present. The absence of bats roosting within these trees cannot be confirmed from this survey visit alone.

Additionally, the surrounding habitats have been identified to as having the potential to support bat species.

6.2 Recommendations

The recommendations for Dower House, Harlington, can be summarised as follows (please refer to **Section 5 – Recommendations** for a more in-depth description):

- Trees of **low** roosting potential are to be removed by soft felling during winter months.

or

- Undertake one activity survey between May and September. Two surveyors per tree will be required to cover all elevations.
- Creation of an artificial lighting plan.
- Incorporate a bat friendly floral planting scheme.

7. References

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8. Appendices

Appendix A: Site Plans

Appendix B: Eco Data Map

Appendix C: Artificial Light and Bats

Appendix D: Photographic Records

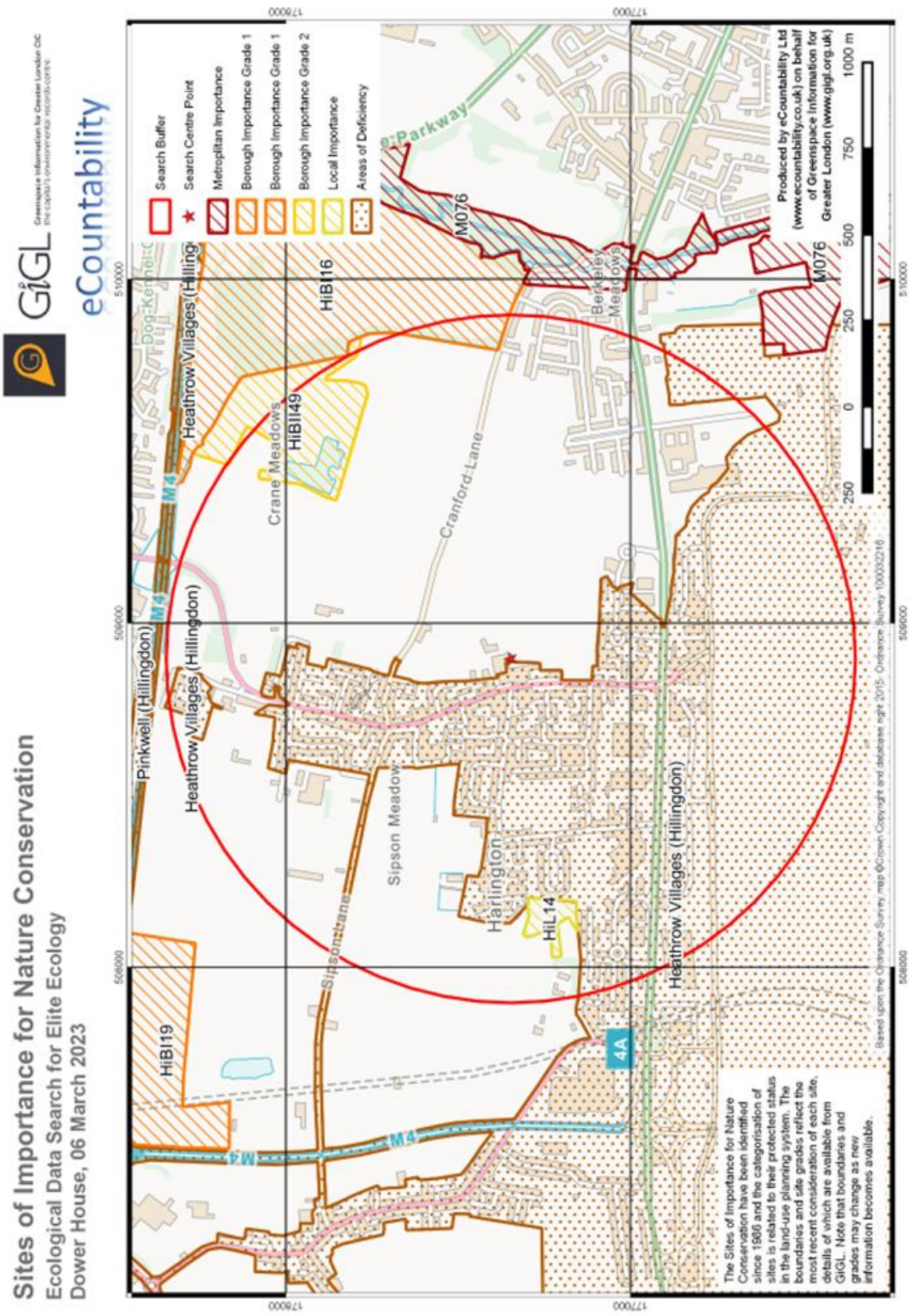
Appendix E: The Annual Bat Year (BCT)

Appendix F: Legislation

Appendix A: Site Plans

Appendix B: The Ecological Data Search Maps

This map was produced by GiGL. All rights regarding the map belong to them.



Appendix C: Artificial Lighting and Bats

Artificial lighting is known to affect bat's roosting and foraging behaviour, with lighting resulting in a range of impacts that includes roost desertion (BCT, 2009), delayed emergence of roosting bats (Downs et al., 2003), increased activity of some bat species and decreased activity by others (Stone et al., 2012).

An experimental approach using LED units, demonstrated that relatively fast-flying bat species, including the common pipistrelle, showed no significant impacts as a result of new artificial lighting, even when lighting was set at relatively high levels close to 50 lux.

In contrast, slow flying bats such as the myotis bats (Myotis spp.) showed sharp reductions in presence, even at low light levels of 3.6 lux (Stone et al., 2012).

Current recommendations for all bat species specifies that no bat roost should be directly illuminated.

Due to the impacts of lighting, mitigation and sensitive lighting design schemes are required for projects where bats are present. These should include bat friendly lighting plans that should aim to avoid lighting wherever possible. If this is not possible, then the minimisation of any lighting impacts is required by adopting the following measures:

- To introduce lighting curfews or use of PIR sensors.

  Lighting curfews can be an effective way of avoiding impacts on bats. These curfews may involve either turning off lighting or dimming light units at specific times of the night, dimming units at key times of the year, providing the luminaire allows for this option via a control unit. Lighting to be triggered by PIR sensors can be expected to be illuminated only when required and for a low proportion of time.

- To consider no lighting solutions where possible.

  Options such as white lining, good signage and LED cats eyes should be considered as preferable. Reflective fittings may help make use of headlights to provide any necessary illumination in some areas.

- To use only high pressure sodium or warm white LED lamps where possible.

  High pressure sodium and warm white LED lamps emit lower proportions of insect attracting UV light than mercury, metal halide lamps and white LED lighting. Generally, lamps should have a lower proportion of white or blue wavelengths, with a colour temperature <4200 kelvin recommended (BCT, 2014).

- To minimise the spread of light.

  The light spread should be kept at or near horizontal to ensure that only the task area is lit. Flat cut-off lanterns or accessories should be used to shield or direct light to where it is required. Baffles, hoods, louvres and shields should be used where necessary to reduce light spill.

- To consider the height of the lighting column.

  While downward facing bollard lighting is often preferable, it should be noted that a lower mounting height does not automatically reduce impacts to bats as bollard lighting can often be designed to provide up-lighting. Where bollard lighting is considered to be the most appropriate system, bollard spacing or unit density should be kept to a minimum and units should be fitted with the appropriate hoods/deflectors to reduce any up-lighting.

- To avoid reflective surfaces below lights.

  The polarisation of light by shiny surfaces attracts insects increasing bat activity (BCT, 2012). Consequently, surface materials around lighting require consideration.

Appendix D: Photographic Records

Plate 1: Image of **T1**.

Plate 2: Image of the stem of **T1**.

Plate 3: Image of **G1**.

Plate 4: Image of **T2**.

Plate 5: Image of the deadwood split on the northern elevation of **T2**.

Plate 6: Image of **T4** (left) and **T3** (right).

Plate 7: Image of the stem of **T3**.

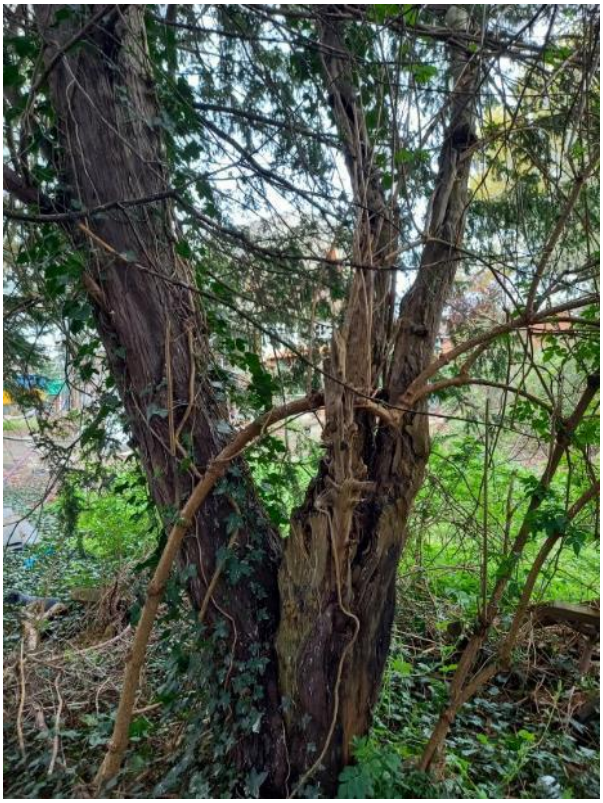


Plate 8: Image of the stem of **T4**.

Plate 9: Image of **T5**.

Plate 10: Image of the ivy on the stem of **T5**.

Plate 11: Image of **T6**.

Plate 12: Image of **T7**.

Plate 13: Image of **T8**.

Plate 14: Image of **T9**.

Plate 15: Image of **T10**.

Plate 16: Image of the peeling bark at the base of **T10**.

Plate 17: Image of **T11**.

Plate 18: Image of **T12**.

Plate 19: Image of the cavities present on **T12**.

Plate 20: Image of **T13**.

Plate 21: Image of **T14**.

Plate 22: Image of the stem of **T14**.

Plate 23: Image of **G2**.

Plate 24: Further image of **G2**.

Appendix E: The Annual Bat Year (BCT)

A Year in the Life of a Bat			
January		**February**	
	Hibernating; using up fat reserves.		Still hibernating; few fat reserves left.
March		**April**	
	Some activity; occasional bat seen feeding.		Awake and feeding at night.
May		**June**	
	Females looking for nursery sites.		Young born, usually only one.
July		**August**	
	Young still suckling.		Young start catching insects; females leave nursery to find males.
September		**October**	
	Mating season begins; start building fat reserves for hibernation.		Search for suitable hibernation site.
November		**December**	
	Hibernation begins although still some activity in warm weather.		Hibernating.

Appendix F: Legislation and Policy

All species of bat are fully protected under a variety of domestic, European and international legislation and conventions. These include:

- Bern Convention (Appendix II)
- Bonn Convention (Appendix II)
- Conservation Regulations (Northern Ireland) 1995
- The Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019
- Countryside Rights of Way Act 2000
- EuroBats Agreement
- Habitats Directive (Annexes IV and II)
- Habitats Regulations 1994 (as amended) Scotland
- NERC Act 2006
- Wildlife and Countryside Act 1981 (as amended)
- Wild Mammals Protection Act

In addition to this, some species have additional protection by being listed on the UK Biodiversity Action Plan (UKBAP).

The legislation afforded to bats makes it illegal to possess or control any live or dead specimens, to damage, destroy or obstruct access to any structure or place used for shelter, protection or breeding, and to intentionally disturb a bat while it is occupying a structure or place which it uses for that purpose.

All nesting Birds are protected under the Wildlife and Countryside Act 1981 (as amended), which protects Birds, nests, eggs and nestlings from harm. In addition to this, some rarer species, such as barn owls are afforded extra protection.

National Planning Policy Framework, Section 15:

In early 2012, the National Planning Policy Framework (NPPF) replaced much previous planning policy guidance, including Planning Policy Statement 9: Biological and Geological Conservation. The government circular 06/05: Biodiversity and Geological Conservation - Statutory Obligations and Their Impact within the Planning System, which accompanied PPS9, still remains valid. A presumption towards sustainable development is at the heart of the NPPF. This presumption does not apply however where developments require appropriate assessment under the Birds or Habitats Directives. The latest National Planning Policy Framework was updated in February 2019, with the section in relation to conserving the natural environment being located within section 15.

Section 15, on conserving and enhancing the natural environment, sets out how the planning system should contribute to and enhance the natural and local environment by minimising impacts on biodiversity and, where possible, provide net gains in biodiversity. Opportunities to incorporate biodiversity gains into a development should be encouraged.

Biodiversity 2020:

This sets out to halt overall biodiversity loss and support healthy well-functioning ecosystems by establishing coherent ecological networks, with more and better places for nature, to the benefit of wildlife and people. The government's policy is aimed at individuals, communities, local authorities, charities, business and government, which all have a role to play in delivering Biodiversity 2020.

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The survey results purport the current status of the site and its potential for protected species utilisation at the time of surveying. It should not be viewed as a complete list of the possible flora and fauna species that could be using the site at different times of the year.

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No reliance should be made on any such comments in relation to the structural integrity of the features located on the surveyed site. All information within the report is based solely on evidence that has been found on site during the service provided. No individual opinion or inference will be made other than that of the suitably qualified ecologist appointed to the project.