HOLLYBANK, MUSWELL HILL, GREATER LONDON

NOCTURNAL EMERGENCE AND DAWN RE-ENTRY BAT SURVEYS

A Report to: Spring Properties Ltd

Report No: RT-MME-120311-02

Date: August 2015

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REPORT VERIFICATION AND DECLARATION OF COMPLIANCE

This study has been undertaken in accordance with British Standard 42020:2013 “Biodiversity, Code of practice for planning and development”.

Report Version	Date	Completed by:	Checked by:	Approved by:
Final	31/08/2015	Paul Roebuck MSc MCIEEM (Senior Ecological Consultant)	Colin Bundy MCIEEM (Associate Director)	Dr Philip Fermor CEnv, MCIEEM (Managing Director)

The information which we have prepared is true, and has been prepared and provided in accordance with the Chartered Institute of Ecology and Environmental Management’s Code of Professional Conduct. We confirm that the opinions expressed are our true and professional bona fide opinions.

DISCLAIMER

The contents of this report are the responsibility of Middlemarch Environmental Ltd. It should be noted that, whilst every effort is made to meet the client’s brief, no site investigation can ensure complete assessment or prediction of the natural environment.

Middlemarch Environmental Ltd accepts no responsibility or liability for any use that is made of this document other than by the client for the purposes for which it was originally commissioned and prepared.

VALIDITY OF DATA

The findings of this study are valid for a period of 12 months from the date of survey. If works have not commenced by this date, an updated site visit should carried out by a suitably qualified ecologist to assess any changes in the habitats present on site, and to inform a review of the conclusions and recommendations made.

NON-TECHNICAL SUMMARY

In July 2015 Spring Properties Ltd. commissioned Middlemarch Environmental Ltd to undertake Nocturnal Emergence and Dawn Re-entry Bat Surveys at Hollybank, Muswell Hill in Greater London. These surveys are required to inform a planning application associated with the redevelopment of the site.

Middlemarch Environmental Ltd has previously carried out a Daytime Bat Survey, Nocturnal Emergence/Dawn Re-entry Bat surveys and a Preliminary Ecological Assessment at this site. The findings of these surveys are detailed in Report RT-MME-115705-02-Rev A, RT-MME-115924 and RT-MME-115705-01, respectively.

The latest bat reports undertaken in June 2014 advised if the proposed works have not commenced before 2015 then an updated survey should be undertaken to determine if bats have colonised the buildings and trees in the interim. Therefore, as the works have not yet started on site, an updated Daytime Bat Survey is required to be completed in addition to these updated Nocturnal Emergence/Dawn Re-entry Bat surveys. The results of which are presented in Report RT-MME-120311-01.

Therefore Nocturnal Emergence and Dawn Re-entry Bat Surveys were recommended. This report details the results of the surveys undertaken between 27th July 2015 and 14th August 2015.

The survey in 2015 showed very similar results to those recorded in 2014. Common and soprano pipistrelle bats were recorded flying over the site and foraging close to the trees and vegetation in generally similar flight patterns to 2014. Whiskered/brandt's bat was also recorded in low numbers but not visually seen. Following the suite of survey work undertaken on site it can be confirmed that the buildings and trees do not contain a bat roost.

The buildings and trees have been subject to a full suite of activity surveys in line with Bat Surveys: Good Practice Guidelines, published by the Bat Conservation Trust (Hundt, 2012) and no bat roosts were identified. The survey data obtained for the site is valid for 12 months from the survey date. If development works to the surveyed building have not commenced within this timeframe it will be essential to update the survey effort to establish if bats have colonised the buildings and trees in the interim.

In the unlikely event that a bat is found during site works all works in that area must immediately cease and a suitably qualified ecologist should be contacted.

Further recommendations regarding lighting and site enhancement for bats have also been provided.

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1. INTRODUCTION

1.1 PROJECT BACKGROUND

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Middlemarch Environmental Ltd has previously carried out a Daytime Bat Survey, Nocturnal Emergence/Dawn Re-entry Bat Surveys and a Preliminary Ecological Assessment at this site. The findings of these surveys are detailed in Report RT-MME-115705-02-Rev A, RT-MME-115924 and RT-MME-115705-01, respectively.

The latest bat reports undertaken in June 2014 advised if the proposed works have not commenced before 2015 then an updated survey should be undertaken to determine if bats have colonised the buildings and trees in the interim. Therefore, as the works have not yet started on site, an updated Daytime Bat Survey is required to be completed in addition to these updated Nocturnal Emergence/Dawn Re-entry Bat surveys. The results of which are presented in Report RT-MME-120311-01.

Therefore Nocturnal Emergence and Dawn Re-entry Bat Surveys were recommended. This report details the results of the surveys undertaken between 27th July 2015 and 14th August 2015.

All UK bat species are European protected species and they are capable of being material considerations in the planning process. A summary of the legislation protecting bats is included within Appendix 1. This section also provides some brief information on the ecology of British bat species.

1.2 SITE DESCRIPTION AND CONTEXT

The proposed development site known as Hollybank is situated off Muswell Hill in Greater London at National Grid Reference TQ 293 893. The site was flat, triangular in shape and measures approximately 0.16 ha in size. The site comprised three sets of one-storey garages and a two-storey residential house. The site also comprised a number of semi-mature trees, bare ground and hardstanding surfaces. The site was predominantly bound by wooden fencing to the north, south and west. The eastern boundary comprised an access road, providing access onto Muswell Hill.

The surrounding landscape is dominated by residential houses to the east and west with areas of open recreational ground. Allotments are located to the north-west of the site with a large area of woodland 500 m south-west.

2. METHODOLOGY

2.1 DESK STUDY

The desk study included a search for statutory nature conservation sites designated for bats within a 10 km radius of the site.

As a part of the Preliminary Ecological Assessment (RT-MME-115705-01) a desk study was undertaken to determine the presence of any bat species within a 1 km radius of the site. The consultee for the desk study data was Greenspace Information for Greater London (GiGl).

The results of the desk study are detailed within Table 3.1.Middlemarch Environmental Ltd then assimilated and reviewed the desk study data provided by these organisations. Relevant bat data are discussed in Chapter 3. In compliance with the terms and conditions relating to its commercial use, the full desk study data are not provided within this report

2.2 FIELD SURVEYS

2.2.1 Overview of Nocturnal Emergence and Dawn Re-entry Surveys

The Cottage and Garages were classed as having moderate to high potential to support roosting bats due to the numerous features of potential interest to roosting bats identified during the daytime survey. In line with The Bat Conservation Trust (Hundt, 2012) guidance, three bat surveys were carried out consisting of two nocturnal emergence bat surveys and one dawn re-entry bat survey. The aim of these surveys was to detect whether bats are roosting within the buildings, and to enable a profile of site utilisation by bats to be compiled.

An oak tree with high potential (Category 1*) was also surveyed as part of the works although it is understood that this tree will be retained as part of the proposals. Furthermore, although an Air Raid Shelter has previously been fully inspected during the Daytime Bat Survey in 2015 and no bats were recorded, this building was also surveyed during the Nocturnal Emergence and Dawn Re-entry Bat surveys.

2.2.2 Nocturnal Emergence Bat Surveys

In line with the specifications detailed in Bat Surveys: Good Practice Guidelines (Hundt, 2012), two nocturnal emergence bat surveys were conducted on site. The surveys commenced 20 minutes prior to sunset and continued until 120 minutes after sunset. The nocturnal emergence surveys were conducted using electronic bat detectors (IPad Echometer and Bat Box Duet with associated recording devices) to facilitate the detection of bats and to aid in the determination of species of bat using the site. Subsequent computer analysis of recordings allowed all species of bat using the site to be identified.

2.2.3 Dawn Re-Entry Bat Survey

Bats swarm at their roost site 10-90 minutes prior to entering the roost at dawn (Mitchell-Jones & McLeish, 2004). Surveying for dawn swarming by bats is an efficient way of detecting new bat roosts. In line with the specifications detailed by Bat Surveys: Good Practice Guidelines (Hundt, 2012) the dawn survey commenced 120 minutes prior to sunrise and continued until sunrise. To facilitate the detection of bats and to aid in the determination of species of bat using the site, the dawn survey was conducted using electronic bat detectors (IPad Echometer and Bat Box Duet with associated recording devices). Computer analysis of bat detector information collected was utilised to identify all species recorded on the site.

3. DESK STUDY

3.1 STATUTORY NATURE CONSERVATION SITES

The site is not located within 10 km of any statutory nature conservation sites designated for the presence of bats.

3.2 SPECIES RECORDS

Records of bat species within a 1 km radius of the survey area provided by the local record centre are summarised in Table 3.1. It should be noted that the absence of records should not be taken as confirmation that a species is absent from the search area.

Species	No. of Records	Most Recent Record	Proximity of Nearest Record to Study Area	Species of Principal Importance?	Local BAP?	Legislation / Conservation Status
Long-eared bat species *Plecotus* sp.	2	2007	60 m south-east	*	✓	ECH 4, WCA 5, WCA 6
Pipistrelle bat species *Pipistrellus*	11	2005	380 m north-east	*	✓	*
Common pipistrelle *Pipistrellus pipistrellus*	10	2007	430 m north-west	-	✓	ECH 4, WCA 5, WCA 6
Soprano pipistrelle *Pipistrellus pygmaeus*	10	2007	860 m south	✓	✓	ECH 4, WCA 5, WCA 6
Daubenton's bat *Myotis daubentonii*	1	2007	960 m north	-	✓	ECH 4, WCA 5, WCA 6
Natterer's bat *Myotis nattereri*	1	2007	960 m north	-	✓	ECH 4, WCA 5, WCA 6
Noctule bat *Nyctalus noctula*	7	2009	960 m north	✓	✓	ECH 4, WCA 5, WCA 6

Key:
*: Species dependent
ECH 4: Annex IV of the European Communities Council Directive on the Conservation of Natural Habitats and Wild Fauna and Flora. Animal and plant species of community interest in need of strict protection.
WCA 5: Schedule 5 of Wildlife and Countryside Act 1981 (as amended). Protected animals (other than birds).
WCA 6: Schedule 6 of Wildlife and Countryside Act 1981 (as amended). Animals which may not be killed or taken by certain methods.

Species of Principal Importance: Species of principal importance for nature conservation in England.
Local BAP: London Biodiversity Action Plan

Table 3.1: Summary of Bat Species Records Within 1 km Radius of Study Site

3.3 PREVIOUS BAT SURVEYS

Middlemarch Environmental Ltd has previously completed bat surveys at this site in 2013 and 2014 Report (RT-MME-115705-02-Rev A and RT-MME-115924). These surveys recorded no roosting bats in the trees and buildings on site. Three species of bat were identified during the surveys; common pipistrelle, soprano pipistrelle and whiskered/brandt's bat. The foraging activity from all three surveys was concentrated around the trees located within the rear gardens of Hollybank cottage, around the trees situated between the cottage and the garages and around the trees located at both the north-eastern and south-western extent. The commuting activity from all three surveys indicated that there is a commuting path from the north-east and south-west.

4. SURVEY RESULTS

4.1 FIRST NOCTURNAL EMERGENCE SURVEY

The nocturnal emergence survey was undertaken on 27th July 2015 by Mandy Davies (Assistant Ecologist), Ben Jones (Assistant Ecologist), Sian Comley (Assistant Ecologist) and Adrian Raso Del Prim (Assistant Ecologist). The weather conditions recorded at the time of the survey are detailed in Table 4.1.

Parameter	Conditions	
	Start	Finish
Temperature (°C)	16	15
Cloud Cover (%)	90	100
Precipitation	None	None
Wind Speed (Beaufort)	F2	F2

Table 4.1: Weather Conditions During First Nocturnal Emergence Survey

The first nocturnal emergence survey commenced 20 minutes prior to sunset and continued until 120 minutes after sunset. Sunset was at 20:54 hrs (BBC Weather Centre Data for London). The results of the survey including the location of surveyors and buildings surveyed is included on drawing number C120311-02-01 in Chapter 7.

One species of bat, common pipistrelle *Pipisrtellus pipistrellus*, was recorded during the survey.

Common pipistrelle
The first common pipistrelle bat was detected at 21:21 (27 minutes after sunset). This bat was recorded commuting from south to north close to the trees to the west of the site. A further five common pipistrelle bats were observed between 21:40 and 22:04 flying over the site, either in a northern or eastern direction. Common pipistrelle bats were also heard on detectors but not seen between 21:37 and 22:12. At 21:37 the detected common pipistrelle bat was considered to be foraging around the trees to the west of the site. No common pipistrelle bats emerged from the surveyed buildings or trees.

No other species of bat were detected or observed during this survey. Analysis of the sound recordings did not identify any further species of bat.

4.2 SECOND NOCTURNAL EMERGENCE SURVEY

The second nocturnal emergence survey was undertaken on 3rd August 2015 by Paul Roebuck (Senior Ecological Consultant), Rita Smoldareva (Ecological Project Officer), Jamie Fletcher (Assistant Ecologist) and Will Rees (Assistant Ecologist). The weather conditions recorded at the time of the survey are detailed in Table 4.2.

Parameter	Conditions	
	Start	Finish
Temperature (°C)	18	17
Cloud Cover (%)	10	10
Precipitation	None	None
Wind Speed (Beaufort)	F1	F1

Table 4.2: Weather Conditions During Second Nocturnal Emergence Survey

The nocturnal emergence survey commenced 20 minutes prior to sunset and continued until 120 minutes after sunset. Sunset was at 20:43 hrs (BBC Weather Centre Data for London). The results of the survey including the location of surveyors and buildings surveyed is included on drawing number C120311-02-02 in Chapter 7.

Two species of bat, common pipistrelle and soprano pipistrelle *Pipistrellus pygmaeus* were recorded during the survey.

Common pipistrelle
The first common pipistrelle bat was detected at 21:03 (20 minutes after sunset). This bat was recorded foraging over the north of the site close to the trees and then heading northwards off site. Another common pipistrelle bat was recorded foraging by the trees to the west of the site at 21:19. A further six common pipistrelle bats were observed between 21:08 and 21:44 flying over the site, generally in a northern or eastern direction but also to the south and west. Common pipistrelle bats were also heard on detectors but not seen between 21:00 and 21:44. In general these were considered to be mainly commuting common pipistrelle bats flying outside the site and occasionally foraging. No common pipistrelle bats emerged from the surveyed buildings or trees.

Soprano pipistrelle
Two soprano pipistrelle bats were visually detected on site. The first soprano pipistrelle bat was detected at 21:16 (33 minutes after sunset). This bat was recorded flying over the Hollybank Cottage to the north and heading off site. Another soprano pipistrelle bat was recorded at 21:25 foraging over the garages to the north of the site and then heading off site in the same direction. The same bat was considered to return and follow the same flight patterns at 21:38. No soprano pipistrelle bats emerged from the surveyed buildings or trees.

No other species of bat were detected or observed during this survey. Analysis of the sound recordings did not identify any further species of bat.

4.3 DAWN RE-ENTRY SURVEY

The dawn re-entry bat survey was undertaken on 14th August 2015 by Sarah Hickman (Ecological Consultant), Rita Smoldareva (Ecological Project Officer) Sian Comley (Assistant Ecologist) and Will Rees (Assistant Ecologist). The weather conditions recorded at the time of the survey are detailed in Table 4.3.

Parameter	Conditions	
	Start	Finish
Temperature (°C)	18	18
Cloud Cover (%)	100	100
Precipitation	None	None
Wind Speed (Beaufort)	F0	F0

Table 4.3: Weather Conditions During Dawn Re-entry Survey

The dawn re-entry survey commenced 120 minutes prior to sunrise and continued until sunrise. Sunrise was at 05:43hrs (BBC Weather Centre Data for London). The results of the survey including the location of surveyors and buildings surveyed is included on drawing number C120311-02-03 in Chapter 7.

Three species of bat, common pipistrelle, soprano pipistrelle and whiskered/brandt's bat *Myotis mystacinus/brandti* were recorded during the survey.

Common pipistrelle
The first common pipistrelle bat was detected at 04:39 (1 hour 4 minutes before sunrise). This bat was recorded flying over the north of the site. Another five common pipistrelle bats were recorded commuting over the south of the site between 05:10 and 05:24 generally in a north, south or easterly direction. Common pipistrelle bats were also heard on detectors but not seen between 04:12 and 05:22. They were considered to be occasionally foraging around the trees and vegetation on site but out of view. No common pipistrelle bats re-entered the surveyed buildings or trees.

Soprano pipistrelle
Four soprano pipistrelle bats were visually detected on site. The first soprano pipistrelle bat was detected at 04:56 (47 minutes before sunrise). This bat was recorded flying over the Hollybank Cottage to the southeast and heading off site. Another three soprano pipistrelle bats were recorded commuting over the north of the site in an east, west and southerly direction between 05:01 and 05:28. Soprano pipistrelle bats were also heard on detectors but not seen between 04:28 and 05:22. They were considered to be occasionally foraging around the trees and vegetation on site but out of view. No soprano pipistrelle bats re-entered the surveyed buildings or trees.

Whiskered/Brandt's Bat
A whiskered/brandt's bat was detected at 04:35 (1 hour 8 minutes before sunrise) but not visually seen. No whiskered/brandt's bat species were observed re-entering the buildings or trees located on site.

No other species of bat were detected or observed during this survey. Analysis of the sound recordings did not detect any further species of bat.

5. DISCUSSION AND CONCLUSIONS

5.1 DISCUSSION

5.1.1 Summary of Previous Surveys

Middlemarch Environmental Ltd has previously completed bat surveys at this site in 2013 and 2014 (Reports RT-MME-115705-02-Rev A and RT-MME-115924). These surveys recorded no roosting bats on site. Common pipistrelle, soprano pipistrelle and whiskered/brandt's bat were recorded during the surveys.

The foraging activity was located around the periphery of the site. The commuting activity indicated that there is a commuting path from the north-east and south-west.

5.1.2 Summary of Bat Activity Surveys

Nocturnal Surveys
Up to two species of bat were recorded during the nocturnal surveys; common pipistrelle and soprano pipistrelle. Generally bat activity was focused around the boundaries of the site. Common pipistrelle and soprano pipistrelle bats were recorded commuting over the site and also foraging over shrubs, trees and hedges.

No bats were recorded emerging from the buildings or trees on site.

Dawn Swarm Survey
Up to three species of bat were recorded during the nocturnal surveys; common pipistrelle, soprano pipistrelle and whiskered/brandt's bat. Generally bat activity was focused around the boundaries of the site. Common pipistrelle and soprano pipistrelle bats were recorded commuting over the site and also foraging over shrubs, trees and hedges.

No bats were recorded re-entering the buildings or trees on site.

5.2 CONCLUSIONS

The survey in 2015 showed very similar results to those recorded in 2014. Common and soprano pipistrelle bats were recorded flying over the site and foraging close to the trees and vegetation in generally similar flight patterns to 2014. Whiskered/brandt's bat was also recorded in low numbers but not visually seen. Following the suite of survey work undertaken on site it can be confirmed that the buildings and trees do not contain a bat roost.

6. RECOMMENDATIONS

All recommendations provided in this section are based on Middlemarch Environmental Ltd's current understanding of the site proposals correct at the time the report was compiled. Should the proposals alter, the conclusions and recommendations made in the report should be reviewed to ensure that they remain appropriate.

R1 Buildings and Trees

The buildings and trees have been subject to a full suite of activity surveys in line with Bat Surveys: Good Practice Guidelines, published by the Bat Conservation Trust (Hundt, 2012) and no bat roosts were identified. The survey data obtained for the site is valid for 12 months from the survey date. If development works to the surveyed building have not commenced within this timeframe it will be essential to update the survey effort to establish if bats have colonised the buildings and trees in the interim.

In the unlikely event that a bat is found during site works all works in that area must immediately cease and a suitably qualified ecologist should be contacted.

R2 Lighting of Boundary Features

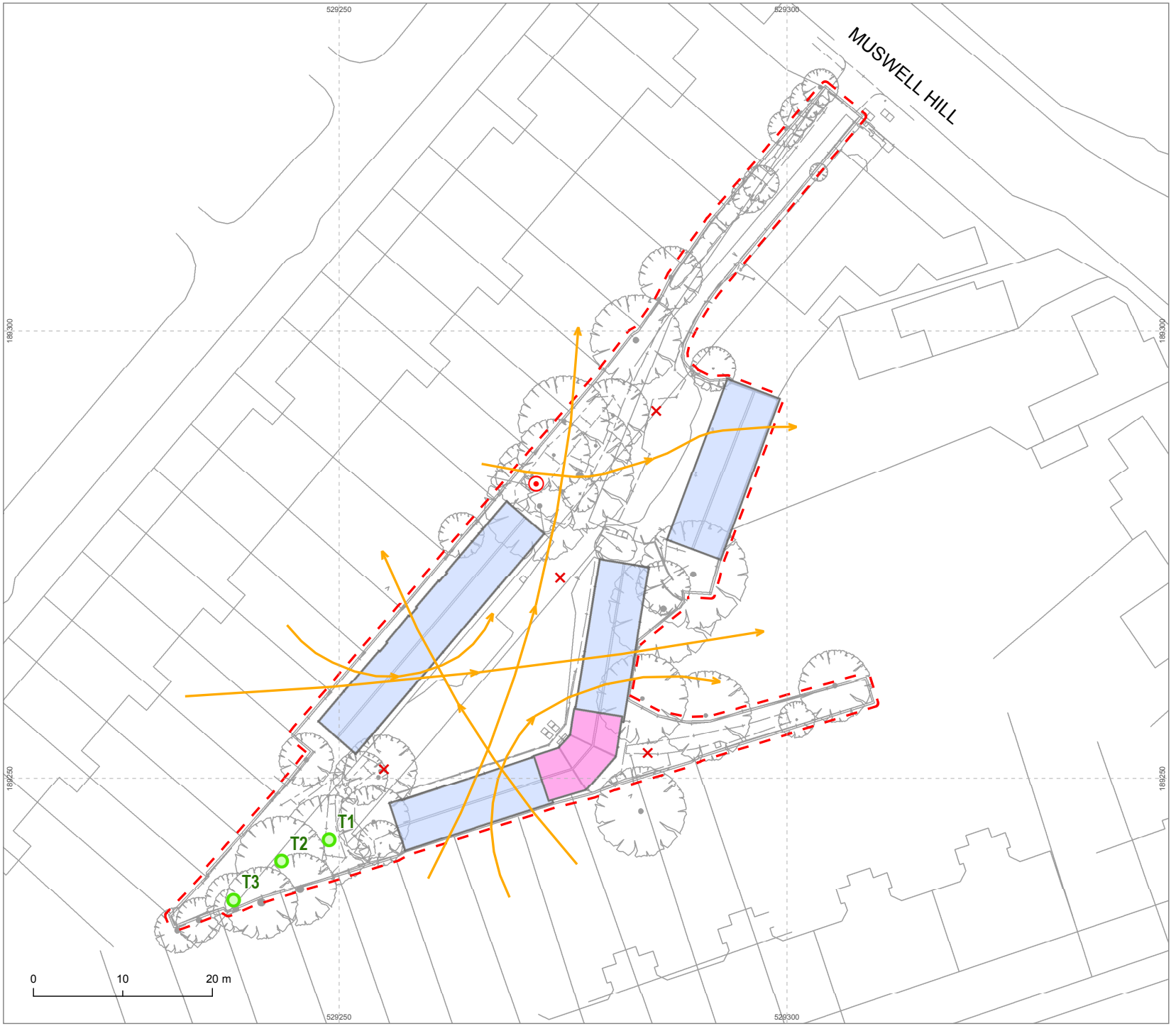
The site is used as a commuting and foraging site for bats within the local area. Therefore, the design of the proposed development should take into account the need to preserve the permeability of the site for bats and other wildlife. Habitat fragmentation may be minimised through the provision of unlit areas of planting which will provide 'green' connectivity either through or around the site. As such, lighting should be kept to a minimum within the proposed development site.

R3 Native Planting and Bat Boxes

The landscaping scheme for the proposed development should incorporate native and wildlife friendly species where possible. In addition, the planting of night-flowering species such as honeysuckle *Lonicera periclymenum*, would provide habitat for a variety of moths and other invertebrates, which in turn will provide a valuable foraging resource for bat species. Furthermore, the proposed development should take advantage of other opportunities to enhance the site for bat species, such as through the installation of bat roost boxes on mature trees in unlit areas. A variety of roost units suitable for all species recorded on site is advised.

7. DRAWINGS

Drawing C120311-02-01 – First Nocturnal Emergence Survey
Drawing C120311-02-02 – Second Nocturnal Emergence Survey
Drawing C120311-02-03 –Dawn Re-entry Survey



C120311-02-01

Legend

- Surveyor location
- Common pipistrelle commuting
- Tree surveyed for bat potential
- Location of air raid shelter
- Garages
- Two-storey cottage
- Site boundary

N

Project
Hollybank, Muswell Hill, Greater London

Drawing
1st Nocturnal Bat Survey 27/07/2015

Client
Spring Properties Ltd

Drawing Number	Revision
C120311-02-01	00
Scale @ A4	Date
1:600	August 2015
Approved By	Drawn By
PR	CD

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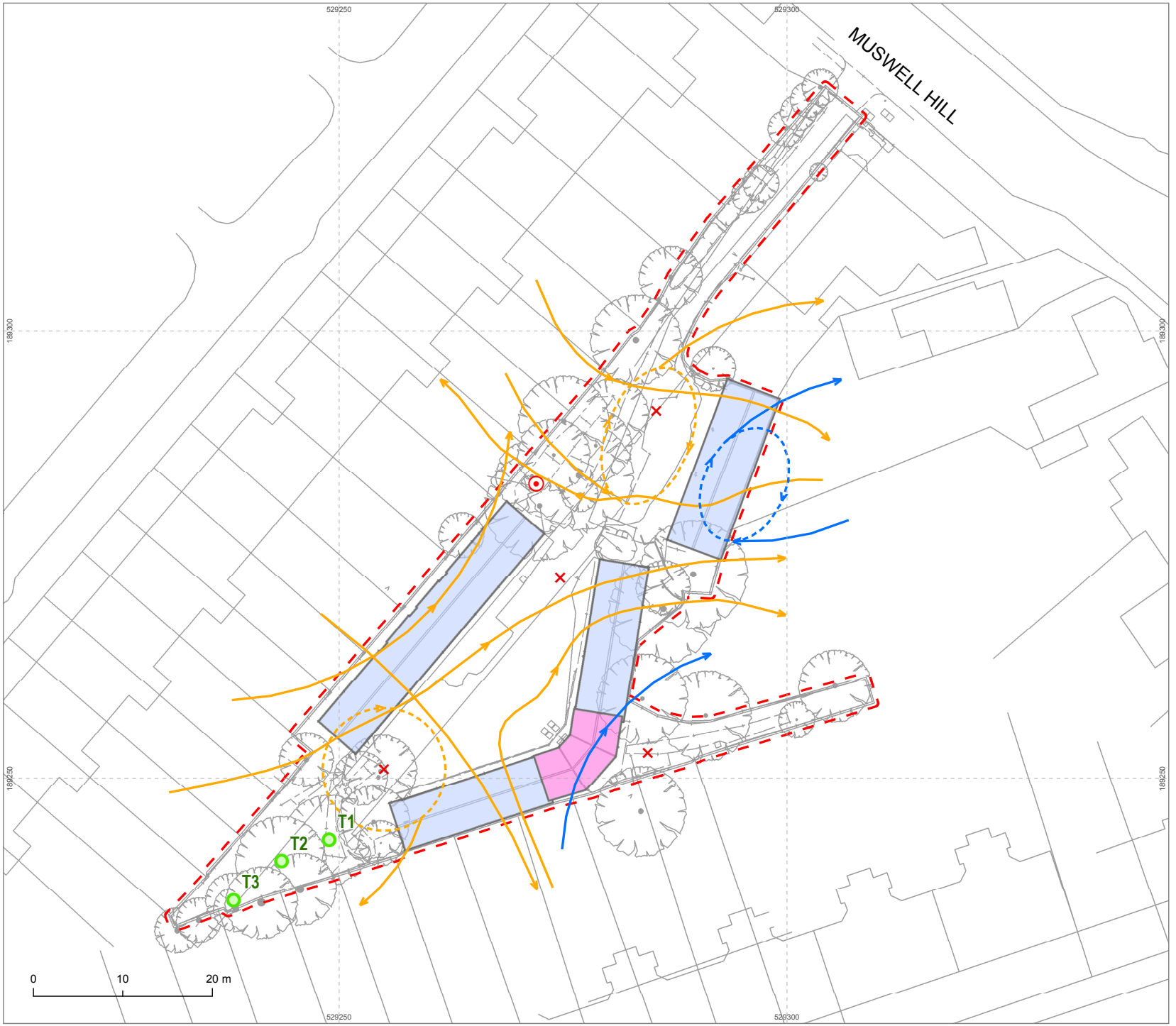

C120311-02-02

Legend

- Surveyor location
- Common pipistrelle commuting
- Common pipistrelle foraging
- Soprano pipistrelle commuting
- Soprano pipistrelle foraging
- Tree surveyed for bat potential
- Location of air raid shelter
- Garages
- Two-storey cottage
- Site boundary

N

Project
Hollybank, Muswell Hill, Greater London

Drawing
2ND Nocturnal Bat Survey 03/08/2015

Client
Spring Properties Ltd

Drawing Number	Revision
C120311-02-02	00
Scale @ A4	**Date**
1:600	August 2015
Approved By	**Drawn By**
PR	CD

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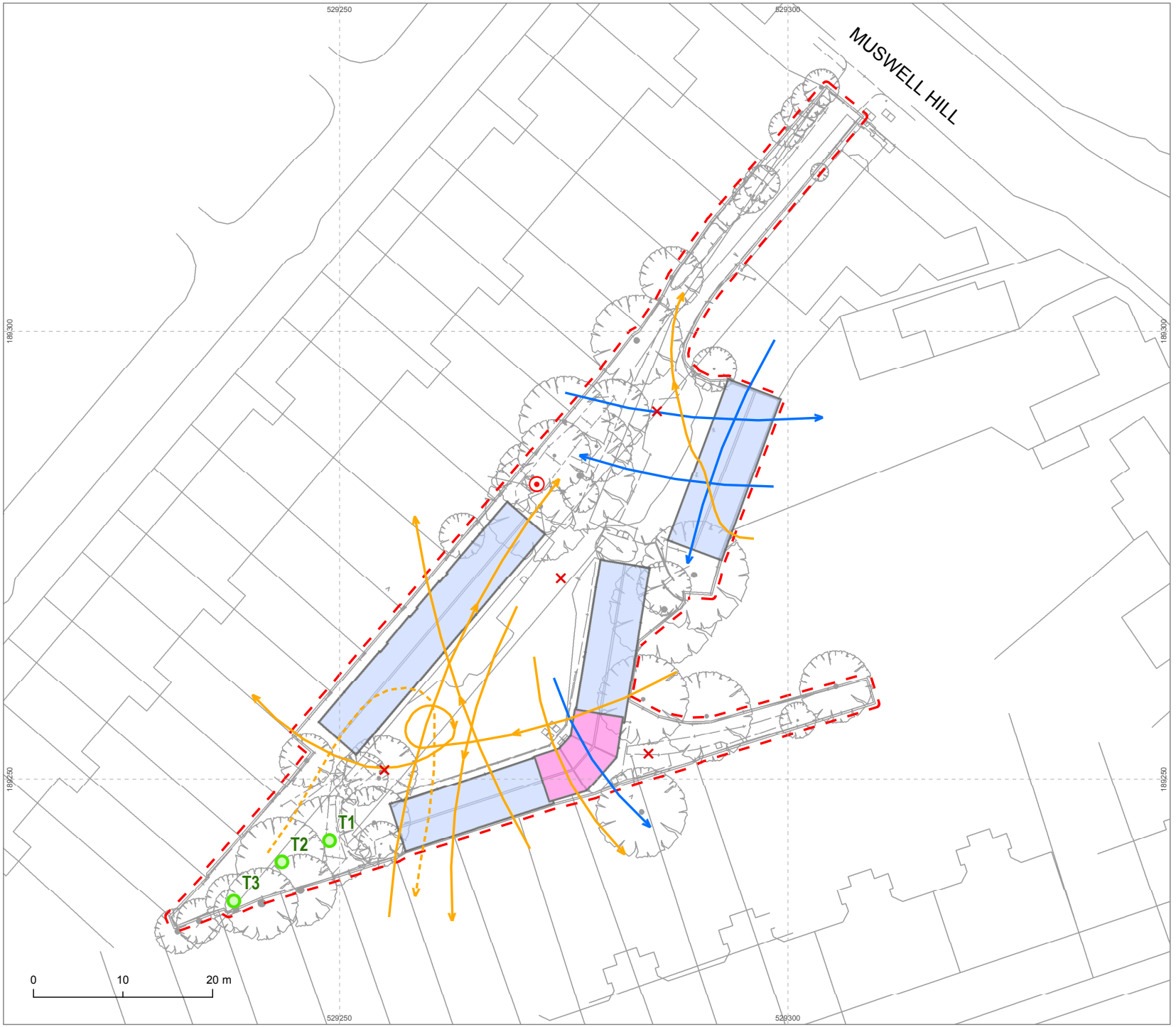

C120311-02-03

Legend

- Surveyor location
- Common pipistrelle commuting
- Common pipistrelle foraging
- Soprano pipistrelle commuting
- Tree surveyed for bat potential
- Location of air raid shelter
- Garages
- Two-storey cottage
- Site boundary

N

Project	Hollybank, Muswell Hill, Greater London
Drawing	Dawn Bat Survey 14/08/2015
Client	Spring Properties Ltd
Drawing Number: C120311-02-03	Revision: 00
Scale @ A4: 1:600	Date: August 2015
Approved By: PR	Drawn By: CD

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APPENDIX 1

LEGISLATION

Bats and the places they use for shelter or protection (i.e. roosts) receive European protection under The Conservation of Habitats and Species Regulations 2010, as amended (Habitats Regulations 2010, as amended). They receive further legal protection under the Wildlife and Countryside Act (WCA) 1981, as amended. This protection means that bats, and the places they use for shelter or protection, are capable of being a material consideration in the planning process.

Regulation 41 of the Habitats Regulations 2010 (as amended), states that a person commits an offence if they:

- deliberately capture, injure or kill a bat;
- deliberately disturb bats; or
- damage or destroy a bat roost (breeding site or resting place).

Disturbance of animals includes in particular any disturbance which is likely to impair their ability to survive, to breed or reproduce, or to rear or nurture their young, or in the case of animals of a hibernating or migratory species, to hibernate or migrate; or to affect significantly the local distribution or abundance of the species to which they belong.

It is an offence under the Habitats Regulations 2010 (as amended) for any person to have in his possession or control, to transport, to sell or exchange or to offer for sale, any live or dead bats, part of a bat or anything derived from bats, which has been unlawfully taken from the wild.

Whilst broadly similar to the above legislation, the WCA 1981 (as amended) differs in the following ways:

- Section 9(1) of the WCA makes it an offence to *intentionally* (rather than deliberately) kill, injure or take any protected species.
- Section 9(4)(a) of the WCA makes it an offence to *intentionally or recklessly** damage or destroy, *or obstruct access to*, any structure or place which a protected species uses for shelter or protection.
- Section 9(4)(b) of the WCA makes it an offence to *intentionally or recklessly** disturb any protected species *while it is occupying a structure or place which it uses for shelter or protection*.

*Reckless offences were added by the Countryside and Rights of Way (CRoW) Act 2000.

As bats re-use the same roosts (breeding site or resting place) after periods of vacancy, legal opinion is that roosts are protected whether or not bats are present.

The following bat species are Species of Principal Importance for Nature Conservation in England: barbastelle bat *Barbastella barbastellus*, Bechstein's bat *Myotis bechsteinii*, noctule *Nyctalus noctula*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared bat *Plecotus auritus*, greater horseshoe bat *Rhinolophus ferrumequinum* and lesser horseshoe bat *Rhinolophus hipposideros*.

At least eight species of bat are known to breed in Greater London, all of which are listed on the London local BAP: Noctule *Nyctalus noctula*, soprano pipistrelle *Pipistrellus pygmaeus*, brown long-eared bat *Plecotus auritus*, Whsikered *Myotis mystacinus,* Brandt's *Myotis brandtii*, Natterer's *Myotis natererii,* Daubenton's *Myotis daubentoni*, Serotine *Eptesicus serotinus*, Leisler's *Nyctalus leisleri*, common pipistrelle *Pipistellus pipistrellus* and nathusius pipistrelle *Pipistrellus nathusiusii*.

The reader should refer to the original legislation for the definitive interpretation.

ECOLOGY

At present, 18 species of bats are known to live within the United Kingdom, of which 17 species are confirmed as breeding. All UK bat species are classed as insectivorous, feeding on a variety of invertebrates including midges, mosquitoes, lacewings, moths, beetles and small spiders.

Bats will roost within a variety of different roosting locations, included houses, farm buildings, churches, bridges, walls, trees, culverts, caves and tunnels. At different times of the year the bats roosting

requirements alter and they can have different roosting locations for maternity roosts, mating roosts and hibernation roosts. Certain bat species will also change roosts throughout the bat activity season with the bat colony using the site to roost for a few days, abandoning the roost and then returning a few days or weeks later. This change can be for a variety of reasons including climatic conditions and prey availability. Bats are known live for several years and if the climatic conditions are unfavourable at a particular roost, they may abandon it for a number of years, before returning when conditions change. Due to the matriarchal nature of bat colonies, the locations of these roosts can be passed down through the generations.

Bats usually start to come out of hibernation in March and early April (weather dependent), when they start to forage and replenish the body weight lost during the hibernation period. The female bats then start to congregate together in maternity roosts prior to giving birth and a single baby is born in June or July. The female then works hard to feed her young so that they can become independent and of a sufficient weight to survive the winter before the weather gets too cold and invertebrate activity reduces. Males generally live solitary lives, or in small groups with other males, although in some species the males can be found living with the females all year. The mating season begins in the autumn. During the winter bats hibernate in safe locations which provide relatively constant conditions, although they may venture outside to forage on warmer winter nights.