WOLD ECOLOGY LTD

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Maria Fidelis School, Camden

Bat Survey, May 2018.

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Notes	:	This report contains sensitive information concerning protected species and caution should be exercised when copying and distributing to third parties.	
Disclaimer	:		

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1.0 EXECUTIVE SUMMARY

1.1 The field surveys during late May 2018 revealed no evidence of roosting bats. As no bats or signs of bats were recorded in the studied school building a Natural England European Protected Species development license is not required. The method statement outlined in section 7.2 details the best working practice and precautions to be taken to avoid breaking the law and must be followed and provided to all contractors involved with the demolition of the building.

1.2 **Bat roosts are protected throughout the year, whether bats are present or not.**

1.3 All bats and their roosts are fully protected under the Wildlife and Countryside Act 1981 (as amended by the Countryside and Rights of Way Act 2000) and are further protected under the Conservation of Habitats and Species Regulations 2017. Should any bats or evidence of bats be found prior to or during development, work must stop immediately and Natural England contacted for further advice. This is a legal requirement under the aforementioned acts and applies to whoever carries out the work.

1.4 Planning consent for a development does not provide a defence against prosecution under this act.

1.5 Habitat enhancement for bats should be implemented as outlined in section 7.0, in order to improve foraging opportunities to bats in the local area.

1.6 The data collected to support the output of this report is valid for one year. This report is valid until **May 2019**. After this time, additional surveys need to be undertaken to confirm that the status of the school building, as a bat roost, has not changed.

1.7 Species list within this report will be forwarded to the local biodiversity records centre to be included on their national database. No personal information will be sent. Please contact Wold Ecology if you do not wish the species accounts and 10 figure grid references to be shared.

1.8 Birds

- Whilst the survey provided detailed information on bats, no bird's nests were observed in the building.
- Birds are afforded various levels of protection and levels of conservation status on a species by species basis. The most significant general legislation for British birds lies within Part 1 of the Wildlife and Countryside Act 1981 (as amended). Under this legislation, it is an offence to, kill, injure or take any wild bird, take, damage or destroy the nest of any wild bird while that nest is in use or being built, take or destroy an egg of any wild bird. All nests should remain undisturbed and intact until after the breeding bird season – 1st March to 31st August.
- Planning consent for a development does not provide a defence against prosecution under this act.
- There was no evidence of barn owls *Tyto alba* roosting in the building.
- There was no suitable access for barn owls to roost in the building.

2.0 INTRODUCTION

2.1 Background Information

2.1.1 In May 2018, Wold Ecology was commissioned by Kier Construction Ltd to undertake a bat survey at the Maria Fidelis School, Camden, NW1 1TA. The site is located at approximate National Grid Reference TQ 29677 82943, in Greater London (see 5.5).

2.1.2 The Application Site comprises the following buildings:

- Maria Fidelis School

2.1.3 The proposed development includes the demolition of the school building on site.

2.2 Survey Objectives

2.2.1 The site was visited and assessed on 29th and 30th May 2018; this was to determine whether the school building contained bat roosts. The work involved the following elements:

Survey objective	Yes/No	Comments
Determine presence/absence of roosting bats	Yes	A daytime, visual inspection for bat roosts and roosting bats. Internal inspection of all roof voids. An assessment of the on-site potential for bats and the likelihood of their presence. Desktop study.
Determine bat usage e.gs maternity roost, summer roosts	Yes	An assessment of whether bats are a constraint to the development. Emergence (dusk) survey. Return (dawn) survey.
Identify swarming, commuting or mating sites	Yes	The survey looked at commuting routes from the roost to foraging grounds to ensure works did not impact these.
Other	Yes	The production of a non-technical summary of the legal implications behind bat presence.
		Report the findings of the field survey work and identify recommendations for a potential mitigation strategy.

3.0 BACKGROUND TO SPECIES

3.1 Ecological overview

3.1.1 There are seventeen species of bat that currently breed in the UK. There is a wide variety of roost type and ecological characteristics between species and for this reason it is necessary to determine the species of bat and the type of roost resident in a structure prior to development. Roosts are utilised by different species of bat, at different times of year for different purposes i.e. summer, breeding, hibernating, and mating etc. (for more detailed information see section 9.0).

3.1.2 Bat populations have undergone a significant decline in the latter part of the 20th century; the main factors cited for causing loss and decline include:

- A reduction in insect prey abundance, due to high intensity farming practice and inappropriate riparian management.
- Loss of insect-rich feeding habitats and flyways, due to loss of wetlands, hedgerows, and other suitable prey habitats.
- Loss of winter roosting sites in buildings and old trees.
- Disturbance and destruction of roosts, including the loss of maternity roosts due to the use of toxic timber treatment chemicals.

3.2 Legal Framework

3.2.1 A bat survey is required prior to planning permission being granted for a development, in order to prevent the potential disturbance, injury and /or death of bats and the disturbance, obstruction and/or destruction of their roosting places. This is in compliance with the Conservation of Habitats and Species Regulations 2017, provision 41 states an offence is committed if a person:

(a) Deliberately captures, injures, or kills any wild animal of a European protected species (i.e. bats),
(b) Deliberately disturbs wild animals of any such species,
(c) Deliberately takes or destroys the eggs of such an animal, or
(d) Damages or destroys a breeding site or resting place of such an animal.

3.2.2 Section 9 of the Wildlife and Countryside Act (1981) states:

- It is an offence for anyone without a licence to kill, injure, disturb, catch, handle, possess or exchange a bat intentionally. It is also illegal for anyone without a licence to intentionally damage or obstruct access to any place that a bat uses for shelter or protection.

3.2.3 Bat roosts are protected throughout the year, whether or not bats are occupying a roost site.

3.3 Planning Policy Guidance

3.3.1 A bat survey is a requirement of the local authority planning department, as part of the planning application process. This is specified in the following legislation:

- National Planning Policy Framework (NPPF): Biodiversity and Geological Conservation – national planning policy relation to biodiversity. NPPF Biodiversity and Geological Conservation gives further direction with respect to biodiversity conservation and land use change/development. NPPF states that not only should existing biodiversity be conserved, but importantly that

habitats supporting such species should be enhanced or restored where possible. The policies contained within NPPF may be material to decisions on individual planning applications.

3.3.2 Planning authorities must determine whether the proposed development meets the requirements of Article 16 of the EC Habitats Directive before planning permission is granted (where there is a reasonable likelihood of European Protected Species being present). Therefore, during its consideration of a planning application, where the presence of a European protected species is a material consideration, the planning authority must satisfy itself that the proposed development meets three tests as set out in the Directive.

3.3.3 The LPA has to assess whether the development proposal would breach Article 12(1) of the Habitats Directive. If Article 12(1) would be breached, the LPA would have to consider whether Natural England was likely to grant a European protected species licence for the development; and in so doing the LPA would have to consider the three derogation tests:

a) 'Preserving public health or public safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment'.

In addition, the LPA must be satisfied that:

(b) 'That there is no satisfactory alternative'

(c) 'That the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range'.

3.3.4 Relevant Case Law

- Woolley v Cheshire East Borough (2009).
- R.(Morge) v Hampshire County Council (2011).
- Prideaux v. Buckinghamshire County Council and Fcc Environmental UK Limited (2013).

3.3.5 The rulings summarise that if it is clear or perhaps very likely that the requirements of the Directive cannot be met because there is a satisfactory alternative or because there are no conceivable 'other imperative reasons of over-riding public interest" then the authority should act on that and refuse permission.'

3.3.6 The conclusion of the judgement is that LPAs must ensure that the option/alternative that best takes into account all the relevant considerations (not just EPS) should be the preferred option assuming that the other two tests specified in Article 16 (1) are also met.

3.3.7 The judgements also clarified that it was not sufficient for planning authorities to claim that they had discharged their duties by imposing a condition on a consent that requires the developer to obtain a licence from Natural England. Natural England considers it essential that appropriate survey information supports a planning application prior to the determination. Natural England does not regard the conditioning of surveys to a planning consent as an appropriate use of conditions.

4.0 ASSESSMENT METHODOLOGY

4.1 Status of species present in Greater London

4.1.1 Of the 16 species of bats in the UK, at least 8 species have been recorded in Greater London. The soprano pipistrelle is by far the most common and occurs in all London Boroughs. The common pipistrelle, noctule and Daubenton's bats are also regularly recorded and widespread.

4.1.2 A survey of London's bat population found that there has been a statistically significant decline in the bat population of Greater London since the mid-1980s, particularly for the noctule *Nyctalus noctula*, Leisler's *Nyctalus leisleri* and the serotine *Eptesicus serotinus* bats (Guest *et al*., 2000).

Source - London Biodiversity Partnership Species Action Plan: Bats

4.2 Data Review and Desk Study

4.2.1 Currently, there is no pre-existing information on bats at the site.

4.2.2 Brown long-eared *Plecotus auritus*, noctule *Nyctalus noctula*, Daubenton's *Myotis daubentonii*, soprano pipistrelle *Pipistrellus pygmaeus* and common pipistrelle *Pipistrellus pipistrellus* within 5km of the Application Site. Common pipistrelle and noctule bats are recorded within 5km on the London Bat Atlas (source - http://natsmaps.com/LondonBatAtlas/#).

4.2.3 Bat records exist in Bats occur in both Camley Street Local Nature Reserve and Regents Park, the aforementioned sites are 900m west and 900m north east respectively. Both sites are not connected to the school and connectivity is heavily fragmented by well-lit roads and buildings.

4.2.3 The following Natural England development licenses are located within 2km of the Application Site (source - magic.gov.uk):

Specie	Distance from site	Destruction of a breeding site	Destruction of a resting site
Common pipistrelle	1100m: S	N	Y

4.3 Daytime and Visual Inspection

4.3.1 The daytime assessment identified whether the area had any signs of occupancy and/or bat usage. This took the form of a methodical search, both internally and externally, for actual roosting bats and their signs. Specifically, the visual survey involved:

- Assessment for droppings on walls, windowsills and in roof spaces
- Scratch marks and staining on beams, other internal structures and potential entrance and exit holes
- Wing fragments of butterfly and moth species underneath beams and other internal structures
- The presence of dense spider webs at a potential roost can often indicate absence of bats
- Assessment of crevices and cracks in the buildings to assess their importance for roosting bats
- The duration of the daytime, visual inspection was 75 minutes

4.3.2 Summary of daytime inspection and visual survey

Date of each survey visit	Structure reference/location	Equipment used/available	Weather
30/05/18	Maria Fidelis School	Binoculars, 1million candle power clu-lite torch, micro Dart endoscope, Dewalt DW03050 Laser Measure. 3.9m telescopic ladders	14°C, 100% cloud. Beaufort 0. No recent rain.
Comments (to include # of surveyors used for each visit): 1 surveyor undertook the visual inspection.			
Personnel: Chris Toohie (Class 2 bat license - 2015-12688-CLS-CLS and RC027) – 30th May 2018			

4.4 Activity Surveys

4.4.1 Emergence surveys are used to determine bat presence in a building and can also give a good estimate of the numbers present. Bats can emerge up to 15 minutes before sunset and 2 hours after sunset. The survey times ensured that bats would have emerged from their roost sites and would be foraging (see section 9.4 and 9.5).

4.4.2 Summary of emergence survey(s)

Date of each survey visit	Start/end times and times of sunset	Structure reference/location	Equipment used/available	Weather
29/05/18	Sunset: 2106 Start: 2045 Finish: 2300	Maria Fidelis School	Cluson CB2 1 million candle power lamps Digital thermometer Heterodyne bat detectors Anabat Walkabout Wildlife Acoustics EM Touch 2 PRO EM3 Anabat Express Night vision scope	14°C - 12°C, 100% cloud. Beaufort 2, SE. No recent rain.
Comments (to include # of surveyors used for each visit): 4 surveyors were positioned around the site so that all potential access points, identified in the daytime, visual inspection, could be observed.				
Personnel: Chris Toohie (Class 2 bat license - 2015-12688-CLS-CLS and RC027) – 29th May 2018 George Day (Class 1 bat licence – 2017-29163-CLS-CLS) – 29th May 2018 James Worth and Ethan Scott – 29th May 2018				

4.4.3 Return surveys conducted at sunrise are particularly useful as bats tend to swarm outside their roosts for up to 2 hours before entering, thus allowing the surveyor more time to identify the bat and entrance locations. Bats will return to roosts approximately 90 minutes before sunrise and 15 minutes after. The timing of the survey ensured that returning bats would be recorded (see section 9.4 and 9.5).

4.4.4 Summary of return survey(s)

Date of each survey visit	Start/end times and times of sunrise	Structure reference/location	Equipment used/available	Weather
30/05/18	Sunrise: 0449 Start: 0300 Finish: 0515	Maria Fidelis School	Cluson CB2 1 million candle power lamps Digital thermometer Heterodyne bat detectors Anabat Walkabout Wildlife Acoustics EM Touch 2 PRO EM3 Anabat Express Night vision scope	13°C, 100% cloud. Beaufort 0. Light rain showers overnight.
Comments (to include # of surveyors used for each visit): 4 surveyors were positioned around the site so that all potential access points, identified in the daytime, visual inspection, could be observed.				
Personnel: Chris Toohie (Class 2 bat license - 2015-12688-CLS-CLS and RC027) – 30th May 2018 George Day (Class 1 bat licence – 2017-29163-CLS-CLS) – 30th May 2018 James Worth and Ethan Scott – 30th May 2018				

4.5 Summary of personnel

Personnel	Experience	Licence No.
Chris Toohie MCIEEM	Project Manager of Wold Ecology with over 11 years' experience surveying bat roosts for development licences. Chris has conducted over 800 bat surveys, held over 60 development licenses and is one of only 153 (April 2018) Natural England Registered Consultants who is able to make use of the new Bat Low Impact Class Licence.	RC027 and 2015-12688-CLS-CLS
George Day	Experienced bat surveyor since 2013. George has undertaken over 100 bat surveys with Wold Ecology Ltd and is currently working towards his bat handling license.	2017-29163-CLS-CLS
James Worth Ethan Scott	Wold Ecology Ltd associates with bat activity survey experience undertaken under the tuition of Wold Ecology licensed bat ecologists. James and Ethan have completed over 50 surveys each.	N/A

5.0 RESULTS

5.1 Habitat description

5.1.1 The studied school is less than 1ha in size and is situated in an urban location. The school is immediately surrounded by compact residential dwellings, commercial units and infrastructure including Euston Station. There are no other structures or buildings with potential to support roosting bats on site.

5.1.2 Adjacent Landscapes

5.1.2.1 The London suburb of Camden Town is a busy and extremely urban location within London and is dominated by areas of hard standing, infrastructure and buildings. Woodland cover within 2km is low due to the urban nature of the surrounding area; tree cover primarily occurs as singleton amenity trees in well-lit locations; a small grass area (<0.2ha) with trees is located adjacent to the northern boundary of the school but is of limited ecological value die to its size, short grassland composition and isolation. Habitat connectivity is also poor due to the urban nature of the Application site. The nearest urban greenspace is located 900m west at Regent's Park; there is no habitat connectivity between the park and the school.

5.1.2.2 Wold Ecology concludes that the adjacent urban habitats are likely to be used by occasionally commuting and foraging bats. These sub optimum habitats are not extensive, well lit, disturbed, and fragmented; they are similar to surrounding urban habitats and consequently, the Application Site and adjacent habitats are not considered integral to the favourable population status of local bat populations.

5.1.3 Habitat Summary

5.1.3.1 A summary of the surrounding habitat is (radius of < 2km from the site):

- Buildings – commercial units and residential properties
- Single street trees
- Mature private gardens
- Regents Park
- Camley Street Local Nature Reserve

5.2 Building description

5.2.1 The bat survey and assessment targeted the following (see section 5.5):

a. ***Maria Fidelis School*** – is three storeys and comprises brick walls and a pitched roof covered with slates; the roof also contains a number of dormer windows. The roof is supported by smooth sawn timbers and is underdrawn; the roof is vaulted with no separate roof void. The building is currently in use as a school.

5.2.2 ***Maria Fidelis School*** (see 5.5 plates 1 - 6) - the following roosting opportunities were present within the fabric of the building:

- There are no gaps beneath the ridge tiles and none are missing.
- Gaps beneath slates.
- Slipped slates.
- Gaps below lead flashing adjacent to chimneys, valleys and dormer cheeks.

- Gaps above the eaves.
- Missing mortar in the brick work.
- The barge boards were tightfitting.
- The timber doors and timber window frames were tight fitting.
- Gaps between timber slats and slates above.
- There was no open doors/window access into the roof void.
- Ivy *Hedera helix* is growing on the building but is of insufficient structure to support roosting bats.
- No evidence of bats was observed.
- The building has been assessed as having a LOW SUITABILITY to support bats.

5.3 Based on the field survey and the criteria in table 4.1 (Bat Surveys for Professional Ecologists – 3rd Edition, p35. Bat Conservation Trust, 2016), the Application Site and studied building has the following suitability for bats:

	Negligible	Low	Moderate	High
Application Site habitats (<2km)	X			
Maria Fidelis School		X		

Table 4.1 Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of habitat features within the landscape, to be applied using professional judgement.

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

Source - Bat Surveys for Professional Ecologists – 3rd Edition, p35. Bat Conservation Trust, 2016.

NORTH

Scale: 1:25,000

Drawing title:
Location Map

KEY

Application Site

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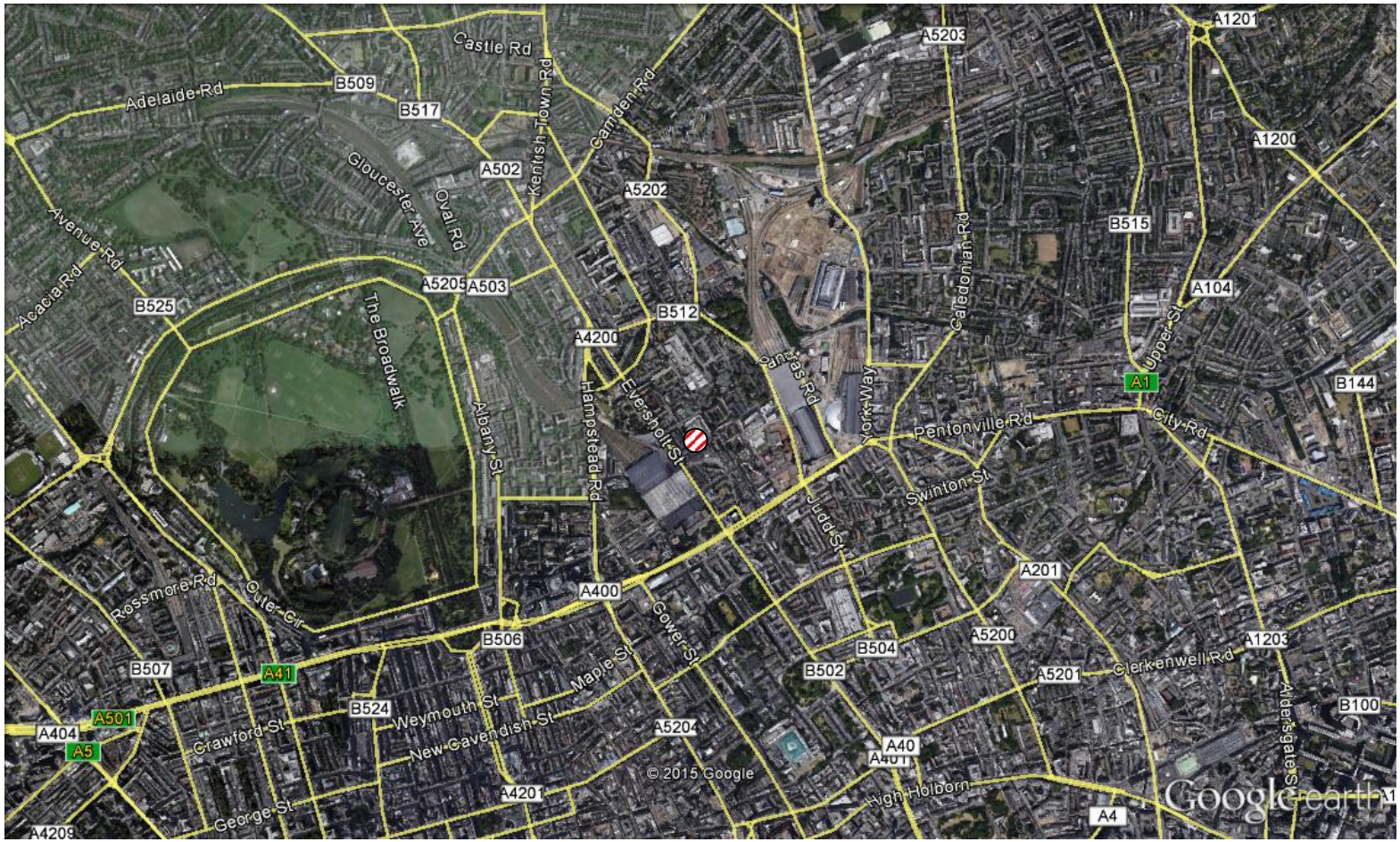

NORTH

Scale: 1:25,000

Drawing title:
Aerial Photograph

KEY

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5.4 Results of Activity Surveys

5.4.1 Emergence Survey

5.4.1.1 **29th May 2018**

- The first common pipistrelle bat was detected at 2147. This was not close to the anticipated (< 30 minutes after sunset) emergence time and suggests that a roost is not close by. The bat appeared from the direction of the adjacent housing estate to the west.
- Common pipistrelle bats were observed foraging and commuting around the site in very low numbers.
- No bats were observed emerging from the school building.

5.4.1.2 For survey results see appendix 9.4 and 9.5.

5.4.2 Return Survey

5.4.2.1 **30th May 2018**

- Bat activity was low throughout much of the survey with the site used by common pipistrelle bats in low numbers.
- No bats were observed returning to roosts in the school building.

5.4.2.2 For survey results see appendix section 9.4 and 9.5.

5.5 Photographs of key features – 30th May 2018

Plate 1 – north elevation.

Plate 2 – east elevation.

Plate 3 – east elevation.

Plate 4 – west elevation.

Plate 5 – west elevation.

Plate 6 – south elevation

5.7 Interpretation and Evaluation of Survey Results

5.7.1 Presence/absence

5.7.1.1 The site is currently used by foraging and commuting common pipistrelle bats in low numbers, a maximum of one bat was observed at any one time.

5.7.1.2 No roosting bats or evidence of roosting bats were observed during the field surveys.

5.7.2 Site Status Assessment

5.7.2.1 Based on a building inspection, an emergence survey and return survey, it has been determined that Maria Fidelis School is unlikely to support a bat roost. The results are based on survey work conducted in May, but as the school has a low suitability to support roosting bats, there remains a possibility that bats could use the school at other times of the year.

5.7.2.2 Maria Fidelis School is located adjacent to fragmented, well-lit and disturbed foraging habitat that is unlikely to play an important role in the ecology of the local bat population.

5.7.3 Constraints

5.7.3.1 There are no constraints to the survey.

6.0 IMPACT ASSESSMENT

6.1 Based on current information, Maria Fidelis School does not support a bat roost. Consequently, the impact to roosting bats from the demolition of the school building is considered to be **negligible.**

6.2 The current information obtained is based on a desk top study, visual inspection and activity surveys conducted in May. Bat activity surrounding the building was also low, with a total of 1 common and widespread bat species observed foraging/commuting in low numbers. Consequently, the impact to bat populations locally, nationally and regionally from the proposed demolition is considered to be **negligible.**

7.0 MITIGATION & COMPENSATION

7.1 Legal Protection

7.1.1 Legal obligations towards bats are generally concerned with roost protection. All developments, known to contain bat roosts, require a licence from Natural England. Under Section 9 of the Wildlife and Countryside Act (1981) it is an offence for anyone without a licence to kill, injure, disturb, catch, handle, possess or exchange a bat intentionally. It is also illegal for anyone without a licence intentionally to damage or obstruct access to any place that a bat uses for shelter or protection.

7.1.2 Planning consent for a development does not provide a defence against prosecution under these acts.

7.1.3 **Bat roosts are protected throughout the year, whether bats are present or not.**

7.1.4 As no bat roosts or evidence of bats were detected in Maria Fidelis School during the surveys, demolition of the school would not require a Natural England development licence. However, the school building has a low suitability of bat interest and therefore has features that could support roosting bats. There is a low possibility that individual bats could turn up roosting in the building at any time during the year. The following procedures highlighted in Section 7.2 should be adopted during the building works. Section 7.2 identifies working practices or precautions necessary to avoid injury or death to any bats that may be present in the buildings.

7.2 Method Statement

7.2.1 This statement should be copied to contractors and all those involved with demolition works, whose work may affect bats and their roosts on site. Even though bats have not been found, building works should occur as though bats could be present.

7.2.2 Timing

7.2.2.1 There are no mandatory timing constraints when roosting bats have not been found.

7.2.3 Locating Bats

7.2.3.1 Bats are by nature highly secretive, mobile mammals, therefore bats and their roosts can be very difficult to detect. A pipistrelle bat is capable of roosting in a crack measuring 20mm. In order to reduce any unnecessary disturbance, injury or death of any late discoveries of individual bats roosting in the buildings the following procedures should be implemented. Common roosts locations must be checked. These include:

- Underneath slates
- Underneath ridge tiles
- Crevices in brick work and gaps in mortar
- Mortise joints in roof timbers
- Above the eaves and internal wall plates

- Under lead flashing
- Roof timbers including ridge beams and rafters

7.2.4 Working Approach

7.2.4.1 Careful removal by hand of all fittings and fixtures as describe in 7.2.3. Wall cavities should be checked prior to demolition.

7.2.4.2 Remove roof coverings by hand. Only half of the roof should be removed on the first day and the second half 24 hours later. This will create unfavourable conditions for any bats still roosting within the roof structure and encourage the bats to leave on their own accord.

7.2.4.3 In the unlikely event that bats are discovered:

- Immediately stop the work that you are undertaking
- Contact Wold Ecology on 01377 200242/07795 071504 for advice.
- Advise colleagues in the vicinity of your work why you have stopped and advise them to be aware of the potential for bats being disturbed, injured or killed
- Immediately report the matter to your site manager/line manager who will inform relevant people.
- Grounded bats should be covered with a box (not airtight) and all works within 5m should cease until a bat ecologist arrives to move the bat.

7.2.4.4 Bats will only be handled by a licensed bat ecologist, wearing gloves, who has received a rabies vaccination. The bat will be placed either into a holding box, with water provided, and re-released close to the farm at dusk, or placed into a bat box located on site.

7.2.4.5 Injured bats will be taken into care (as directed by the Bat Workers Manual, section 7.3, pages 64 – 66: 3rd edition 2004) and fed and cared for until such time when conditions are suitable (night time temperature are $>6^0$C) for them to be released at dusk in the mitigation area.

7.2.5 Bat boxes

7.2.5.1 Specially designed bat boxes can be located on site. Schwegler Bat Boxes are recommended and well tested boxes. The following bat boxes provide additional roost habitats and are available from Wold Ecology:

- The **1FQ** is an attractive box designed specifically to be fitted on the external wall of a house, barn or other building. Equally appealing to bats as a roost or a nursery, it features a special porous coating to help maintain the ideal temperature inside along with a rough sawn front panel to enable the bats to land securely.

7.2.5.2 The majority of these boxes are self-cleaning as they are designed so that the droppings fall out of the entrance. This reduces the possibility of smell during the summer months. For more information on designs and installation of bat boxes see: www.schwegler-natur.de and www.bct.org.uk.

7.2.5.3 Wold Ecology recommends that at least 2 bat boxes are sited on new buildings. Bat boxes should be erected on south, east or west elevations/aspects; 3-5 metres above ground level or close to roof lines.

7.2.6 Lighting

7.2.6.1 Lighting has a detrimental effect on bat activity; many bats will actually avoid areas that are well lit. Lighting can cause habitat fragmentation by preventing bats from commuting between roosts and foraging grounds (A.J Mitchell-Jones 2004).

7.2.6.2 The impact on bats can be minimised by the use of low pressure sodium lamps or high-pressure sodium instead of mercury or metal halide lamps where glass glazing is preferred due to its UV filtration characteristics. Lighting to be used should not emit Ultra Violet radiation so that they don't attract insects and consequently, they will have a minimal effect on bats.

7.2.6.3 Luminaire and light spill accessories - Lighting should be directed to where it is needed, and light spillage avoided. This can be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvres and shields to direct the light to the intended area only.

7.2.6.4 If applicable, the height of lighting columns in general should be as short as is possible as light at a low level reduces the ecological impact. However, there are cases where a taller column will enable light to be directed downwards at a more acute angle and thereby reduce horizontal spill. For pedestrian lighting, this can take the form of low level lighting that is as directional as possible and below 3 lux at ground level. Aim for lighting column of 5m or less, hooded and cowled to prevent light spill, for main lighting columns

7.2.6.5 Security lighting power, it is rarely necessary to use a lamp of greater than 2000 lumens (150 W) in security lights. The use of a higher power is not as effective for the intended function and will be more disturbing for bats. Many security lights are fitted with movement sensors which, if well installed and aimed, will reduce the amount of time a light is on each night. This is more easily achieved in a system where the light unit and the movement sensor are able to be separately aimed. If the light is fitted with a timer this should be adjusted to the minimum to reduce the amount of 'lit time'. The light should be aimed to illuminate only the immediate area required by using as sharp a downward angle as possible. This lit area must avoid being directed at, or close to, any bats' roost access points or flight paths from the roost. A shield or hood can be used to control or restrict the area to be lit. Avoid illuminating at a wider angle as this will be more disturbing to foraging and commuting bats as well as people and other wildlife.

7.2.6.6 At this site, lights will **not** be mounted where they will shine directly on to bat boxes.

7.2.7 Timber treatment

7.2.7.1 It is good practice, where bats may come into contact with roof timbers, to carry out timber treatment using Permethryn type chemicals on the Natural England list of approved safe chemicals. New pre-treated timbers i.e. tanalised timber will be allowed to dry thoroughly before use, if applicable. A list of Natural England approved paints and timber treatments is available at http://www.naturalengland.org.uk/Images/Bat%20roost%20timber%20treatmen

t_tcm6-10167.pdf.

7.2.8 Habitat enhancements

7.2.8.1 Freshwater, woodland, grassland, urban gardens, trees and amenity green space are suitable foraging habitats for bats whilst linear habitats such as hedgerows and streams are particularly important commuting routes between roosts and foraging ground. It is recommended that the natural landscape remains largely unchanged and as many mature trees are retained on the site to continue to provide cover and feeding grounds. Landscaped areas can provide good foraging grounds for bats. Areas can be improved by growing night-scented flowers and other flowers favoured by insects. More information on suitable planting to encourage bats obtained from The Bat Conservation Trust (www.bats.org). Suitable species include:

- Foxglove *Digitalis purpurea*
- Cowslip *Primula veris*
- Red campion *Silene dioica*
- Marjoram *Origanum vulgare*
- Ox-eye daisy *Leucanthemum vulgare*
- Red clover *Trifolium pratense*
- Evening primrose *Oenothera biennis*.
- Honeysuckle *Lonicera periclymenum.*
- Wild Clematis *Clematis virginiana*

8.0 REFERENCES

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9.0 APPENDICES

9.1 Background to Bats - Bat Biology.

9.1.1 Bats roost in a variety places such as caves, mines, trees and buildings. Woodlands, pasture, ponds and slow flowing rivers or canals provide suitable feeding areas for bats as they support an abundance of suitable insect forage. Bats tend to feed during the first two to three hours after sunset and again before dawn, when insect activity is at its most intense (JNCC 2004).

9.1.2 Bat activity over the course of a year reflects the seasonal climate and the availability of food as follows (The Bat Conservation Trust, undated):
January - March - insect prey is scarce and bats will hibernate alone or in small groups.
April - May - insects are more plentiful and bats will become active. They may become torpid (cool and inactive) in severe weather. Females will start to form groups and will roost in several sites.
June - July - females gather in maternity roosts and give birth to young, which are suckled for several weeks. Males roost alone nearby.
August - September – mothers leave the roost before the young. Bats mate and build up fat for the winter.
October - December – Bats search for potential hibernacula. They become torpid for longer periods and then hibernate.

9.1.3 Bats do not stay in the same roost throughout the year. They have different requirements of roosts at various times of the year. During late April/May the bats leave their winter roosts and the females come together to form 'nursery roosts', these usually consists of pregnant females along with a few non-breeding and immature females. At this time, the males roost either singly or in small numbers. The single offspring is born during late June early July and can fly within 3-5 weeks.

9.1.4 Typical roost site are cracks and crevices in buildings and other structures but more typically under hanging tiles, slates, soffits and cavity walls of fairly modern buildings or holes and splits in trees.

9.1.5 The conditions needed by bats for hibernation require the maintenance of a relatively stable low temperature ($2 – 6^0$). Suitable sites include; old trees, caves, cellars, tunnels, and icehouses.

9.1.6 Whilst the summer roosts consist of single species (although 2 – 3 species can be found within one large structure but occupying separate roost sites), winter sites often consist of 4 – 6 species of bat, although there is often niche separation.

9.1.7 Bats have a complex social structure based on 'meta populations' and also utilise other transitional or intermediate roost sites. The several types of roost which bats occupy throughout the year, are as follows:

- **Day roost**: a place where individual bats, or small groups of males, rest or shelter in the day but are rarely found by night in the summer.
- **Night roost**: a place where bats rest or shelter in the night but are rarely found in the day. May be used by a single individual on occasion or it could be used regularly by the whole colony.
- **Feeding roost**: a place where individual bats or a few individuals rest or feed during the night but are rarely present by day.

- **Transitional/occasional roost**: used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.
- **Swarming site**: where large numbers of males and females gather during late summer to autumn. Appear to be important mating sites
- Mating sites: sites where mating takes place from later summer and can continue through winter.
- **Maternity roost**: where female bats give birth and raise their young to independence.
- **Hibernation roost**: where bats may be found individually or together during winter. They have a constant cool temperature and high humidity. These have to be cold and free from any temperature fluctuation with high humidity. The coldness enables bats to lower their body temperature and become torpid. This saves a lot of energy, enabling them to survive on the fat stores within their bodies that they have built up throughout the summer.
- **Satellite roost**: an alternative roost found in close proximity to the main nursery colony used by a few individual breeding females to small groups of breeding females throughout the breeding season.

9.1.8 The main threats to bats include:

- Habitat loss (e.g. deforestation)
- Loss of feeding areas as a result of modern forestry and farming practices.
- Use of toxic agrochemicals and remedial timber treatment chemicals.
- Disturbance and damage to bat roosts.

9.1.9 Bats have been in decline both nationally and internationally during the latter part of the 20th Century. Bats require a variety of specific habitats in order to meet the basic needs of feeding, breeding and hibernating and are therefore extremely vulnerable to change such as the loss of flight lines through the removal of hedgerows. It is thought that even the two most common and widespread bats, the common pipistrelle and the soprano pipistrelle, have declined by an estimated 70% (1978-1993 figures). There are a number of bat species, which are now considered seriously threatened with one species, the greater mouse-eared bat being classed as extinct as it is no longer breeding in the U.K.

9.1.10 All European bats are listed in Annex IV of the EC Directive 92/94/EEC 'The Conservation of Natural Habitats and of Wild Fauna and Flora' as needing "strict protection". This is translated into British Law under the Habitats and Species Regulations 2017. British bats are included under Schedule 5 of the Wildlife & Countryside Act 1981. They can therefore be described as a 'fully protected' or 'protected' species.

9.1.11 A summary of the legal protection afforded to bats under both European and British law is provided by the Bat Conservation Trust (BCT, 2010) and states:
'All European bat species and their roosts are listed in Annex IV of the EC Directive 92/94/EEC 'The Conservation of Natural Habitats and of Wild Fauna and Flora' as needing "strict protection". This is implemented in Britain under the Conservation of Habitats and Species Regulations 2017 which has updated the Conservation (Natural Habitats &c.) Regulations (as amended). In summary, in the UK, it is an offence to:

- Deliberately capture, injure or kill a bat;

- Deliberately disturb a bat in a way that would affect its ability to survive, breed or rear young, hibernate or migrate or significantly affect the local distribution or abundance of the species;
- Damage or destroy a roost (this is an absolute offence); and
- Possess, control, transport, sell, exchange or offer for sale/exchange any live or dead bat or any part of a bat.'

9.1.12 The species is also listed in Appendix II of the Bonn Convention (and its Agreement on the Conservation of Bats in Europe) and Appendix II of the Bern Convention (and Recommendation 36 on the Conservation of Underground Habitats). Although these are recommendations and not statutory instruments.

9.1.13 Natural England is the Government body responsible for nature conservation. Local planning authorities must consult them before granting planning permission for any work that would be likely to result in harm to the species or its habitat. Natural England issue "survey" licenses for survey work that requires the disturbance or capture of a species for scientific purposes. They also issue "conservation" licenses that are required for actions that are intended to improve the natural habitat of a European protected species or to halt the natural degradation of its habitat.

9.1.14 'Development' licences are issued by Natural England for any actions that may compromise the protection of a European protected species, including bats, under the Conservation of Habitats and Species Regulations 2017. This includes all developments and engineering schemes, regardless of whether or not they require planning permission.

9.1.15 The UK Biodiversity Action Plan states that although the pipistrelle is one of the most abundant and widespread bat species in the UK, it is still thought to have undergone a significant decline in the latter part of this century. The main factors cited for causing loss and decline include:

- A reduction in insect prey abundance, due to high intensity farming practice and inappropriate riparian management.
- Loss of insect-rich feeding habitats and flyways, due to loss of wetlands, hedgerows and other suitable prey habitats.
- Loss of winter roosting sites in buildings and old trees.
- Disturbance and destruction of roosts, including the loss of maternity roosts due to the use of toxic timber treatment chemicals.

9.2 Significance of bat roosts, appraising the nature conservation value;

9.2.1 The significance of bat roosts should be appraised against the following table. Where the extent of the bat roost is unclear a precautionary approach should be taken in evaluating the significance of the roost and the highest potential category should be selected.

Table 9.2.1 Appraisal of significance of bat roosts.

Scale	Summary	Examples
International	Any significant roosting sites for European Annex 2 species	Barbastelle bat roosts are only known applicable feature in East Anglia.

National	Any roosts qualifying as SSSI under the EN criteria.	Details of criteria are given in 9.1.2 Site Selection Guidelines for Biological SSSI's.
Regional	Any significant bat roosts and features, equivalent in interest to qualifying a site as a Country Wildlife Site.	Breeding and hibernation roosts of most species.
Local	All other sites supporting feeding bats as Wildlife and Countryside Act protected species.	Bats foraging within a structure, night roosts and minor transition roosts.

9.2.2 Site Selection Guidelines for Biological SSSIs

9.2.2.1 The following statements are made in respect of selecting SSSIs for bats in JNCC (1989) and JNCC (1998) in Section 13;

Sub-section 1.9 Reason for notification
"The bats have become a major focus of conservation concern in Britain, and all 15 species are protected through Schedule 5 of the 1981 Act.
The mouse-eared bat is now virtually extinct in Britain and other species, most notably the two horseshoe bats, are threatened.
Some species, for example the barbastelle, are so rare that little is known about their conservation status, but other species appear to be declining in numbers.
All bats are vulnerable, through their use of a relatively small number of sites for communal roosting and breeding, often in buildings; so, legal protection against disturbance and taking has been an effective conservation measure.
Enhancing the protection of key sites through the SSSI mechanism can be helpful, but the notification of sites in buildings, particularly domestic dwellings, needs to be considered carefully if it is to have the desired effect."

Sub-section 3.3 basis of selection
"The selection of bat roosts is on a national basis except for certain mixed hibernacula in AOSs where large roosts are unknown."

Sub-section 3.3.4 Barbastelle, Bechstein's and grey long-eared bats
"All of these are rare species with no or very few breeding roosts known. Any traditional breeding roosts should be considered for selection if found."

Sub-section 3.3.5 Natterer's, Daubenton's, Whiskered, Brandt's, Serotine, Noctule and Leisler's bats
"These species are reasonably widespread and it would be difficult to justify the notification of breeding roosts except in the most exceptional circumstances. These might include exceptionally large colonies with a long history of usage of a particular site. In general, protection of roosts of these species should come under section 9 of the 1981 Act."

Sub-section 3.3.6 Pipistrelle and brown long-eared bat
"These two species are widespread and more common than the above. Protection should rely on section 9 of the 1981 Act."

Sub-section 3.3.7 All bat species – mixed assemblages

"Large hibernacula of mixed species are very important and sometimes spectacular, but perhaps number only 20 sites in total. On a national basis, all hibernacula containing (a) four or more species and 50 or more individuals, (b) three species and 100 or more individuals or (c) two species and 150 or more individuals should be selected. In some parts of Britain such large sites are unknown, so alternatively in these areas one hibernaculum site per AOS containing 30 or more bats of two or more species may be considered for selection."
"Because of the complications associated with the notification of sites in buildings, the appropriate CSD mammal's specialist should be consulted over the selection of all such sites."

9.3 Summary of conservation significance of roost types (Bat Mitigation Guidelines, 2004).

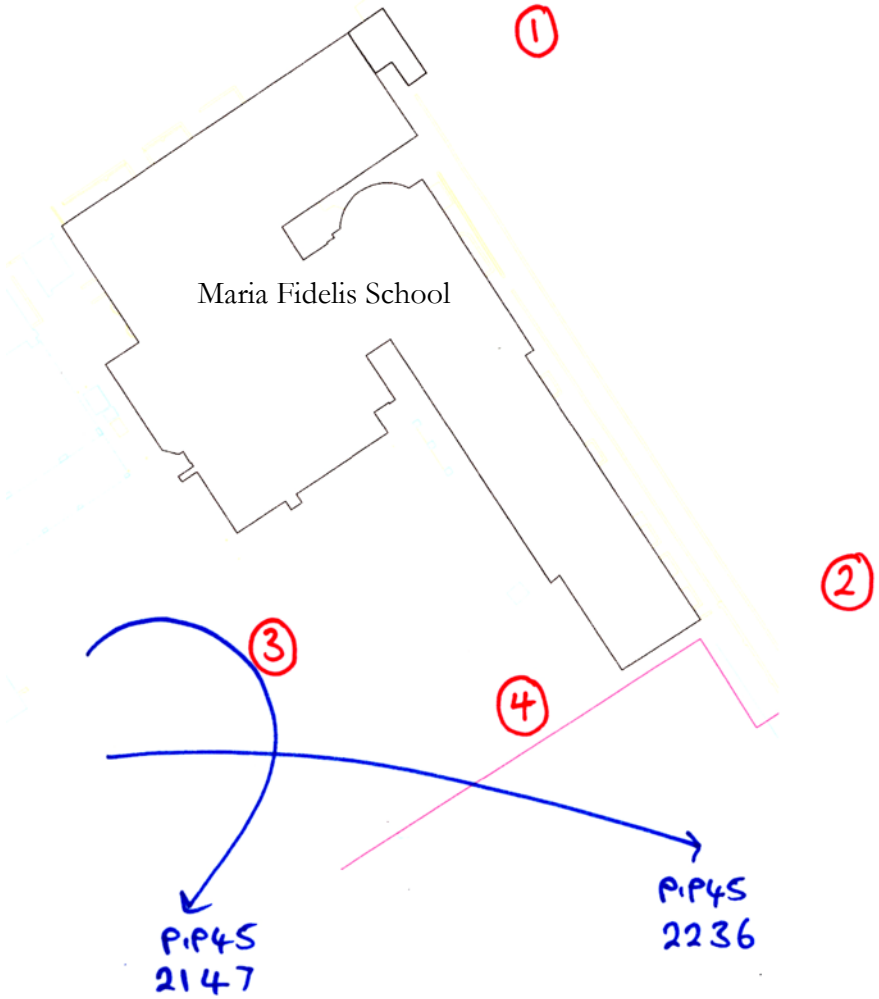
Roost type	Development effect	Scale of impact		
		Low	Medium	High
Maternity	Destruction			✓
	Isolation caused by fragmentation			✓
	Partial destruction; modification		✓	
	Temporary disturbance outside breeding season	✓		
	Post-development interference			✓
Major hibernation	Destruction			✓
	Isolation caused by fragmentation			✓
	Partial destruction; modification		✓	
	Temporary disturbance outside hibernation season	✓		
	Post-development interference			✓
Minor hibernation	Destruction			✓
	Isolation caused by fragmentation			✓
	Partial destruction, modification		✓	
	Modified management		✓	
	Temporary disturbance outside hibernation season	✓		
	Post-development interference		✓	
	Temporary destruction, then reinstatement	✓		
Mating	Destruction		✓	
	Isolation caused by fragmentation		✓	
	Partial destruction	✓		
	Modified management	✓		
	Temporary disturbance	✓		
	Post-development interference	✓		
	Temporary destruction, then reinstatement	✓		
Night roost	Destruction	✓		
	Isolation caused by fragmentation	✓		
	Partial destruction	✓		
	Modified management	✓		
	Temporary disturbance	✓		
	Post-development interference	✓		
	Temporary destruction, then reinstatement	✓		

NB This is a general guide only and does not take into account species differences. Medium impacts, in particular, depend on the care with which any mitigation is designed and implemented and could range between high and low.

9.4 Bat records for activity surveys conducted in 2018

Date – 29th May 2018					
Loc.	**Time**	**Species**	**kHz**	**Direction**	**Comment**
3	2147	C. Pipistrelle	45	S	Commuting
4	2236	C. Pipistrelle	45	E	Commuting
Date – 30th May 2018					
2	0309	C. Pipistrelle	45		Audible
4	0351	C. Pipistrelle	45	W	Commuting
1 & 4	0406	C. Pipistrelle	45	W	Commuting
3 & 4	0416 - 0430	C. Pipistrelle	45		Foraging
1 & 4	0426	C. Pipistrelle	45	W	Commuting
1	0435 - 0444	C. Pipistrelle	45		Foraging

9.5 Bat Activity Survey Flight Maps



NORTH

Not to Scale

Drawing title:
Emergence Survey Plan – **29th May 2018**

KEY

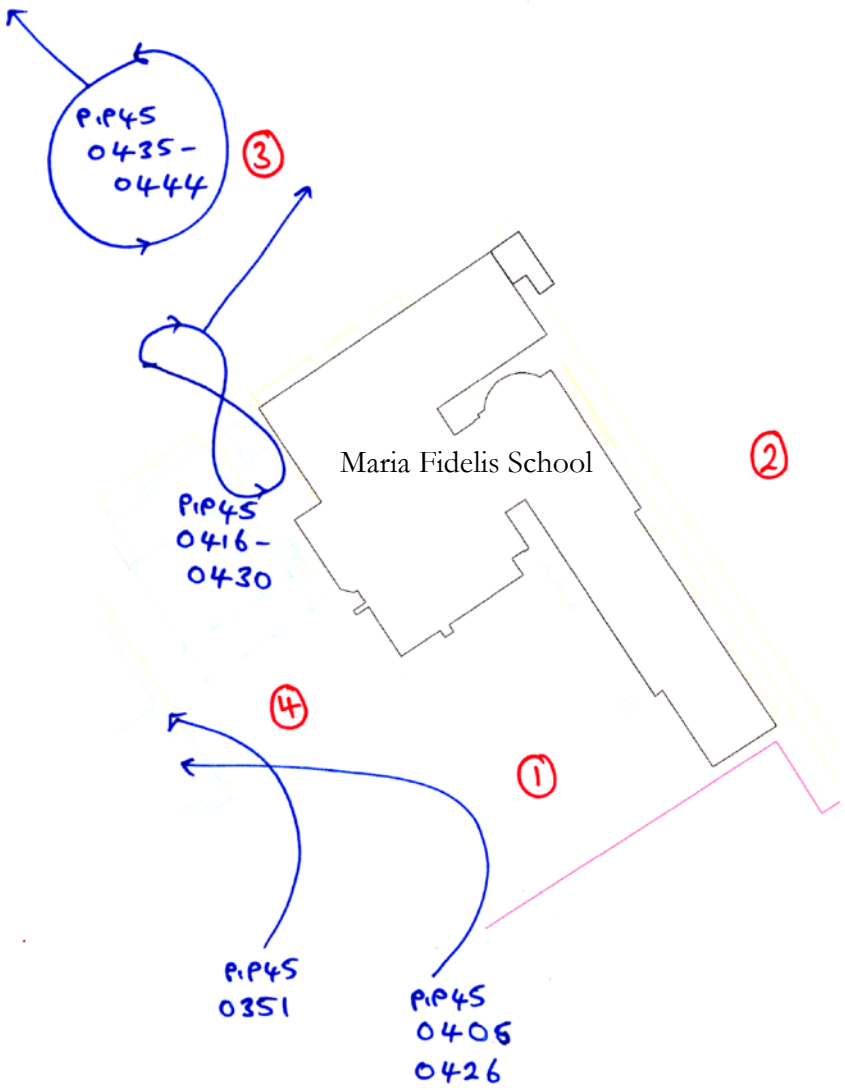
1 - 4 Location of surveyors

→ Commuting activity

WOLD ECOLOGY LTD

2 Redwood Gardens
Driffield
East Yorkshire
YO25 6XA

T: 01377 200242
E: info@woldecology.co.uk
W: www.woldecology.co.uk



NORTH

Not to Scale

Drawing title:
Return Survey Plan – **30th May 2018**

KEY

1 - 4 Location of surveyors

→ Commuting activity

Foraging activity

WOLD ECOLOGY LTD

2 Redwood Gardens
Driffield
East Yorkshire
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