A Bat Assessment of The Proposed Housing Development, McGrath's Lane, Newtown, Drogheda and an Evaluation for Potential Impacts on the Bat Fauna

Brian Keeley B.Sc. (Hons) in Zool. MCIEEM

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Introduction

Bats are a widespread element of the Irish fauna. They are known to occur from much of the rural landscape and to a lesser extent, the urban environment and here they occupy buildings and occasionally trees for short or long periods. Houses and other buildings are a vital element of the annual cycle of all Irish bat species and at no time more so than the period May to August, but many bats may also avail of buildings as hibernation sites. In sites such as the proposed development site where there are no buildings, there is still the potential for roosting within trees or within nearby houses and feeding within the site proposed for development. Changes to a site including tree and hedgerow removal may reduce the options available to bats as a roosting site and may also affect their feeding and commuting activity.

Bats are protected by Irish and EU law and to prevent unlawful injury or death, it is essential that a full understanding of the site is available in advance to protect the resident bats from unintentional harm and to create a pathway by which a legal derogation and exemption may be designed in consultation with the National Parks and Wildlife Service of the Department of Culture, Heritage, and the Gaeltacht.

The site at McGrath's Lane adjacent to the railway line in Drogheda, County Louth and close to the County Meath border will undergo a change from an exposed agricultural landscape bounded by a railway line, farmland and two houses into a new urban neighbourhood There will be vegetation clearance from some areas including hedgerow removal and the construction of a large number of buildings. A new link to Marsh Road will be constructed altering the traffic dynamics of the site entirely. This will change the nature of the site irrespective of the proposed construction by splitting the agricultural lands.

This assessment will address the potential for bat roosting within the site and neighbouring buildings within the houses and identify the potential for impacts upon bat feeding and commuting within the lands that form the proposed site of construction based upon a visual assessment of the lands and a walkover survey to determine the potential for roost sites within the trees on site and the potential for roosts in the nearest houses and a bat detector assessment undertaken in the breeding season (May to August) in 2019.

Surveying for bats in February is a suitable time to address the usage of trees as hibernation sites and to identify features within trees that may not be obvious in summer when trees are in full leaf (which can lead to the discovery of roost sites that are obscured from view in summer).

Surveying in May is a suitable period to look at the commencement of the breeding season when the single annual young are born and when females form the largest roost type (in the Irish context); the maternity roost. These roosts are typically in close proximity or within areas of good feeding. A bat detector assessment at this time can disclose the value of a site for feeding and how bats avail of a site in commuting to and from important sites including feeding sites and roosts.

Methodology

The proposed development site (see Figures 1 and 2) at McGrath's Lane, Drogheda, County Louth was examined on two occasions in 2019: 14th February 2019 in daylight and 16th May 2019 both in daylight and overnight to assess the site for bat usage and bat activity.

February 2019

The trees within the site were visually inspected on 14th February for the presence of bat signs with the aid of a high-powered beam and all hedgerow and treelines were followed sequentially until the site had been fully assessed. Features with roost potential were sought in all trees and elements of the landscape that would be beneficial to feeding bats were sought and identified.

May 2019

The site was re-examined on 16th May concentrating on areas of the site noted to have the highest roost potential in the February assessment. The bat detector assessment that commenced prior to

sunset was undertaken equipped with an Echometer 3 (EM3) full spectrum receiver with a screen displaying the ultrasonic signals received and also recording all ultrasonic signals received to a SD card for later analysis. The surveyor observed the trees in the north-western section of the site perimeter from prior to sunset up to 21.50 hours. A second detector, a Songmeter2BAT+ (SM2) was positioned to the northwestern-side of these trees up to 22.13 hours and was then moved to the small pond where it remained from 22.15 hours up to 04.45 hours at which time it was paced on the north-eastern edge of the site, remaining here up to sunrise.

A walked transect of the site was undertaken following the observation of the trees in the northwestern corner and similarly, a walked transect was undertaken prior to sunrise that examined these trees in addition to evaluating the direction of return of bats to roost sites in the immediate area.

Survey Constraints

This assessment included a visual assessment of the availability of potential roosts and suitable feeding areas and likely corridors linking these sites as well as a bat detector assessment in the summer period when bats are breeding. The weather conditions in May were ideal for assessment bat activity with temperatures of 11ºC at sunset (21.23 hours) and temperatures dropping to 9ºC at sunrise (05.21 hours).

Existing Environment

Species of bat roosting within the site
None

No bats emerged from or returned to any tree within the site. Bat activity was high on a number of occasions through the survey period at mature tree lines, but no evidence of roosts was noted.

Bats were seen and heard to fly towards the building on the south-eastern edge of the site approaching sunrise. This is indicative that either this house, associated buildings or a building in line with this house is a common pipistrelle and also possibly a soprano pipistrelle bat roost. There was also activity during the night close to the house in the southwestern corner which may suggest a roost but given an absence of observations here prior to sunrise of any returning bats, it is not confirmed that this is a roost. Individual bats may return to a building without being observed if the surveyor is located at another part of the site and there is the potential for individual bats here.

Similarly, there is low potential for individual bats returning to trees unobserved but much less possibility of maternity roosts or large number of bats returning.

Species of bat feeding within the site (see Figures 1 to 7)

Leisler's bat	*Nyctalus leisleri*
Common pipistrelle	*Pipistrellus pipistrellus*
Soprano pipistrelle	*Pipistrellus pygmaeus*

Bat activity was most in evidence around the mature trees in the north-western section of the site and in the south-eastern section (towards the south-eastern corner of the site and towards the house outside the site). In other areas, bat activity was less sustained, and activity was more often of commuting bats than feeding bats.

Common pipistrelles were the most frequently encountered bat species while soprano pipistrelle was present in smaller numbers at any given time. Leisler's bat activity was noted throughout the survey except prior to sunrise. This species is entering the site from outside and is not roosting in the immediate area.

Modifications or Features introduced by the proposed development

- **Vegetation alterations**

There will be a requirement to remove some of the vegetation from the site to facilitate housing and roads. This would see hedgerow in the centre and some on the edges of the site removed (see Figures 3 and 4) in addition to the pond towards the southeast.

- **Lighting**

There will be an increased level of lighting introduced by the new houses. There is very limited illumination onsite at present as there are no occupied houses or offices within the site and there is very likely limited overflow of lighting from the existing neighbouring houses and wastewater treatment plant. There will be increased lighting for the construction and operation of the new buildings. This would lead to the disturbance of light intolerant or shy species while the more urban-adapted species will be affected only over a short-term period.

Pipistrelles and Leisler's bats are less affected by light than all other species, but pipistrelles will avoid light where possible. Leisler's bats may be attracted to lighting later into the night-time to feed on moths that themselves are attracted or disorientated by the lights.

- **New roads**

There will be a network of new roads including the new road running from Marsh Road (R150) into and beyond the site to the southeast. This may lead to road-death where bats are crossing or feeding along the road.

Impacts of The Proposed Development

Potential death or injury during construction

Tree felling and tree surgery create a risk of death or injury to bats who are present within any trees for treatment. This would be a breach of the Wildlife Act and Habitats Directive where there are insufficient efforts to avoid this. This would be a moderate negative impact if an individual were affected up to a long-term negative impact if a greater number of bats were present.

Potential roost loss

Tree felling and tree surgery also create a risk of roost loss even where bats are not at-risk during felling. The beech trees within the north-western area provide the highest roost potential within the site. None of these trees were in use as roosts in May 2019 and there is no evidence that any of the trees serve as maternity roosts.

Loss of roosts would be a long-term moderate negative impact, if these are present, in the absence of mitigation.

Disturbance from lighting

Lighting will be utilised for two different functions:

1) Access and safety and 2) Security and policing. The former is to allow ease of use at night. The latter is to ensure a perceived higher security level. This may affect light-intolerant bat species during foraging and if directed at emergence points would affect all bat species, even those that will feed in illuminated areas. Species such as common pipistrelle and Leisler's bat are less affected than almost all other Irish bat species. No light-intolerant species of bat were noted within the site.

At worst, it would be a permanent moderately negative impact in the absence of mitigation.

Reduced Feeding

Reduced vegetation including the removal of mature trees may lead to reduced insect abundance. The removal of the pond, vegetation removal and change of land use and habitats will reduce bat feeding opportunities. This area was not highly active in terms of bat activity in May 2019.

This is likely to be a permanent slightly negative impact.

Proposed Mitigation

Timing of felling / surgery and
Checking of all suitable trees by a bat specialist prior to felling or surgery

All trees shall be checked by a bat specialist prior to felling or surgery. The trees of concern are all within the north-western corner of the site (unless later surveying reveals that other trees are roost sites).

All trees with roost potential shall be felled between September and November to ensure that bats are not breeding or hibernating within trees and to ensure that nesting birds are unaffected (March 1st to August 31st).

Planting of vegetation

Where there is an opportunity to provide vegetative cover, some native and local plant species should be employed such as dog rose with an encouragement of species such as *Clematis*, *Hebe*, night-scented stock, *Nicotiana* and other species attractive to moths. The retention of as much of the existing beech as possible is recommended including surgery in preference to felling wherever feasible.

Planting along the embankments leading to the road should be dense to create a means of encouraging bats to fly up and over the road to prevent road death. Planting to the western section of the site should also be undertaken to enhance the beech trees as possible roost sites and feeding and commuting corridors.

Bat boxes

Trees within the site offer some moderate to good roost potential and there may be roost loss. While no bats were roosting within the trees within the active survey in May 2019, the trees are still potential roosts.

6 x 2F Schwegler bat boxes shall be provided within the site (in unlit areas including on the remaining beech trees at least 1.5 metres above ground level with no surrounding clutter – branches, bramble etc.).

Lighting

Lighting should be controlled to avoid light pollution of green areas and should be targeted to areas of human activity and for priority security areas. Motion-activated sensor lighting is preferable to reduce light pollution. Areas such as the beech trees in the north-west and perimeter vegetation must be protected from illumination from roads and housing (see Figure 4). This may be achieved through cowls and appropriately directed lighting. No lighting should exceed 3 lux along the treetops of the bordering remaining trees (and those trees to be planted when mature).

Impacts of The Development After Mitigation

It is anticipated that this development will have no direct impact upon the conservation status of any bat species. There may be a reduction in the availability of lands to bats due to increased lighting and roads and there will be some loss of feeding due to hedgerow loss.

Plate 1: Trees with roost potential in the north-western corner of the site (February 2019)

Plate 2: Potential roost features in beech trees in the north-western corner

The final image is a beech tree in the hedgerow running north-south outside of the site

Plate 3: Potential roosts to the east (left image) and west (right image) of the site

Plate 4: Potentially good feeding around the existing pond

Plate 5: Potentially good foraging hedgerow within the hedge passing the pond within the site

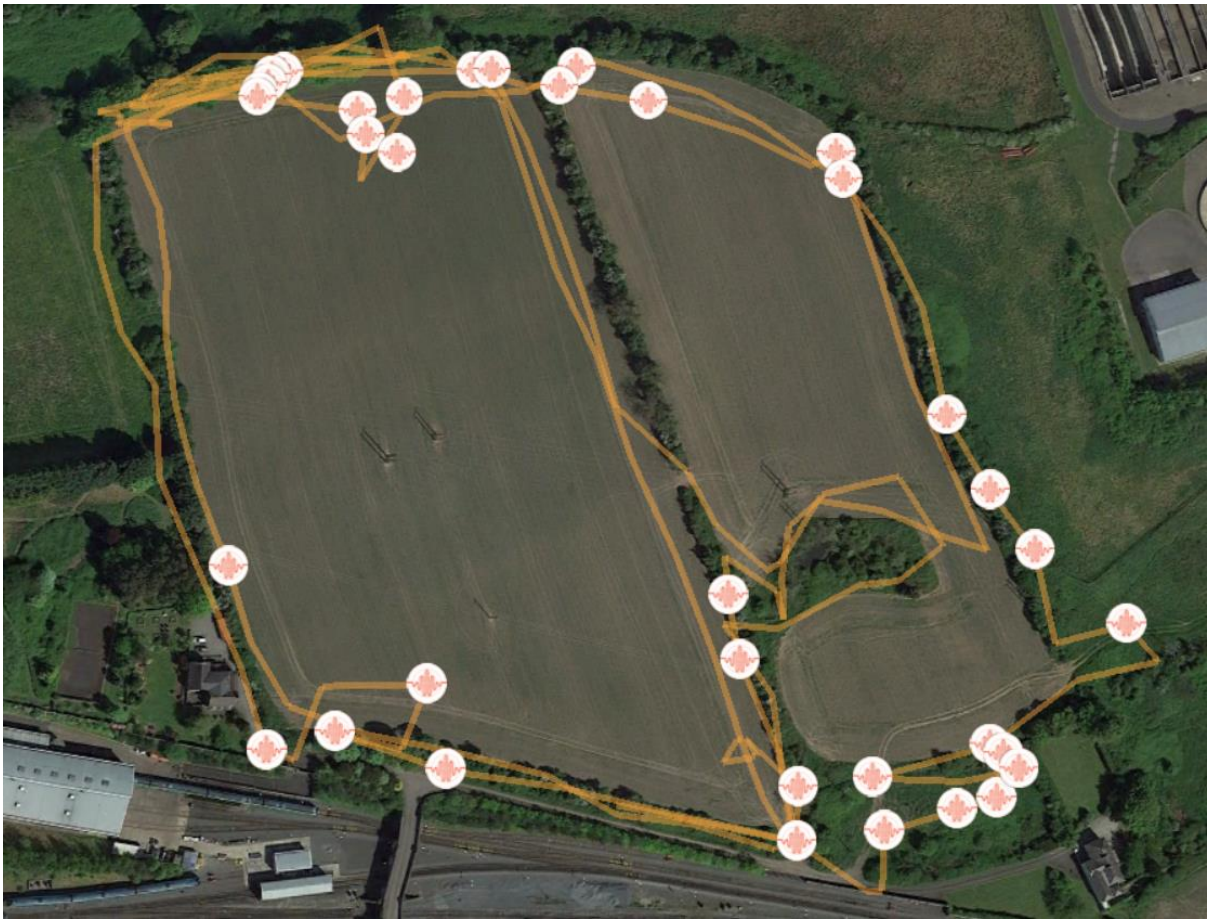


Figure 1: Bat activity noted within the site on 16th May 2019

All points at which a bat signal was noted. The observations are summarised in the following figure and included with visual observations and identification of the bat signals to species level

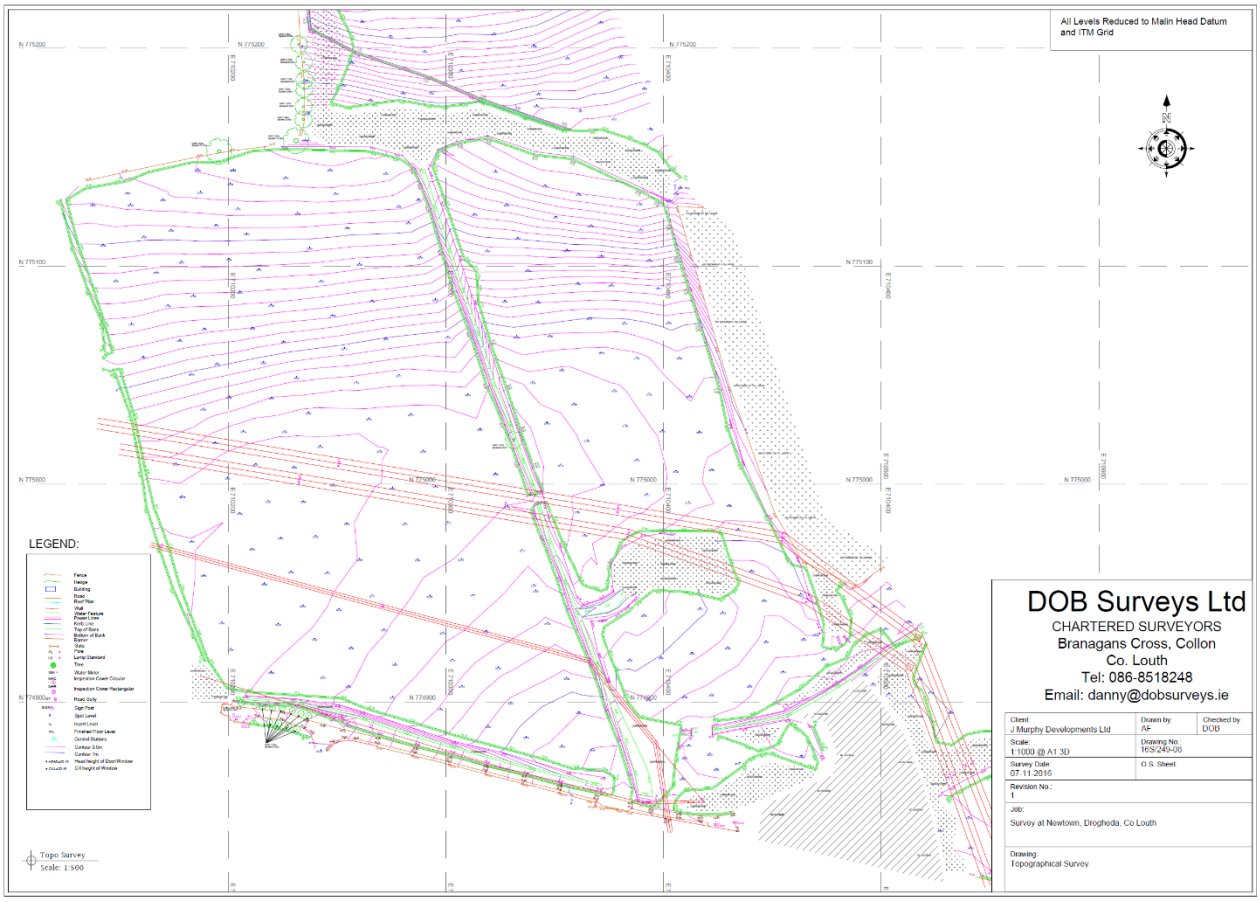


Figure 2: Topographical survey of the site

The site rises from south to north before a steeper slope down to Marsh Road and towards the River Boyne. The map shows the high tension power lines running east-west and given the size of the arable fiedl the western field is more exposed to wind but was not windswept at the time of survey and is suitably sheltered to allow bat feeding and commuting.

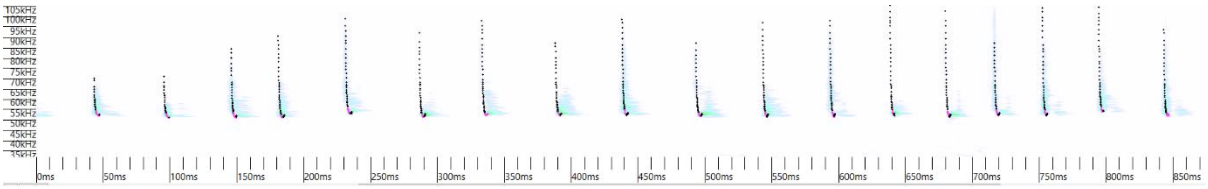
Figure 3: Basic principles of the development of the site

The above layout shows the proposed housing, green area where the pond is at present and the connecting road to the east and lane running to the Railway bridge in the south.

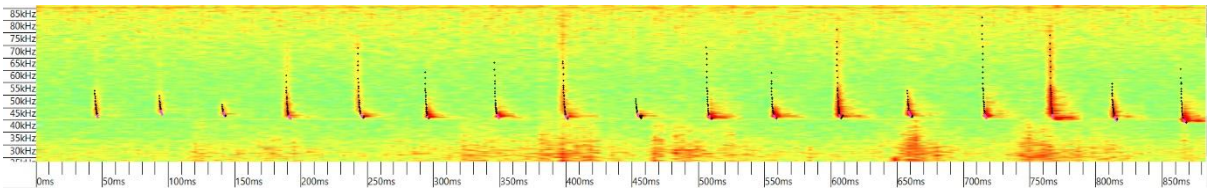
Figure 4: Landscape Masterplan indicating areas where lighting must be carefully controlled

The above indicates the plant mix proposed for the development and and hard landscape and boundary treatments.

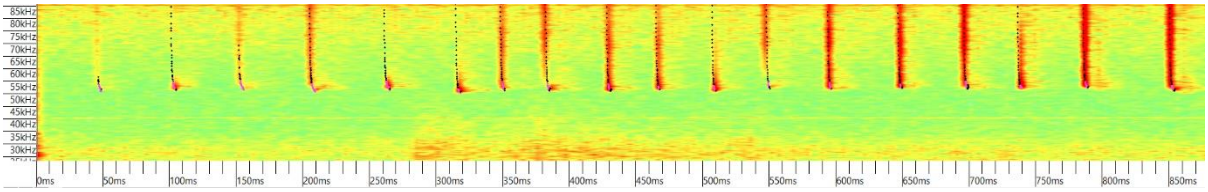
The area marked with a red box is an area where lighting would create the greatest conflict for bats and where lighting control is most important



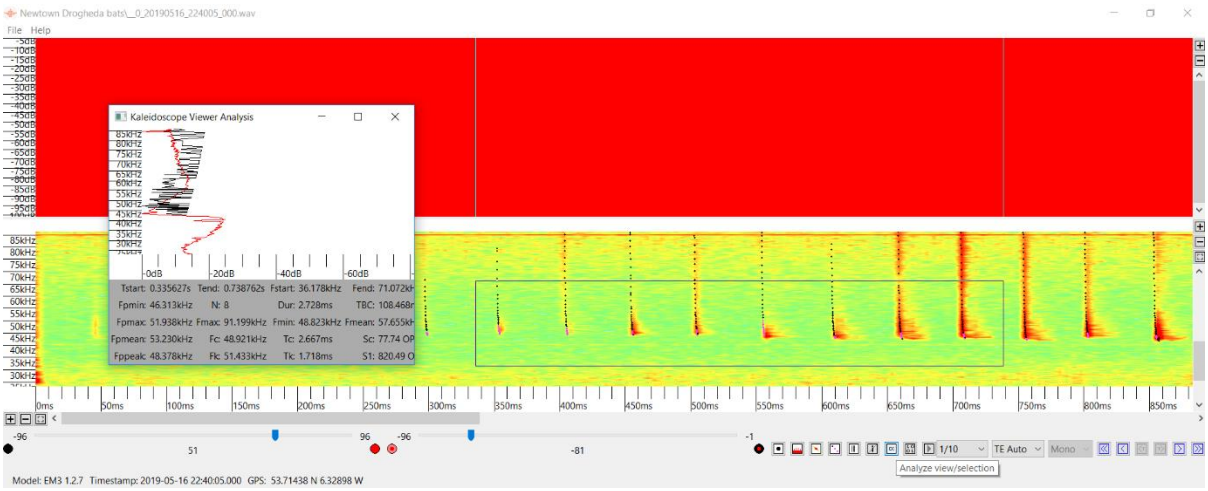
Soprano pipistrelle at the pond 22.18 HOURS



Common pipistrelle at 21.43 HOURS

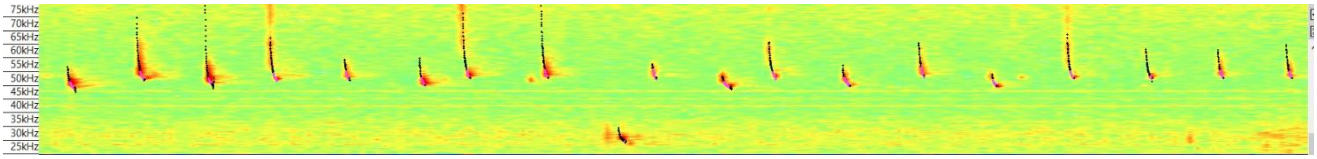


Soprano pipistrelle at 21.57 HOURS

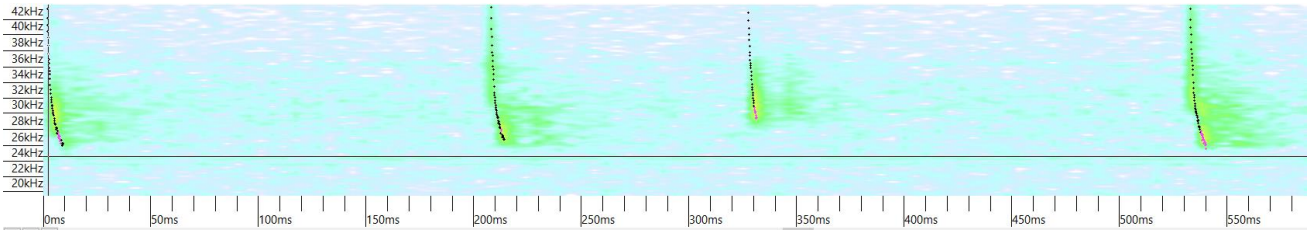


Bat signal in intermediate range between common and soprano pipistrelles

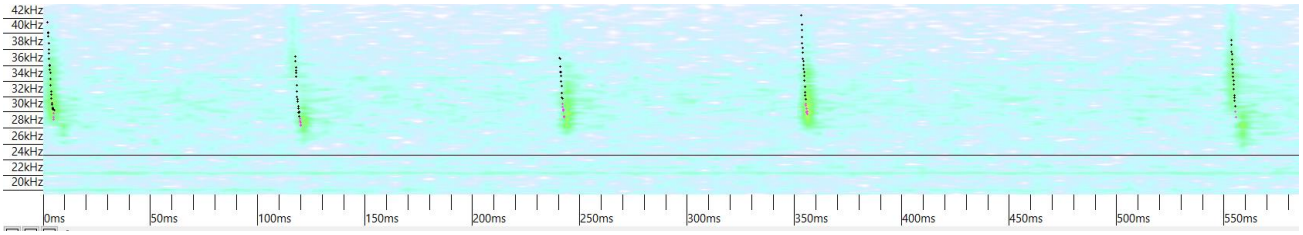
Figure 5: Bat ultrasonic signals plotting frequency of call against time



3 bat species at once 2231 HOURS



Leisler's bat 22.35 HOURS



Leisler's bat 22.55 HOURS

Figure 5 ctd.

Figure 6: Bat activity within the site based on level of activity noted

Legend

Band along hedgerow	Transect covered from prior to sunset up to 23.00 hours
Upper Light green box	Initial bat activity mainly common pipistrelle
Lower Light green box	Later bat activity (common pipistrelle) close to house
Two- headed arrow	Commuting route along fence and then hedgerow
One-headed arrow	Area where bats first seen to enter the site
Purple arrow	Area of high activity after sunset with feeding bats and evidence of commuting
Blue circle	Soprano pipistrelle along hedge at 21.57 hours
Green circle	Last bat of the night; a common pipistrelle at 22.56 hours
Light yellow box	Area where pipistrelle and Leisler's bat activity was noted
Opaque yellow boxes	Areas where Leisler's bat and pipistrelles were present at the same time
Small white box	Location of SM2 from 21.13 hours to 22.13 hours
Small darker box	Location of SM2 from 22.15 hours onwards

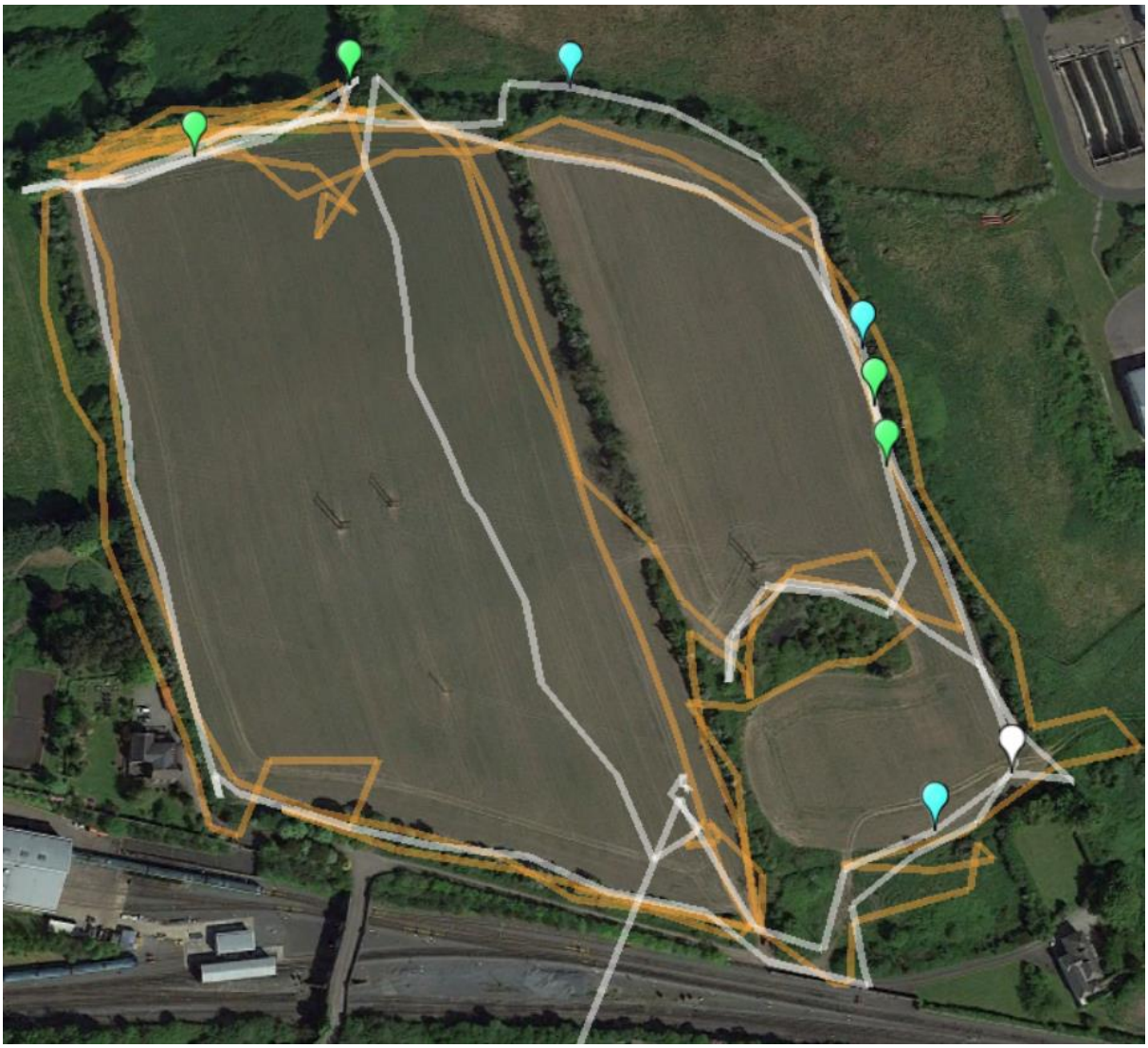


Figure 7: Bat activity within the site prior to dawn on 17th May 2019

Legend

Green paddle	Common pipistrelle	Blue paddle	Soprano pipistrelle
White paddle	Either common or soprano pipistrelle		

Table 1: Bat roosts and records from within 10 km of the site proposed for housing at McGrath's Lane, Drogheda based on Bat Conservation Ireland data (there are no roosts within 1 km of the site)

BCIreland data: search results 28 May 2019					
Search parameters: Roosts Transects Ad-hoc observation sites with observations of all bats within 10000m of O1029074999.					
Roosts					
Name	Grid reference	Grid ref easting	Grid ref northing	Address	Species observed
08MHOB10WC	O0460075619	304600	275619	Oldbridge Estate; Co. Meath	Pipistrellus spp. (45kHz/55kHz)
08MHOB11WC	O0457875652	304578	275652	Oldbridge Estate; Co. Meath	Unidentified bat
08MHOB12WC	O0457875652	304578	275652	Oldbridge Estate; Co. Meath	
08MHOB13WC	O0456675652	304566	275652	Oldbridge Estate; Co. Meath	Unidentified bat
08MHOB14WC	O0456675652	304566	275652	Oldbridge Estate; Co. Meath	Nyctalus leisleri
08MHOB15WC	O0449075723	304490	275723	Oldbridge Estate; Co. Meath	Pipistrellus pygmaeus
08MHOB16WC	O0449075723	304490	275723	Oldbridge Estate; Co. Meath	Unidentified bat
08MHOB17WC	O0448575731	304485	275731	Oldbridge Estate; Co. Meath	Pipistrellus spp. (45kHz/55kHz)
08MHOB18WC	O0448575731	304485	275731	Oldbridge Estate; Co. Meath	Unidentified bat
08MHOB1WC	O0470375806	304703	275806	Oldbridge Estate; Co. Meath	Pipistrellus pygmaeus
08MHOB2WC	O0467975742	304679	275742	Oldbridge Estate; Co. Meath	Unidentified bat
08MHOB3WC	O0467975742	304679	275742	Oldbridge Estate; Co. Meath	
08MHOB4WC	O0463775734	304637	275734	Oldbridge Estate; Co. Meath	Unidentified bat
08MHOB5WC	O0468075706	304680	275706	Oldbridge Estate; Co. Meath	Unidentified bat
08MHOB6WC	O0468075706	304680	275706	Oldbridge Estate; Co. Meath	
08MHOB7WC	O0461675625	304616	275625	Oldbridge Estate; Co. Meath	
08MHOB8WC	O0461675625	304616	275625	Oldbridge Estate; Co. Meath	Unidentified bat
08MHOB9WC	O0461275616	304612	275616	Oldbridge Estate; Co. Meath	Pipistrellus spp. (45kHz/55kHz)
08MHIN1WC	O0617470807	306174	270807	Inver Energy Facility; Duleek; County Meath.	Unidentified bat
08MHIN2WC	O0617470807	306174	270807	Inver Energy Facility; Duleek; County Meath.	Unidentified bat
08MHIN3WC	O0613270859	306132	270859	Inver Energy Facility; Duleek; County Meath.	Unidentified bat
08MHIN4WC	O0613270859	306132	270859	Inver Energy Facility; Duleek; Co. Meath.	Unidentified bat
08MHIN5WC	O0612870864	306128	270864	Inver Energy Facility; Duleek; Meath.	Unidentified bat

08MHIN6WC	O0612870864	306128	270864	Inver Energy Facility; Duleek; County Meath.	
12LDP1WC	O0828575140	308285	275140	Drogheda Tidy Towns; Co. Louth	
12LDP2WC	O0830075171	308300	275171	Drogheda Tidy Towns; Co. Louth	
12LDP3WC	O0830075171	308300	275171	Drogheda Tidy Towns; Co. Louth	
12LDP4WC	O0830075171	308300	275171	Drogheda Tidy Towns; Co. Louth	
12LDP6WC	O0830475190	308304	275190	Drogheda Tidy Towns; Co. Louth	
12LDP8WC	O0831275193	308312	275193	Drogheda Tidy Towns; Co. Louth	
12LHD7WC	O0830475190	308304	275190	Drogheda Tidy Towns; Co. Louth	Unidentified bat
12LHD9WC	O0831275193	308312	275193	Drogheda Tidy Towns; Co. Louth	Unidentified bat
12LHP5WC	O0830475190	308304	275190	Drogheda Tidy Towns; Co. Louth	Unidentified bat
Annesbrook House	O043661	304300	266100	Duleek; County Meath	Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Plecotus auritus
Farmhouse and buildings Ballymakenny Road	O088754	308800	275400	North of Drogheda town; County Louth	Pipistrellus pipistrellus (45kHz)
Hillside house and old farm buildings	O088754	308800	275400	On Kelly Family Lands; immediately east of Twenties Lane; North Drogheda; County Louth	Pipistrellus pygmaeus
Hilltown Demesne Courtyard	O0910067900	309100	267900	Hilltown Great; Bellewstown; Dundalk; Co. Meath	Myotis spp.; Pipistrellus spp. (45kHz/55kHz); Plecotus auritus
M1 rail overbridge	O0736372960	307363	272960	Platin; Co Meath	Plecotus auritus
Marymount NS	O0832674753	308326	274753	Donore Avenue Ballsgrove Drogheda Co. Louth	Pipistrellus pipistrellus (45kHz); Unidentified bat
Oldbridge Demesne	O051751	305100	275100	Oldbridge; County Meath	Pipistrellus pygmaeus
Oldbridge Demesne; Holm oak	O051751	305100	275100	Oldbridge; County Meath	Pipistrellus pygmaeus
Oldbridge Demesne; Monterey Pine Roost	O0520075100	305200	275100	Co. Meath	Pipistrellus pipistrellus (45kHz); Plecotus auritus
Oldbridge Demesne-Tree roost 5	O053748	305300	274800	Oldbridge; County Meath	Nyctalus leisleri
Oldbridge Demesne-Tree roost 3	O052751	305200	275100	Oldbridge; County Meath	Pipistrellus pygmaeus
Oldbridge Demesne-Tree roost 4	O053748	305300	274800	Oldbridge; County Meath	Nyctalus leisleri
Oldbridge Demesne-Tree roost 6	O054749	305400	274900	Oldbridge; County Meath	Pipistrellus pygmaeus
Oldbridge Demesne-Tree roost 7	O054749	305400	274900	Oldbridge; County Meath	Nyctalus leisleri; Pipistrellus pygmaeus
Prioryland	O0567	305000	267000	Duleek; County Meath	Unidentified bat

Railway underbridge	O0119468841	301194	268841	Drumman; Co Meath	Myotis nattereri
Rebegan Stud farm	O004690	300400	269000	Dunshaughlin; County Meath	Unidentified bat
Ruined house on Twenties Lane	O088754	308800	275400	North Drogheda; County Louth	Pipistrellus pygmaeus
Sandy Acre	O1676	316000	276000	Mornington; County Meath	Unidentified bat
Sandy Avenue	O1375	313000	275000	Mornington; County Meath	Unidentified bat
St Brigid's Beaulieu	O126767	312600	276700	Beaulieu; Drogheda; County Louth	Plecotus auritus
St Marys Tullyallen	O031773	303100	277300	Tullyallen; Drogheda; County Louth	Plecotus auritus
Townley Hall	O026765	302600	276500	Townley Hall; County Meath	Pipistrellus pipistrellus (45kHz)
Unoccupied bungalow	O149656	314900	265600	Stamullen; County Meath	Nyctalus leisleri; Pipistrellus pipistrellus (45kHz)
Walsh Residence Tullyallen	O044776	304400	277600	Tullyallen; County Louth	Pipistrellus pygmaeus
Transects					
Name	Grid reference start	Grid ref start easting	Grid ref start northing	Species	
Annesbrook Townland Transect	O0355565525	303555	265525	Myotis daubentonii; Unidentified bat	
Bellewstown Bridge Transect	O0731769153	307317	269153	Myotis daubentonii; Pipistrellus pygmaeus; Unidentified bat	
Boyne Estuary Transect	O1254476333	312544	276333	Myotis daubentonii	
Dardistown Bridge Transect	O1038069783	310380	269783	Myotis daubentonii; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Pipistrellus spp. (45kHz/55kHz); Unidentified bat	
Dardistown Bridge Transect spot 1	O1038069783	310380	269783	Myotis daubentonii; Unidentified bat	
Dardistown Bridge Transect spot 10	O1116670170	311166	270170	Myotis daubentonii; Unidentified bat	
Dardistown Bridge Transect spot 2	O1047069797	310470	269797	Myotis daubentonii; Myotis mystacinus; Unidentified bat	
Dardistown Bridge Transect spot 3	O1058969807	310589	269807	Myotis daubentonii; Unidentified bat	
Dardistown Bridge Transect spot 4	O1069769850	310697	269850	Myotis daubentonii; Unidentified bat	
Dardistown Bridge Transect spot 5	O1079569884	310795	269884	Myotis daubentonii; Unidentified bat	
Dardistown Bridge Transect spot 6	O1089169903	310891	269903	Myotis daubentonii; Unidentified bat	
Dardistown Bridge Transect spot 7	O1098869956	310988	269956	Myotis daubentonii; Unidentified bat	
Dardistown Bridge	O1105670012	311056	270012	Myotis daubentonii; Unidentified bat	

Transect spot 8					
Dardistown Bridge Transect spot 9	O1114870073	311148	270073	Myotis daubentonii; Unidentified bat	
Drogheda New Bridge Transect	O0842675139	308426	275139	Myotis daubentonii; Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus	
Gormanstown Bridge Transect	O1707665774	317076	265774	Myotis daubentonii; Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Pipistrellus spp. (45kHz/55kHz); Unidentified bat	
N77 (10) 2003-2008	O0045182026	300451	282026	Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Pipistrellus spp. (45kHz/55kHz); Unidentified bat	
N77 (2) 2009-	O0045182026	300451	282026	Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Plecotus auritus	
O04 (4) 2004-	O153685	315300	268500	Myotis spp.; Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Pipistrellus spp. (45kHz/55kHz)	
O04 (5) 2004-	O093676	309300	267600	Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Pipistrellus spp. (45kHz/55kHz); Unidentified bat	
O04 (6) 2004-	O024688	302400	268800	Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Pipistrellus spp. (45kHz/55kHz)	
O04 (7) 2004-	O004670	300400	267000	Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Pipistrellus spp. (45kHz/55kHz); Unidentified bat	
Obelisk Bridge Transect	O0455076250	304550	276250	Myotis daubentonii; Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Unidentified bat	
Oldbridge Transect	O0460076200	304600	276200	Myotis daubentonii; Myotis nattereri; Nyctalus leisleri; Pipistrellus pygmaeus; Unidentified bat	
Ad-hoc observations					
Survey	Grid reference	Grid ref easting	Grid ref northing	Date	Species
Bat Conservation Ireland Bat Detector Workshop	O026765	302600	276500	28/05/2004	Myotis mystacinus; Myotis nattereri; Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Plecotus auritus
BATLAS 2010	O1387877749	313878	277749	15/07/2008	Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus
BATLAS 2010	O1185282101	311852	282101	07/07/2008	Pipistrellus pygmaeus
BATLAS 2010	O1347970335	313479	270335	07/07/2008	Nyctalus leisleri; Pipistrellus pygmaeus
BATLAS 2010	O1256076690	312560	276690	15/07/2008	Pipistrellus pygmaeus
BATLAS 2010	O1403380325	314033	280325	07/07/2008	Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus
BATLAS 2010	O1069	310000	269000	26/08/2008	Myotis spp.; Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Pipistrellus spp. (45kHz/55kHz)
BATLAS 2010	O1118470163	311184	270163	15/07/2008	Pipistrellus pygmaeus
EIA survey- Paul Scott (Scott Cawley)	O088754	308800	275400	16/08/2007	Myotis spp.; Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus
EIA survey- Paul Scott (Scott Cawley)	O149656	314900	265600	2008-08-00	Myotis daubentonii; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus
EIA survey- Paul	O088754	308800	275400	17/07/2008	Nyctalus leisleri; Pipistrellus pygmaeus

Scott (Scott Cawley)					
EIS surveys - Brian Keeley	O1510065600	315100	265600	06/07/2006	Myotis spp.; Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Plecotus auritus
EIS surveys - Brian Keeley	O1680066000	316800	266000	03/07/2006	Myotis daubentonii; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus
EIS surveys - Brian Keeley	O13517049	313510	270490	11/05/2011	Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus
EIS Surveys - Tina Aughney	O0670	306000	270000	29/04/2008	Myotis nattereri; Myotis spp.; Nyctalus leisleri; Pipistrellus pipistrellus (45kHz); Pipistrellus pygmaeus; Pipistrellus spp. (45kHz/55kHz)

Table 2: Bat data from the static monitor recording overnight

DATE	TIME	AUTO ID	MANUAL ID
16/05/2019	22:40:30	LEISLER'S BAT	LEISLER'S BAT
16/05/2019	22:41:30	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	22:42:00	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	22:42:30	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	23:06:30	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	23:48:00	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	23:51:00	COMMON PIPISTRELLE	COMMON PIPISTRELLE
17/05/2019	00:30:42	LEISLER'S BAT	LEISLER'S BAT
17/05/2019	01:50:30	COMMON PIPISTRELLE	COMMON PIPISTRELLE
17/05/2019	03:45:30	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
17/05/2019	04:35:00	COMMON PIPISTRELLE	PIP
17/05/2019	04:35:30	COMMON PIPISTRELLE	COMMON PIPISTRELLE
17/05/2019	04:36:00	SOPRANO PIPISTRELLE	PIP
17/05/2019	04:42:30	COMMON PIPISTRELLE	COMMON PIPISTRELLE
17/05/2019	04:48:00	COMMON PIPISTRELLE	COMMON PIPISTRELLE

Table 3: Bat data from the hand-held Echometer 3 detector

DATE	TIME	AUTO ID	MANUAL ID
16/05/2019	21:42:55	COMMON PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	21:43:25	SOPRANO PIPISTRELLE	PIP
16/05/2019	21:44:26	COMMON PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	21:44:56	COMMON PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	21:45:26	SOPRANO PIPISTRELLE	PIP
16/05/2019	21:45:56	SOPRANO PIPISTRELLE	COMMON PIPISTRELLE SOPRANO PIPISTRELLE
16/05/2019	21:46:27	SOPRANO PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	21:46:58	COMMON PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	21:47:28	SOPRANO PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	21:48:59	COMMON PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	21:51:01	SOPRANO PIPISTRELLE	PIP
16/05/2019	21:57:35	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	22:10:14	COMMON PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	22:15:48	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	22:16:49	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	22:17:19	SOPRANO PIPISTRELLE	PIP
16/05/2019	22:18:50	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	22:29:28	LEISLER'S BAT	LEISLER'S BAT
16/05/2019	22:29:58	LEISLER'S BAT	LEISLER'S BAT
16/05/2019	22:30:28	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	22:30:59	SOPRANO PIPISTRELLE	COMMON PIPISTRELLE SOPRANO PIPISTRELLE LEISLER'S BAT
16/05/2019	22:31:29	SOPRANO PIPISTRELLE	COMMON PIPISTRELLE LEISLER'S BAT
16/05/2019	22:32:30	SOPRANO PIPISTRELLE	COMMON PIPISTRELLE SOPRANO PIPISTRELLE LEISLER'S BAT
16/05/2019	22:33:00	SOPRANO PIPISTRELLE	COMMON PIPISTRELLE LEISLER'S BAT
16/05/2019	22:34:31	COMMON PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	22:35:32	LEISLER'S BAT	LEISLER'S BAT
16/05/2019	22:36:02	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	22:36:33	NoID	PIP
16/05/2019	22:38:03	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
16/05/2019	22:40:05	SOPRANO PIPISTRELLE	PIP
16/05/2019	22:46:39	COMMON PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	22:48:11	COMMON PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	22:49:12	COMMON PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	22:49:42	COMMON PIPISTRELLE	COMMON PIPISTRELLE
16/05/2019	22:55:45	PLAUR	LEISLER'S BAT
16/05/2019	22:56:16	COMMON PIPISTRELLE	COMMON PIPISTRELLE LEISLER'S BAT
17/05/2019	04:27:05	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE

17/05/2019	04:27:35	SOPRANO PIPISTRELLE	PIP
17/05/2019	04:35:19	COMMON PIPISTRELLE	COMMON PIPISTRELLE
17/05/2019	04:35:49	COMMON PIPISTRELLE	COMMON PIPISTRELLE
17/05/2019	04:36:20	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
17/05/2019	04:38:55	SOPRANO PIPISTRELLE	SOPRANO PIPISTRELLE
17/05/2019	04:43:01	COMMON PIPISTRELLE	COMMON PIPISTRELLE
17/05/2019	04:48:08	COMMON PIPISTRELLE	COMMON PIPISTRELLE