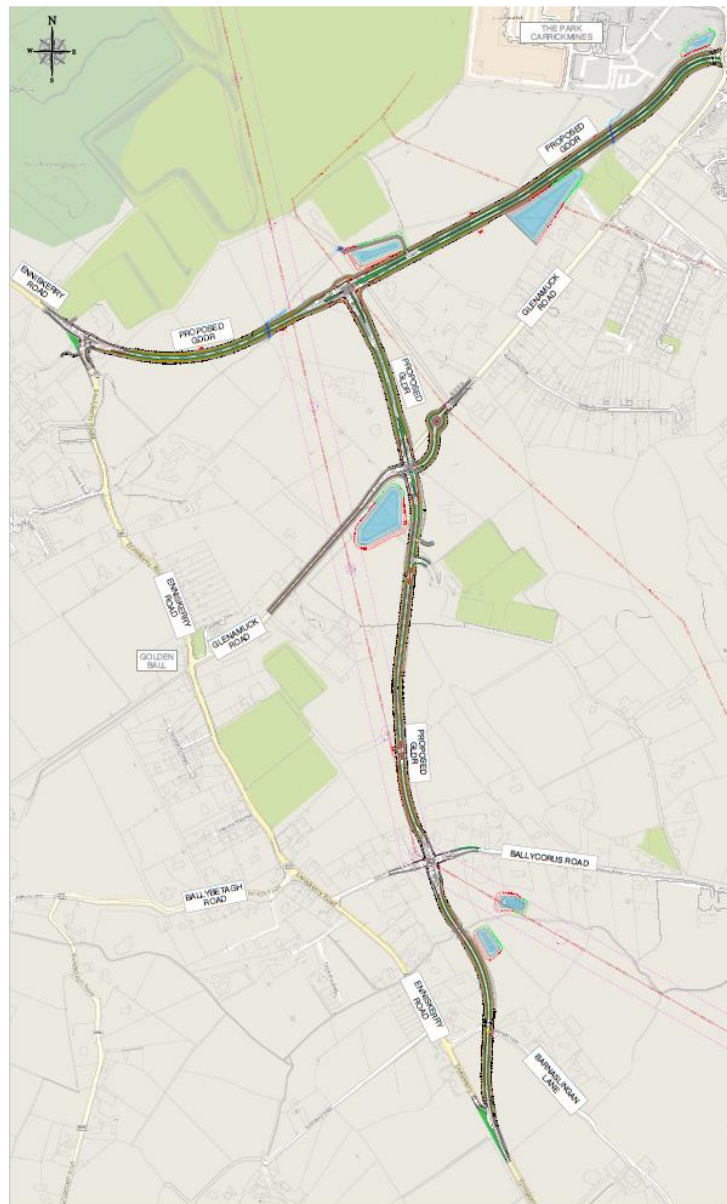


## Appendix 10-2 Bat Survey

# A Bat Survey of the Glenamuck District Roads Scheme and An Evaluation of The Potential Impacts of The Route on The Resident Bat Fauna



Brian Keeley B.Sc. (Hons) in Zool. MCIEEM September 2018

## Executive Summary

The proposed route of the Glenamuck District Road was examined for roosting, commuting and foraging bats in July and September 2018. There were 8 species of bat noted within the area with evidence of roosts of no less than 3 species in close proximity to the route. No roosts were noted within the land-take. There will be a loss of mature trees that may serve as roost sites. There will be severance of commuting corridors and feeding areas by the new road that will affect most if not all bat species. The new road creates a risk of roadkill in addition to habitat loss.

It is proposed that all trees within the land take shall be examined by a bat specialist in advance of felling to determine whether there are any roosts within these trees.

Measures to prevent injury or death to bats must be put in place if roosts are noted and a derogation for roost removal shall be acquired from NPWS.

12 bats boxes of four designs are proposed for the remaining trees. These must be sited in areas that will not be illuminated, exposed to traffic or in dense cover that would prevent bat entry. Most boxes shall be installed in a southerly direction.

Lighting will be designed to avoid illuminating tree canopies in the surrounding areas.

Planting should encourage bats to fly towards the culverts to pass under the road in addition to providing feeding. The road will reduce the availability of feeding and commuting for bats while not altering the overall favourable status of any bat species nationally or within Dublin.

## **Introduction**

Most of Ireland's mammals enjoy protection under the Wildlife Act (1976) and the more recent updating of this legislation (Wildlife (Amendment) Act 2000, S.I. No. 94 of 1997, S.I. No. 378 of 2005, European Communities (Natural Habitats) (Amendment) Regulations, 2005). In conjunction with the enactment of the Habitats Directive into Irish legislation, all native mustelid species and bat species are protected with further protection given to otters and lesser horseshoe bats. Lesser horseshoe bats are not found in County Dublin.

Bats account for nine of Ireland's terrestrial mammal species, approximately one quarter of the species of the Irish land mass. All of the species found to date and indeed all bat species that may remain undetected up to the present are afforded legal protection under Irish and EU legislation and agreements (Wildlife Act (1976), Wildlife (Amendment) Act (2000), S.I. No. 94 of 1997 and S.I. No. 378 OF 2005 implementing the EU Habitats Directive, Bonn Convention (The Convention on the Conservation of Migratory Species of Wild Animal) and the Bern Convention (Convention on the Conservation of European Wildlife and Natural Habitats).

A speedy and productive means of determining the mammal fauna along a road alignment is to walk the entire route concerned, paying particular attention to all hedgerow, woodland, watercourses, fence lines, paths etc. to locate mammal signs. However, this does not provide complete knowledge on the bat fauna as they are nocturnal and do not inhabit ground-level burrows but instead may be found in buildings, bridges, sheds, trees and many other shelters.

The survey undertaken along the current route allows a targeting of mitigation measures to the appropriate or most efficient sites with the aim of preventing accidental death or injury and to allow safe passage across long-established routes under or over the new road.

Fieldwork for the current report on bat distribution along the proposed road route was carried out by Brian Keeley. This report addresses the main issues affecting the bat fauna considered in this assessment.

Road realignment and construction activities and subsequent operation of the completed road create a number of significant short-term and long-term risks for the resident Irish mammal fauna, in addition to impacts upon other vertebrates and invertebrates.

The construction of the road itself may involve the removal of key features of the surrounding environment and of the habitats of bat species, such as trees, hedgerow lines, streams. The most damaging operation is the destruction of bat dwellings during the vegetation clearance and early earthworks, through the felling of trees or demolition of houses or outbuildings or alterations to bridges or other structures.

## **Methodology**

### *Equipment*

Pettersson D240X heterodyne and time expansion bat detector and Echometer 3 recording monitor  
Peersonic and Songmeter2 Bat+ monitor for static recording – ultrasonic receivers storing signals as sound files to SD cards for later analysis

Kaleidoscope 3.1.1 and Batsound 4.2.1 software

Head torch

The survey was undertaken in two seasons to provide a more long-term consideration of the bat fauna and its utilisation of the landscape in the Glenamuck and Kiltiernan area. The site was initially examined on July 5<sup>th</sup>, 2018 and with a second summer date of July 15<sup>th</sup>, 2018 . The route was again examined on 4<sup>th</sup>- 5<sup>th</sup> and 6<sup>th</sup> – 7<sup>th</sup> September 2018.

The assessment commenced with an examination of the buildings and trees close to the route between the former Wayside Celtic grounds and up north as far as the De La Salle Palmerston Rugby grounds and Dun Laoghaire County Council (DLR) lands running towards Carrickmines on 5<sup>th</sup> July.

The areas of survey were lands reaching east from the Enniskerry Road and north and south of the Glenamuck Road.

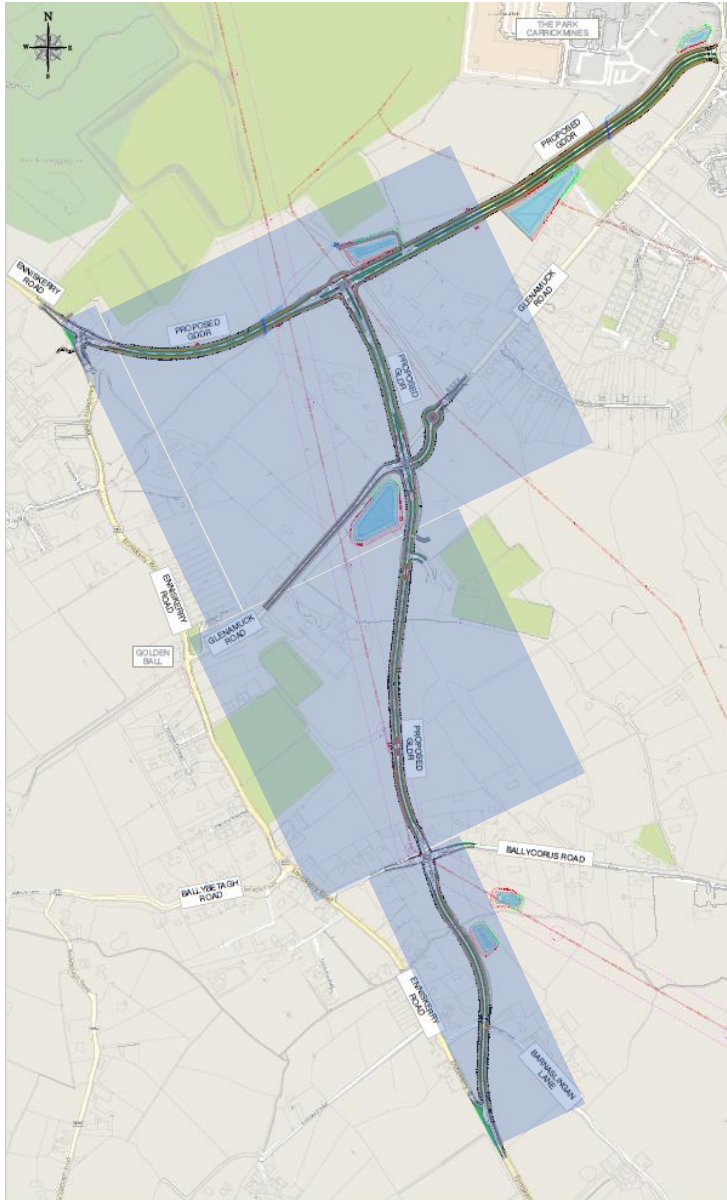
The survey aimed to determine which species commuted through the route or fed or travelled along hedgerow that was likely to bring them into the road alignment. A Peersonic ultrasonic receiver was placed in the land take on the northern side of the Ballycorus Road.

The second date in July (15<sup>th</sup>) was concentrated on the southern section of the route from south of Ballycorus Road down on to Barnaslingan Lane and back to the most southern section on the Enniskerry Road south of Kiltiernan village. The main area of examination was the field north of Barnaslingan Lane. This was only undertaken south of the Loughlinstown River as access was denied to lands to the north. From the first observations prior to dusk in this field and along the stream, surveying moved south into the fields between Barnaslingan Lane and Enniskerry Road. After this, the field north of Ballycorus Road was examined for bat activity.

In autumn, the survey commenced within the field north of Barnaslingan Lane and then moved to the fields between this lane and Enniskerry Road before moving to lands north of Ballycorus Road. On the second night surveying, moved to the northern section of the route. Based on the autumn evaluation, a house along the Glenamuck Road was chosen as a site to commence the survey. The residents of the house were questioned regarding bats and based on their response decided the start point of the survey as the garden of this house. Surveying moved from here into the fields and lanes to the north of the Glenamuck Road .

A SM2 was placed within the field north of Barnaslingan Lane on 4<sup>th</sup> September and was placed along the Ballycorus Road within the land take on 6<sup>th</sup> September. A second SM2 was placed on a wall on Barnaslingan Lane within the land take on 4<sup>th</sup> September.

An examination of available information from Bat Conservation Ireland, personal data and other known survey results was undertaken to compile a list of most likely species in addition to the evaluation of the habitat and known distributions of Irish species.



Proposed route with approximate area of bat survey marked in blue

## Results

### Bats roosting within the land take of the Glenamuck District Road

None noted

There were three bat roosts noted during the assessment but none of these were within the land take. A bat roost was reported from a house along Glenamuck Road to the west of the proposed road. Here, a single bat was believed to be present between the two floors of a two-storey house. There may be more than one bat present here as observations by untrained bat specialists may cease once one bat has emerged or returned to a building.

The identity of the species concerned was not determined but, on the night, and morning of survey, both soprano and common pipistrelle were noted within the garden.

Soprano pipistrelles were noted returning towards Rockville House prior to dawn on 6<sup>th</sup> July 2018. This house is known to be a roost to more than one bat species. However, as there is considerable construction work around it, it is possible that the bat fauna is currently reduced.

A Leisler's bat was seen to return to a house on Barnaslingan Lane at 04.54 hours on 16<sup>th</sup> July 2018 (sunrise 05.17 hours). This building lies within 120 metres of the proposed route.

Another probable roost location is the buildings or trees in the area south of the stream and west of Enniskerry Road, north of Barnaslingan Lane. Here, a soprano pipistrelle was noted feeding early in the night of 4<sup>th</sup> September and late into the morning of 5<sup>th</sup> September within the garden and later along the stream. The bat was last seen at mature trees in the northernmost garden (south of the stream) but it was unclear whether the bat had entered the tree. This is outside of the road land-take.

A house to the west of the route on the Glenamuck Road and closest to the road has high roost potential but this building was not accessed. Bat species noted within this area included pipistrelles, Leisler's and *Myotis* species as well as brown long-eared bat and this property is a potential roost site for these species.

### **Bat species feeding and commuting through the land take**

Leisler's bat	<i>Nyctalus leisleri</i>
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>
Common pipistrelle	<i>Pipistrellus pipistrellus</i>
Nathusius' pipistrelle	<i>Pipistrellus nathusii</i>
Natterer's bat	<i>Myotis nattereri</i>
Whiskered bat	<i>Myotis mystacinus</i>
Brown long-eared bat	<i>Plecotus auritus</i>



**Bat activity 5<sup>th</sup> July 2018 at Kiltiernan**

First bat signals between 22.08 hours and 22.20 hours

*Legend*

<i>Green paddle / circle</i>	<i>Common pipistrelle</i>	<i>Yellow paddle</i>	<i>Leisler's bat</i>
<i>Blue paddle / circle</i>	<i>Soprano pipistrelle</i>	<i>White paddle</i>	<i>Two pipistrelle species</i>
<i>(common and soprano)</i>		<i>Red circle</i>	<i>Myotis (probably whiskered bat)</i>
<i>White box</i>	<i>Static monitor (common and soprano pipistrelle, Leisler's and Natterer's bats recorded)</i>		



Leisler's bat activity was noted throughout the proposed route. This species was seen and heard feeding in lands north and south of Barnaslingan Lane, within the lands adjacent to Wayside Celtic and around the perimeter of the Rugby grounds. On July 5<sup>th</sup>, the bat was recorded at Derryclare on Ballycorus Road and was not heard for the remainder of the active survey but was noted at 02.49 hours on the passive monitor.

Soprano pipistrelles were relatively widespread within the area and given that there is a long-established roost at Rockville House, this is not surprising. Soprano pipistrelle bats fed along the double hedge to the west of the route and Wayside Celtic and along woodland behind the sports centre. This species was found in all areas and on all dates of survey.

Common pipistrelles were present throughout the survey area and were the most commonly encountered bat in the lands around the Wayside Celtic grounds. There is high common pipistrelle activity here along Glenamuck Road. Common pipistrelles were noted along Enniskerry Road shortly after emergence time on July 5<sup>th</sup>, 2018.

Leisler's bats and both common and soprano pipistrelles were noted feeding along the edge of the De La Salle Rugby grounds.

Nathusius' pipistrelle was noted on 7<sup>th</sup> September by the remote monitor at 02.17 hours. This species was noted only once, and it is possible that it travels over a distance to reach this area. The species was noted in previous surveys in neighbouring lands and south towards the ski slope several years ago.

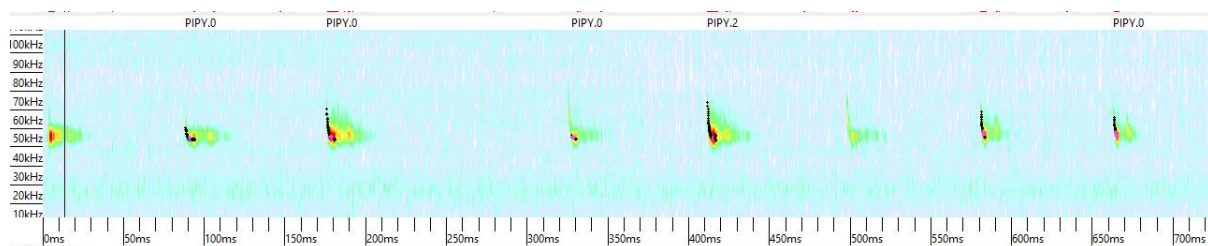
Two species of the genus *Myotis* were present in the area: whiskered Natterer's and bats. Natterer's bats were noted on the active survey prior to dawn on 6<sup>th</sup> July on Barnaslingan Lane and again close to the route southern section at Enniskerry Road on July 15<sup>th</sup>. Static monitors recorded them at Ballycorus Road within the land take in July and September and along Barnaslingan Lane in September.

Signals around the Rockville House area on Glenamuck Road on July 5<sup>th</sup> at approximately 22.45 hours were closest to whiskered bat in characteristics.

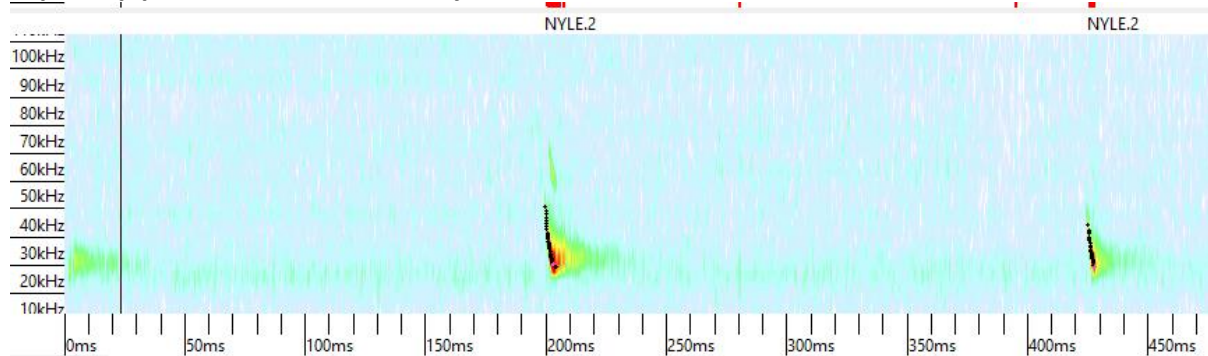
Brown long-eared bats were noted by remote monitors at Barnaslingan Lane on 4<sup>th</sup> September 2018 as well as on Ballycorus Road on 6<sup>th</sup> September. This species was also present at 02.00 hours on 5<sup>th</sup> September at Barnaslingan and at 05.32 hours on 7<sup>th</sup> September at Ballycorus. This species has previously roosted at Rockville House and may still be here or in nearby buildings.

**Peersonic July 5<sup>th</sup> on Ballycorus Road indicating the presence of 4 bat species**

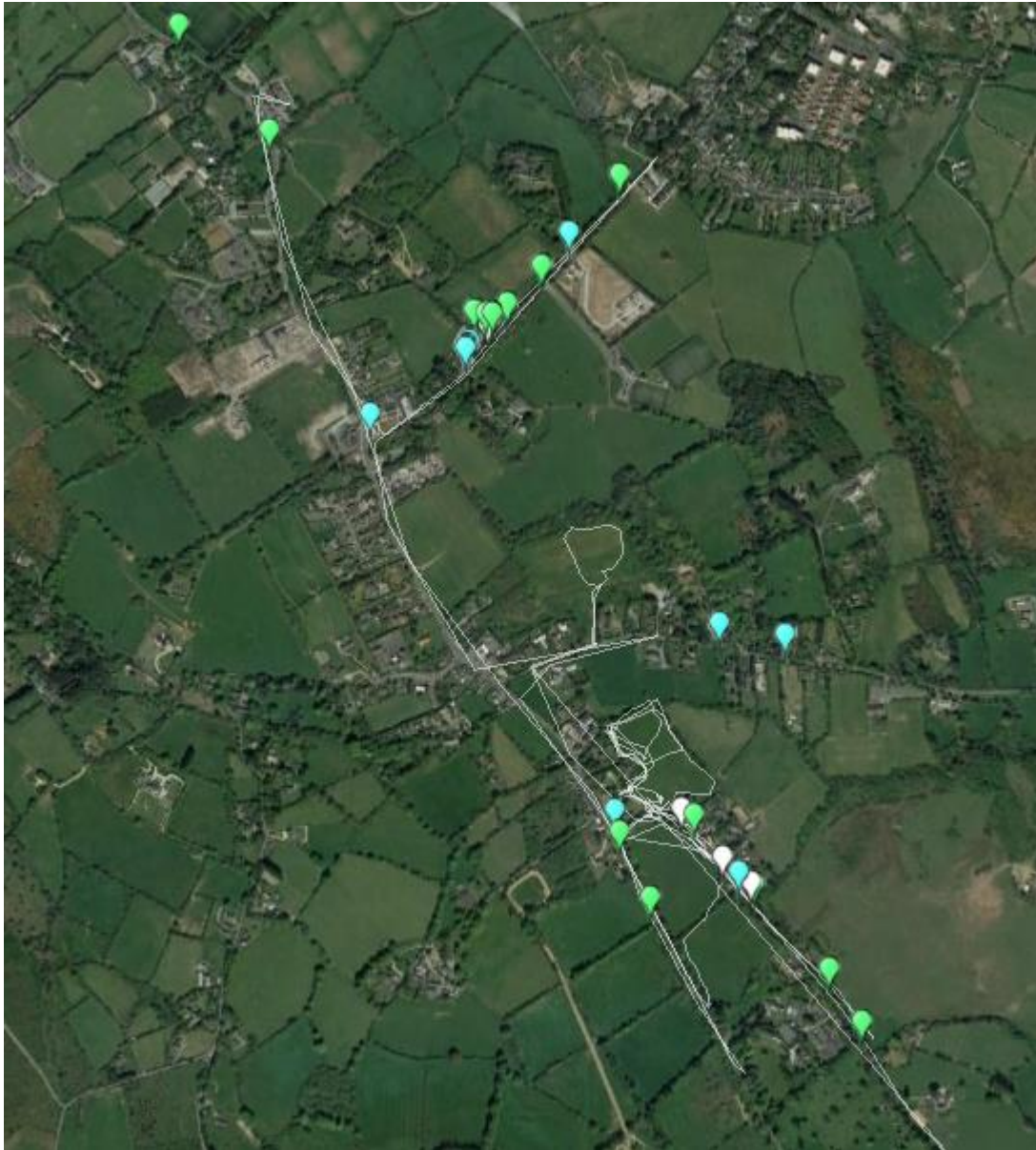
Time	Auto Id	Pulses	Matching	Manual Id
22:29:00	Noid	2	0	Common Pipistrelle
22:33:00	Common Pipistrelle	3	3	Common Pipistrelle
00:29:00	Soprano Pipistrelle	9	9	Soprano Pipistrelle
02:49:00	Leisler's Bat	2	2	Leisler's Bat
03:17:00	Common Pipistrelle	6	6	Common Pipistrelle
03:24:00	Common Pipistrelle	8	8	Common Pipistrelle
03:47:00	Common Pipistrelle	7	5	Common Pipistrelle
03:56:00	Natterer's Bat	13	7	Natterer's Bat
04:10:00	Common Pipistrelle	5	3	Common Pipistrelle



**Soprano pipistrelle 00.29 hours 6 July 2018**



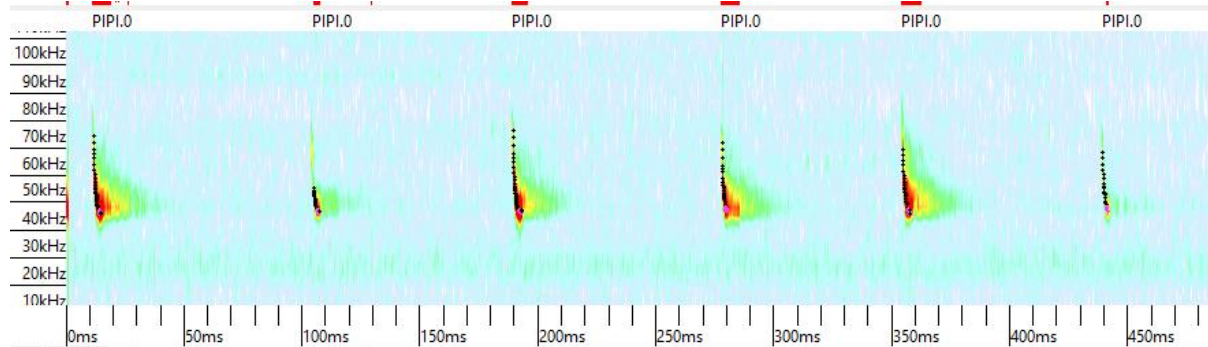
**Leisler's bat 02.49 hours 6 July 2018**



**Bat activity 15<sup>th</sup> July 2018**

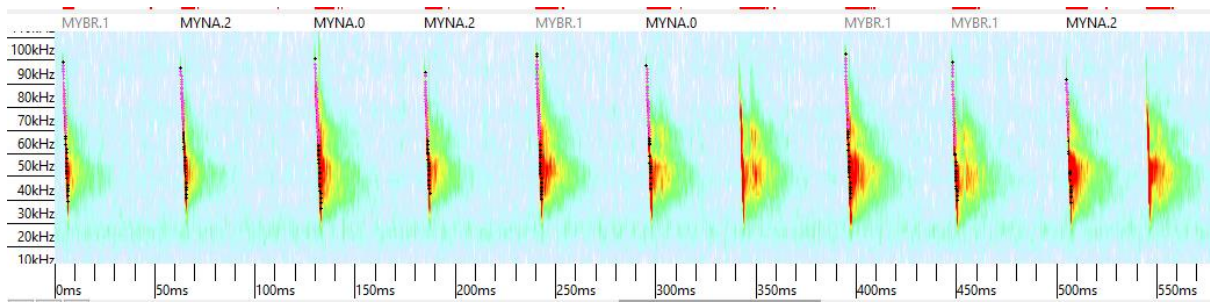
*Legend*

*Green paddle    Common pipistrelle    Blue paddle    Soprano pipistrelle*  
*White paddle    Myotis bat*

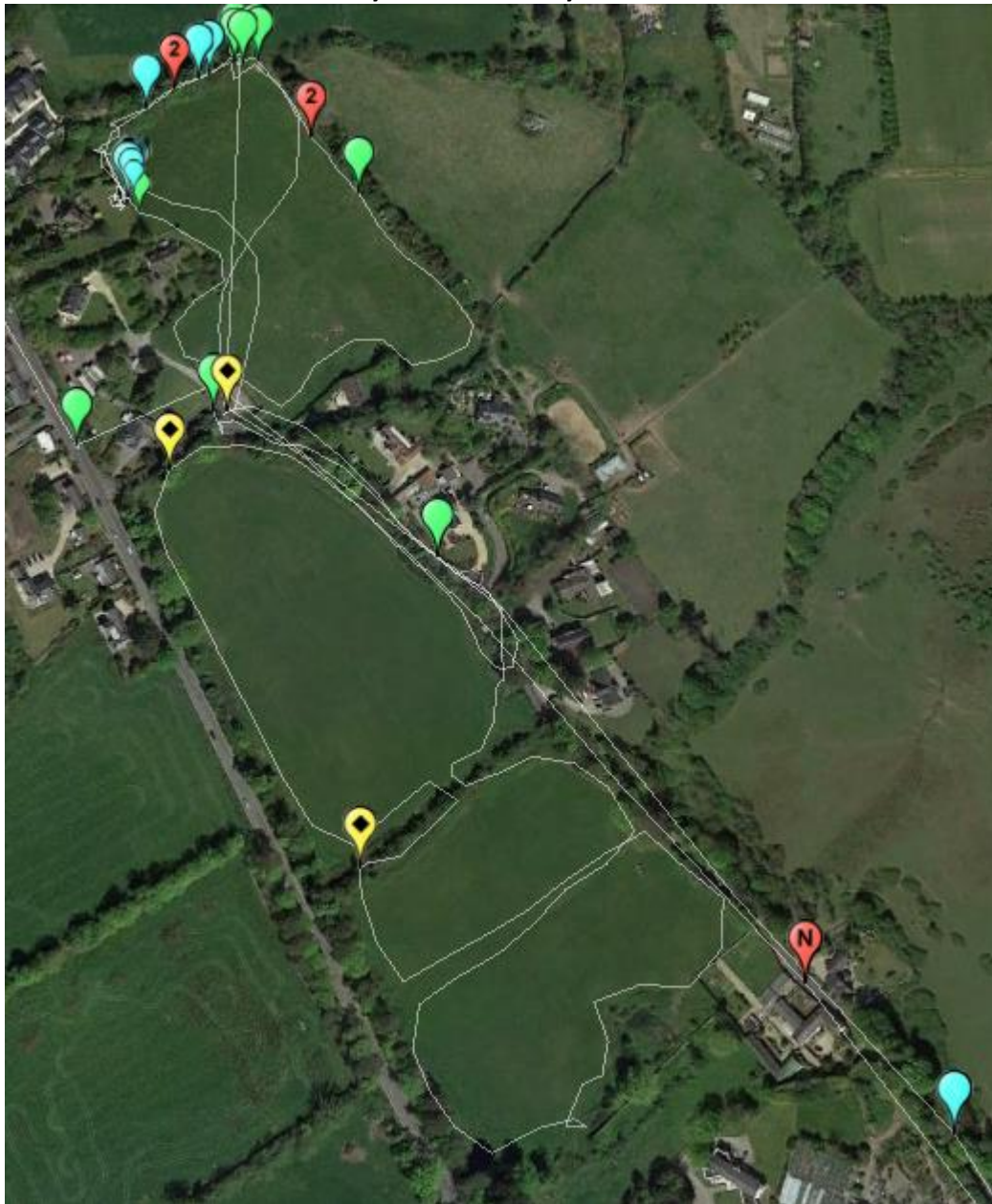


**Common pipistrelle 03.17 hours 6 July also recorded 22.29, 22.33, 03.24, 03.47 and 04.10 hours**





**Natterer's bat 03.56 hours 6 July 2018 near Derryclare**



**Bat activity Glenamuck District Road Southern section 4<sup>th</sup> September 2018**

*Legend*

*Blue paddle*

*Soprano pipistrelle*

*Green paddle Common pipistrelle*

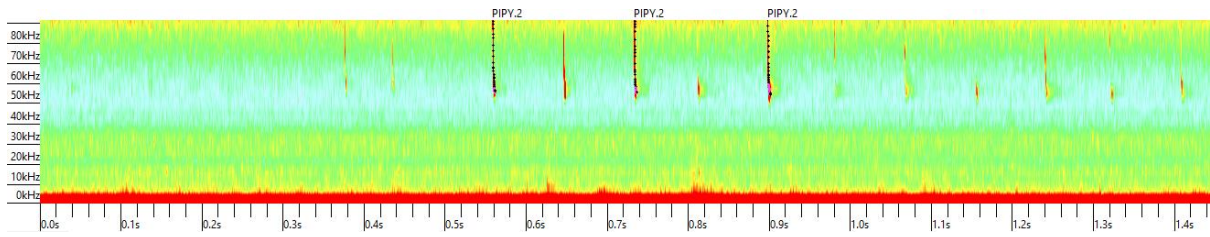
*"2" paddle*

*Soprano and common pipistrelle*

*Yellow paddle Leisler's bat*

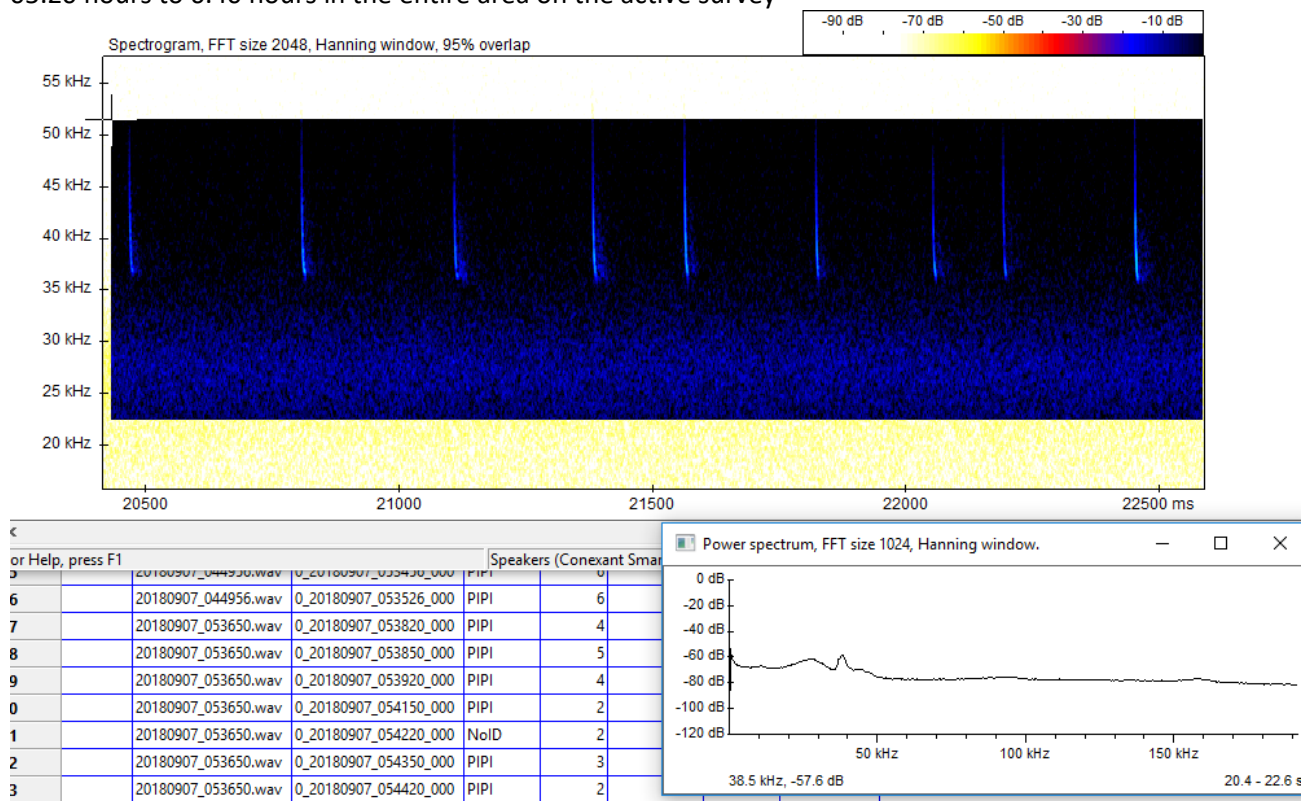
*"N" paddle*

*Natterer's bat and common pipistrelle*



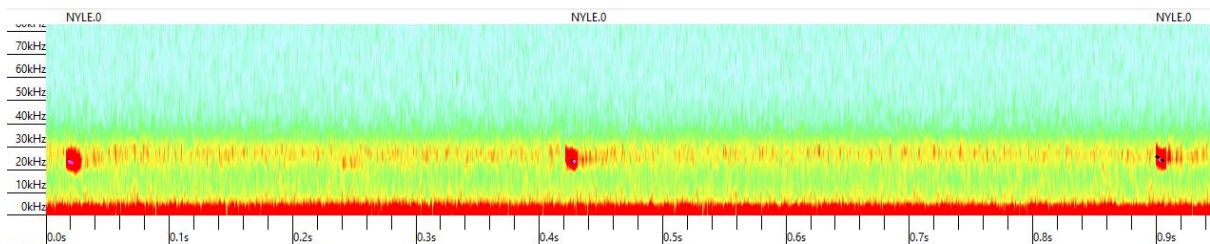
**Bat activity prior to sunrise on 7<sup>th</sup> September 2018 at Glenamuck**

Soprano pipistrelle in a garden off the Glenamuck Road South at 06.20 hours; the only signal from 05.20 hours to 6.40 hours in the entire area on the active survey



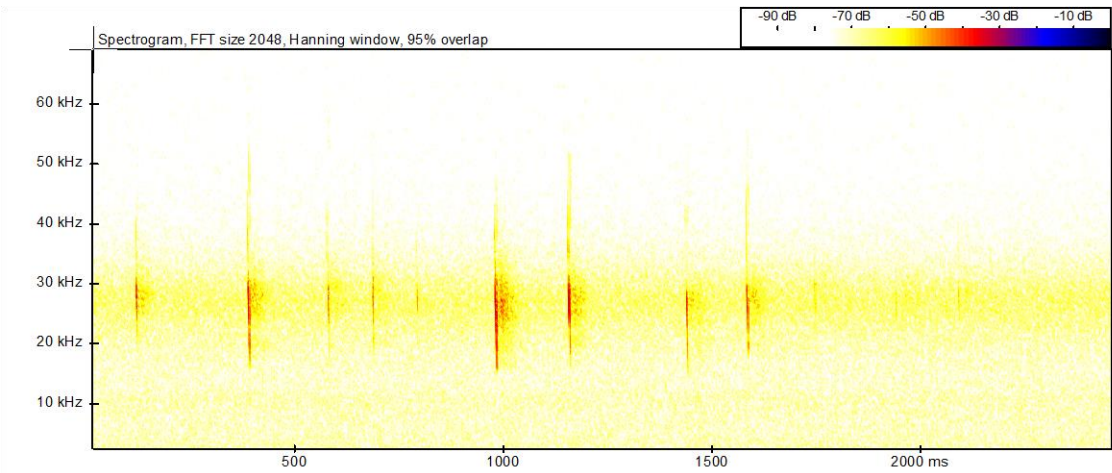
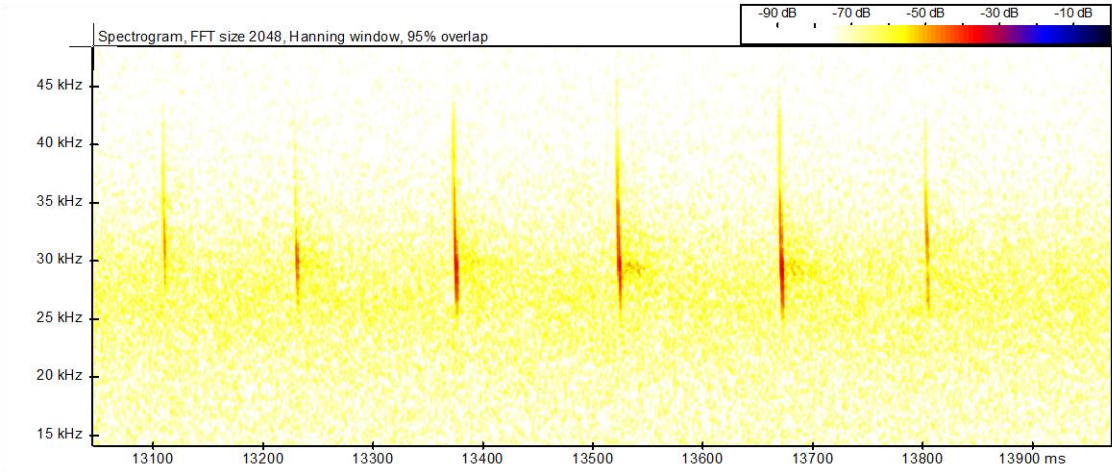
**Nathusius' pipistrelle signal on 7<sup>th</sup> September 2018 at 02.17 hours.**

This bat passed the passive monitor on Ballycorus Road.

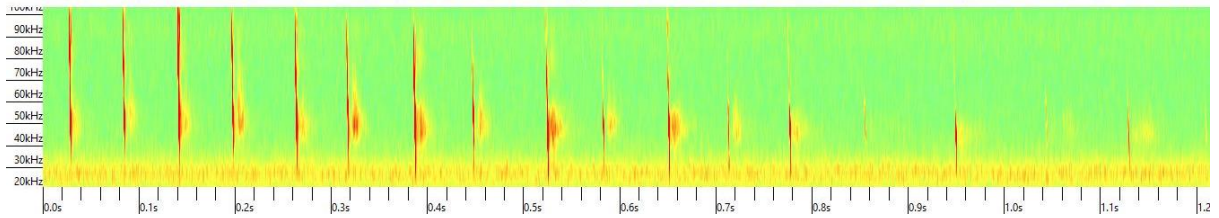


**Leisler's bat at 20.52 hours on Ballycorus Road section**





**Brown long-eared bat at 23.05 hours and at 23.13 hours at Ballycorus Road 6<sup>th</sup> September**



**Natterer's bat at 21.02 hours at Ballycorus Road 6<sup>th</sup> September 2018**



**Bat activity at the northern section of the route 6<sup>th</sup> September 2018**

*Legend*

<i>Blue paddle</i>	<i>Soprano pipistrelle</i>	<i>Green paddle</i>	<i>Common pipistrelle</i>
<i>Yellow paddle</i>	<i>Leisler's bat</i>	<i>"L" paddle</i>	<i>Leisler's bat and soprano pipistrelle</i>

**Bat activity recorded by a SM2 monitor at Ballycorus Road on 6<sup>th</sup> September 2018**

TIME	AUTO ID	MANUAL ID
20:38:56	Common pipistrelle	Common pipistrelle
20:39:56	Common pipistrelle	Common pipistrelle
20:44:56	Common pipistrelle	Common pipistrelle
20:45:56	Common pipistrelle	Common pipistrelle
20:48:56	Common pipistrelle	Common pipistrelle
20:52:26	Leisler's bat	Leisler's bat
20:52:56	Common pipistrelle	Common pipistrelle
20:55:26	Common pipistrelle	Common pipistrelle
20:55:56	Common pipistrelle	Common pipistrelle
20:56:26	Leisler's bat	Leisler's bat
20:58:26	Common pipistrelle	Common pipistrelle
20:58:56	Common pipistrelle	Common pipistrelle
21:02:56	MYBR	Natterer's bat
21:03:26	MYNA	Natterer's bat
21:05:26	Leisler's bat	Leisler's bat
21:08:56	Common pipistrelle	Common pipistrelle
21:10:26	Leisler's bat	Leisler's bat
21:10:56	Leisler's bat	Leisler's bat
21:16:50	MYBR	MYOTIS
21:17:50	Leisler's bat	Leisler's bat
21:22:20	Leisler's bat	Leisler's bat
21:24:50	Leisler's bat	Leisler's bat
21:27:50	Common pipistrelle	Common pipistrelle
21:36:50	Soprano pipistrelle	Soprano pipistrelle
21:46:50	Common pipistrelle	Common pipistrelle
21:49:20	Leisler's bat	Leisler's bat
22:01:30	Common pipistrelle	Common pipistrelle
22:03:30	NoID	Leisler's bat
22:07:00	Common pipistrelle	Common pipistrelle
22:07:30	Common pipistrelle	Common pipistrelle
22:09:30	Common pipistrelle	Common pipistrelle
22:10:30	Common pipistrelle	Common pipistrelle
22:30:00	Leisler's bat	Leisler's bat
22:32:00	Leisler's bat	Leisler's bat
22:32:30	Leisler's bat	Leisler's bat
22:40:23	Leisler's bat	Leisler's bat
23:03:23	Leisler's bat	Leisler's bat
23:03:53	Leisler's bat	Leisler's bat
23:05:53	Brown long-eared bat	Brown long-eared bat
23:13:53	NoID	Brown long-eared bat
02:17:22	Nathusius' pipistrelle	Nathusius' pipistrelle
05:13:56	Common pipistrelle	Common pipistrelle
05:22:26	Common pipistrelle	Common pipistrelle



05:22:56	Common pipistrelle	Common pipistrelle
05:26:26	Common pipistrelle	Common pipistrelle
05:27:26	Common pipistrelle	Common pipistrelle
05:27:56	Common pipistrelle	Common pipistrelle
05:29:26	Common pipistrelle	Common pipistrelle
05:29:56	Common pipistrelle	Common pipistrelle
05:30:26	Common pipistrelle	Common pipistrelle
05:32:56	Brown long-eared bat	Brown long-eared bat Common pipistrelle
05:33:26	Common pipistrelle	Common pipistrelle
05:33:56	Common pipistrelle	Common pipistrelle
05:34:26	Common pipistrelle	Common pipistrelle
05:34:56	Common pipistrelle	Common pipistrelle
05:35:26	Common pipistrelle	Common pipistrelle
05:38:20	Common pipistrelle	Common pipistrelle
05:38:50	Common pipistrelle	Common pipistrelle
05:39:20	Common pipistrelle	Common pipistrelle
05:41:50	Common pipistrelle	Common pipistrelle
05:42:20	NoID	Common pipistrelle
05:43:50	Common pipistrelle	Common pipistrelle
05:44:20	Common pipistrelle	Common pipistrelle
05:46:20	Common pipistrelle	Common pipistrelle
05:49:20	Common pipistrelle	Common pipistrelle
05:50:50	Common pipistrelle	Common pipistrelle
05:53:50	Common pipistrelle	Common pipistrelle
05:56:20	Common pipistrelle	Common pipistrelle
05:56:50	Common pipistrelle	Common pipistrelle
06:08:20	Leisler's bat	Leisler's bat

#### Bat activity noted at Barnaslingan Lane 4<sup>th</sup> September 2018 by SM2 monitor

TIME	AUTO ID	MANUAL ID
20:24:30	Common pipistrelle	Common pipistrelle
20:25:00	Common pipistrelle	Common pipistrelle
20:33:30	Leisler's bat	Leisler's bat
20:35:30	Soprano pipistrelle	Soprano pipistrelle
20:36:00	Common pipistrelle	Common pipistrelle
20:37:55	Leisler's bat	Leisler's bat
20:39:25	Common pipistrelle	Common pipistrelle
20:47:25	MYBR	MYOTIS
20:51:25	Common pipistrelle	Common pipistrelle
20:55:25	Common pipistrelle	Common pipistrelle
20:59:25	Common pipistrelle	Common pipistrelle
20:59:55	Common pipistrelle	Common pipistrelle
21:00:25	Common pipistrelle	Common pipistrelle
21:05:25	Common pipistrelle	Common pipistrelle
21:06:55	Common pipistrelle	Common pipistrelle

21:09:25	Soprano pipistrelle	Soprano pipistrelle
21:09:55	Soprano pipistrelle	Soprano pipistrelle
21:11:25	Leisler's bat	Leisler's bat
21:11:55	Leisler's bat	Leisler's bat
21:23:49	Common pipistrelle	Common pipistrelle
21:24:19	Common pipistrelle	Common pipistrelle
21:24:49	Common pipistrelle	Common pipistrelle
21:25:19	Leisler's bat	Leisler's bat
21:30:49	Leisler's bat	Leisler's bat
21:31:49	MYBR	MYOTIS
21:34:19	Common pipistrelle	Common pipistrelle
21:48:49	Common pipistrelle	Common pipistrelle
21:49:19	Soprano pipistrelle	Soprano pipistrelle
21:54:00	Brown long-eared bat	Brown long-eared bat
21:58:30	Soprano pipistrelle	Soprano pipistrelle
21:59:00	Common pipistrelle	Common pipistrelle
21:59:30	Common pipistrelle	Common pipistrelle
22:05:30	Soprano pipistrelle	Common pipistrelle Soprano pipistrelle
22:08:00	Common pipistrelle	Common pipistrelle
22:13:30	Common pipistrelle	Common pipistrelle
22:14:00	Common pipistrelle	Common pipistrelle
22:18:30	Soprano pipistrelle	Soprano pipistrelle
22:20:30	Common pipistrelle	Common pipistrelle
22:42:21	Brown long-eared bat	Brown long-eared bat
22:54:51	Common pipistrelle	Common pipistrelle
22:55:21	Common pipistrelle	Common pipistrelle
23:04:51	Common pipistrelle	Common pipistrelle
23:10:21	Leisler's bat	Leisler's bat
23:11:51	Common pipistrelle	Common pipistrelle
23:19:51	Common pipistrelle	Common pipistrelle
23:20:21	Common pipistrelle	Common pipistrelle
23:28:45	Leisler's bat	Leisler's bat
23:37:15	Common pipistrelle	Common pipistrelle
23:38:15	NoID	Common pipistrelle
23:38:45	Common pipistrelle	Common pipistrelle
23:42:45	Common pipistrelle	Common pipistrelle
23:47:45	Brown long-eared bat	Common pipistrelle
23:48:15	Common pipistrelle	Common pipistrelle
23:58:15	MYBR	MYOTIS
00:23:39	Common pipistrelle	Common pipistrelle
00:24:39	Common pipistrelle	Common pipistrelle
01:03:00	Common pipistrelle	Common pipistrelle
01:06:30	Common pipistrelle	Common pipistrelle
01:15:00	MYBR	MYOTIS

01:16:00	Common pipistrelle	Common pipistrelle
01:59:24	Common pipistrelle	Common pipistrelle
01:59:54	Common pipistrelle	Common pipistrelle
02:00:24	Brown long-eared bat	Brown long-eared bat
02:38:49	Common pipistrelle	Common pipistrelle
02:39:49	Common pipistrelle	Common pipistrelle
02:43:19	Common pipistrelle	Common pipistrelle
02:46:19	Common pipistrelle	Common pipistrelle
02:47:49	Common pipistrelle	Common pipistrelle
02:48:19	Common pipistrelle	Common pipistrelle
02:48:49	Common pipistrelle	Common pipistrelle
02:49:19	Common pipistrelle	Common pipistrelle

## **Potential Impacts of Glenamuck District Road on Bats**

### **Construction Phase**

#### **Loss of roosts**

There will be a removal of mature trees to facilitate construction of the road. Bats may avail of trees as roost sites during any season and are known to breed in suitable trees (uncommon or relatively rare), mate (more common and widespread), roost or perch (widespread). Roosts may be used for several days or weeks uninterrupted or more often, may be short-term resting places.

Tree roosts are very difficult to pinpoint without considerable effort including bat detector assessments and / or visual inspection.

Given the possibility of short-term use, there is also the likelihood that there are tree roosts within the area that have not been identified. Some of the mature trees within the land-take have potential as roosts.

### **Operational Phase**

#### **Roadkill**

Bats may be killed while feeding along roads or flying across them to feeding areas or roosts. This is most significant close to major roosts. All Irish bat species have been noted as road fatalities within their European range, but lower-flying bats are more at risk.

#### **Loss of feeding**

Vegetation removal to construct the road will interrupt hedgerow continuity and lead to loss of mature trees and scrub. This will lead to loss of feeding for bats.

#### **Increased Lighting**

There will be a requirement for lighting of the new road in addition to the increased lights from cars, buses, trucks, bicycles and access for pedestrians along the roadside.

#### **Increased Noise**

There will be an increase of traffic noise through all the lands that the road traverses. This may affect the ability of species such as brown long-eared bat to use audible sound for hunting and will affect the ability of bats to hear lower frequency social calls with interference from car brakes etc.

## Mitigation Measures

### Construction

#### **Checking of all mature trees for bats prior to felling**

All mature trees shall be examined in advance of felling by a bat specialist and where potential as a roost is considered moderate to high, the tree shall be further inspected either by means of a fibrescope and access or by a bat detector assessment at a time of year when bats are active and such as survey is likely to identify their exit or return to a tree roost.

#### **Provision of bat boxes**

14 bat boxes are proposed in neighbouring trees to compensate for roost loss through tree removal and severance of the habitat. The boxes proposed are the following:

Schwegler:	2F x 4	Improved Cavity Bat box x 2	Eco Bat box x 2
	2FN x 4	Improved Crevice Bat box x 2	

These boxes shall be erected away from direct light and from traffic and from any clutter that would obstruct entry or exit for bats. Boxes shall be primarily erected in a southerly direction with a number of boxes facing away from this direction (for example, east). Boxes may be erected singly or in groups of no greater than 3 to any one tree or other structure (wall, building, culvert etc.).

### Operational

#### **Culvert access for bats**

There will be three culverts to carry the road over the Glenamuck Stream and its minor tributaries in the north of scheme (WX01-WX03). There will be a bridge to carry the road over the Loughlinstown River in the south of the scheme (WX4). The culverts are approximately 1 to 2 metres in height and provide only a narrow channel by which bats might pass under the road. The bridge has over 2 metres clearance over the stream invert and a cross-sectional area of over 10 metres<sup>2</sup>. Culvert cross-sectional area of no less than 47m<sup>2</sup> is considered adequate to allow pipistrelles to avail of culverts while smaller sizes such as 7m<sup>2</sup> can facilitate Daubenton's bats (based on a probability of 95% that a culvert is used). Low culverts may be used by bats to pass under roads but the taller the culvert the more beneficial to bats.

#### **Lighting**

Road lighting must not overspill on to the surrounding vegetation . Lighting must not increase the level of illumination of tree canopy level by greater than 3 lux to ensure that bats do not lose feeding and commuting areas. This has greatest impacts on species such as brown long-eared bat, Natterer's and whiskered bats.

**Planting**

Planting along the road leading to each culvert should be sufficiently dense to encourage bats to commute to the culverts and cross the road at these points (e.g. leading to the Loughlinstown River). Planting would also provide feeding areas for bats.

**Impacts After Mitigation**

There will be a loss of feeding from the construction of the road. There will be an increase in lighting from the road. There will be a replacement of tree roost potential with bat boxes. This may create more suitable roost sites than currently available. There is a reduction in safe movement through the lands crossed while there will be facilitation of future development of the lands crossed by the provision of the road. While bat species will not move from a favourable to an unfavourable conservation status, there will be a reduction in suitability of the area for bats.