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ECOLOGICAL IMPACT ASSESSMENT

EFFECTS OF OUTDOOR CONCERTS IN 2015 ON BATS AND WATERFOWL, MARLAY PARK, CO. DUBLIN.

DUN LAOGHAIRE-RATHDOWN COUNTY COUNCIL

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1. INTRODUCTION AND SURVEY AREA

a. Aims of the Assessment

Scott Cawley, Ecological Consultants were contracted by Dun Laoghaire-Rathdown County Council to provide advice to Council Parks Staff regarding the protection of fauna in Marlay Park during the set-up and operation of outdoor concerts on 3rd and 4th July 2015 and to monitor the response of fauna to the set-up and operational phases of these concerts and the longer terms effects on bat distribution over the summer of 2015. The focus of the impact assessment was on the behavioural response and short-medium term response of waterfowl and bats. The aim of the impact assessment was to determine if there was any evidence of adverse effects on individual birds and bats and to extrapolate these observations to potential impacts on the local avian and bat population diversity and distribution.

This Report focuses on the results of the impact assessment.

b. Study Area

The Study Area covered the main field that would be occupied by the stage on both the 3/4th July concerts and the Longtitude festival, the perimeter treelines and paths, the Central Pond and Woodland Pond. This area was deemed to be the zone of influence of any significant light and noise disturbance generated from the setup and the concerts themselves.

It was acknowledged that other areas such as the car parking area and approach routes could also potentially be affected by changes in lighting but it decided that the best use of survey effort was assigned to the areas of greatest magnitude of change.

Figure 1: Study Area

c. Legislative Background

i. Bats

Currently there are nine species of bat known to breed in Ireland. All nine species and their roost sites are strictly protected under both European and Irish legislation, as described below.

- ***Wildlife Act 1976 and Wildlife (Amendment) Act, 2000 (S.I. No. 38 of 2000)***
  All bat species occurring in Ireland are listed in Schedule V of the Wildlife Act 1976 (amended by the Wildlife (Amendment) Act 2000) as protected species. This legislation makes it illegal to kill or injure bats in the wild and makes it an offence to wilfully interfere with, or to destroy, their breeding and resting places.

- ***Council Directive on the Conservation of Natural Habitats and of Wild Flora and Fauna 1992 (Council Directive 92/43/EEC)***
  The Habitats Directive offers legal protection to all ten bat species which occur in Ireland and lists them under Annex IV of the Directive, as species of community interest, in need of strict protection. The lesser horseshoe bat is additionally listed in Annex II of the Directive, requiring the designation of Special Areas of Conservation to secure its conservation and protection.

- ***European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. No. 477 of 2011)***
  These regulations give effect to the above two strands of European and national legislation and supersede previous regulations in 1997. This legislation makes it an offence to deliberately capture or kill bats in the wild, to deliberately disturb them particularly during the breeding, rearing, hibernation and migration seasons, or to cause the deterioration or destruction of their breeding and resting sites. Disturbance under the EC Habitats Directive has been tested under case law in the UK (but not in Ireland) to be defined as impact negatively on the demography (survival or breeding) of the species at the local population level. The rarity of the species and vulnerability of individuals of the species would have to be taken into account. Derogation licences can be issued to permit roost loss or disturbance and other potential offences to be committed providing the conservation status is unaffected and other tests within the legislation are met.

- Furthermore as a signatory to the European Bats Agreement (Agreement on the Conservation of Bats in Europe) 1993, Ireland is required to protect their habitats, requiring the identification and protection from damage or disturbance, of important feeding areas. All Irish bat species are listed in Appendix II of the Bern Convention (1979), as species requiring strict protection. Finally, all but two bat species in Ireland are listed as internationally important in the Irish Red Data Book (1993). Natterer's and the whiskered bat are both listed as indeterminate. Brandt's bat status and Greater Horseshoe bat status is not yet determined in Ireland and no breeding sites have been located in the Republic.

ii. Birds

- ***Wildlife Act 1976 and Wildlife (Amendment) Act, 2000 (S.I. No. 38 of 2000)***
  All bird species occurring in Ireland are listed in the Wildlife Act 1976 (amended by the Wildlife (Amendment) Act 2000) as protected species. This legislation makes it illegal to kill or injure nearly all birds, nests and eggs in the wild and also places restrictions on clearance of breeding bird habitats.

2. SURVEY METHODOLOGY

a. Overview of Surveys

Three sets of surveys were carried out:

i) Pre-Concert set up surveys – to provide a baseline from which the impact assessment would be based.

ii) Manual bat and bird monitoring on the nights of the two concerts on 3rd and 4th July 2014 to provide qualitative data on bat and bird distribution and behaviour.

iii) Static bat detector monitoring from 24th June- 10th July to record any changes in bat activity at three locations before, during and after the concerts.

iv) Manual bat surveys on 2nd September to provide qualitative data on bat and bird distribution post-event at the end of the summer.

These are described in more detail below. The design of the surveys and the protocols for identification of bat calls and making impact assessment judgements are based on the following documents:

- Bat Mitigation Guidelines for Ireland (Kelleher & Marnell, 2006. NPWS).
- Bat Surveys: Good Practice Guidelines (Hundt, 2012. Bat Conservation Trust).

b. Pre-Concert Set up baseline surveys (24th-25th June 2015)

Two manual bat detector surveys were undertaken on the 24th and 25th June 2015. Each survey consisted of a post-dusk and pre-dawn survey using two surveyors. The weather conditions on both surveys were clear and cool (14 degrees Celsius) on 24th but heavy showers on the 25th June. Bat surveyors were Mr Paul Scott CEnv, MCIEEM and Dr Daniel Buckley, both experienced bat surveyors each with over 10 years' experience. Surveyors used Pettersson D240x time expansion detectors and Wildlife Acoustic EM3 detector. Dusk surveys and pre-dawn surveys focused on any evidence of bats using Marlay House or outbuildings as well as trees in the perimeter. 45 minutes after dusk, the Study area was walked and observations of bat activity were recorded using the ultrasonic detectors and infrared scope (Night Owl optics).

Birds observations were made for two hours prior to dusk and for an hour after dawn to determine nesting and roosting behaviour. Observations were made using Bushnell H20 10x42mm binoculars.

c. Impact Monitoring Surveys (3rd-4th July 2015)

On the evening of both surveys the Study Area was walked by a single surveyor continuously from 20 minutes prior to dusk to 2330, 30 minutes after the cessation of the concerts. Observations of bat activity were made using ultrasound detector and infrared scope. All effort was made to make qualitative observations from the same viewpoints as made in the pre-concert surveys.

Bird activity and distribution was recorded at frequent intervals (usually every 20 minutes) on both lakes and each side of the pontoon. Responses to specific stimuli were also made including the main flux of public across the pontoon during entry and exit and during the pyrotechnic display on the night of 3th July.

d. Static Bat Detector Surveys (24th June-10th July 2015)

Whilst manual surveys were necessary to identify bat behaviour, flight paths, height and direction, such data were only snapshots of activity at any single point in time. In order to provide an indication of the changes in bat activity in specific locations over a longer period of time, three static ultrasound detectors were installed on trees around the perimeter:

Location 1: Anabat SD1 detector on path to the east of the concert, placed within treeline facing main stage. This detector would record any changes in bat activity attributed to the concert and was in full view of the stage lighting and sound.

Location 2: Anabat SD1 detector placed on tree on south side of Central lake facing toward concert field to the north. This detector would record any changes in bat activity attributed to the concert and was in full view of the stage lighting and sound.

Location 3: Wildlife Acoustics SMZC detector mounted on a tree located at the eastern end of the Central lake, shielded from both sound and lighting from the concerts and proposed to be a "Control" location.

Figure 2: Static Detector locations

e. Post Event Impact Monitoring Surveys (2nd September 2015)

The Study Area was walked by a single surveyor continuously from 20 minutes prior to dusk to 2330 as per the concert monitoring surveys. Observations of bat activity were made using ultrasound detector and infrared scope. All effort was made to make qualitative observations from the same viewpoints as made in the previous surveys.

3. Bat Survey Results

a. Pre-Concert Set up baseline surveys (24th-25th June 2015)

The following observations were made on the dusk and dawn surveys carried out on the 24th and 25th June, prior to any works taking place on the site.

Bats:

- Dusk emergence and dawn entry surveys carried out around Marlay House did not detect any bat roosts. Lighting in this area was likely to be a deterrent to any bats wanting to roost there. Small numbers of Common and Soprano pipistrelle bats *Pipistrellus pipistrellus* and *P.pygmaeus* and Leisler's bats Nyctalus *leisleri* were recorded approximately 30 minutes after dusk in the Tea Room area to the west. This corroborates surveys undertaken in 2010 By tina Aughney which also confirmed that there were no active roosts in the House.
- A single Leisler's bat was recorded roosting in a tree cavity to the south of the Central lake but no other roosting bats were confirmed. At least one Pipistrelle species of bat was recorded feeding in the lakeside woodland to the south of the Central Lake, prior to dusk.
- On both nights, Common pipistrelle bats were recorded in small numbers (2-3) feeding around the wooded paths to the east and west of the Concert field. Light levels here were 0.1 lux and below the sensitivity limit of the light meter.
- The western and eastern ends of the Central Lake supported greatest levels of diversity and activity including Soprano and Common Pipistrelle bats, Leisler's bats and Daubenton's bats *Myotis daubentonii*. Approximately 3-4 Daubenton's bats were seen at any one time and they appeared to feed in localised areas before flying up the lake and back again.
- A single Brown Long-eared bat call was recorded in woodland north of the Woodland pond.
- Lower numbers of all bats were recorded than would have been expected by the habitat and weather conditions but this could be due to many environmental variables.

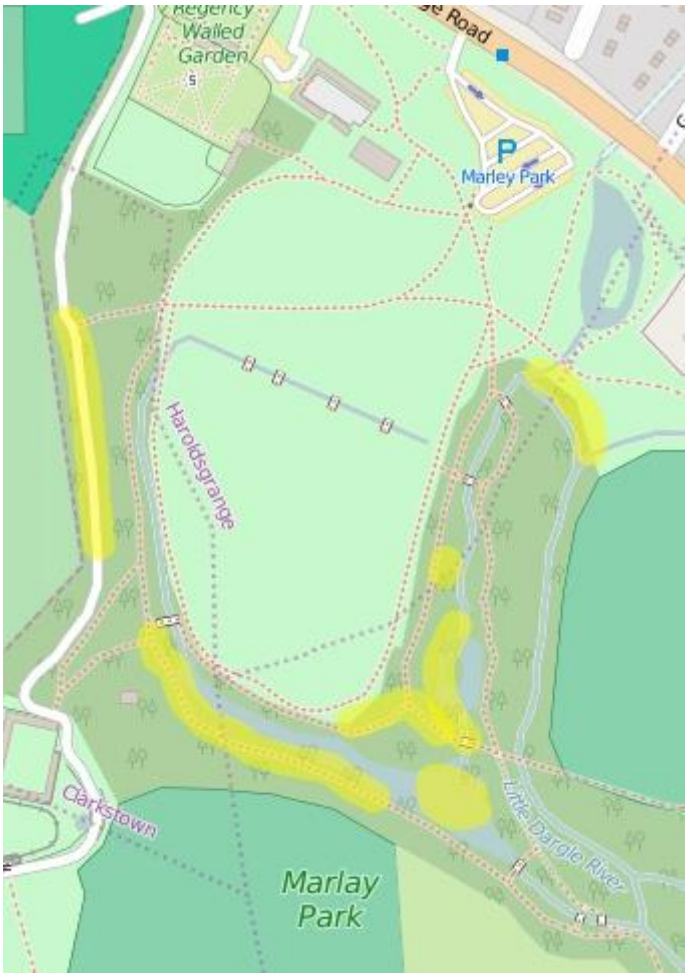

Figure 3: Bat activity hotspots Pre-Concert Set up.

Birds:

- Two pairs of Little grebe *Tachybaptus ruficollis* were noted on the Central Pond and a single pair on the Woodland pond. Two juvenile birds were noted at the western end of the Central lake. No nests were visible and all juvenile birds were mobile and fledged but still dependent on parents.
- A single pair of Moorhen *Gallinula chloropus* and a young juvenile was recorded at the western end of the Central pond.
- Approximately 35-40 Mallard and hybrid duck were recorded in the Central lake. Two Mute Swan and cygnets were recorded on the Woodland Pond.
- Two Grey Heron were seen flying into a Pine tree next to the Central Pond and could be the location of a known heronry. No juvenile birds were seen.

b. Impact Monitoring Surveys (3rd-5th July 2015)

The following observations were made on the dusk and dawn surveys carried out on the 3rd and 4th July, prior to any works taking place on the site.

Bats:

- Soprano pipistrelle bats were first recorded to the south of the Central Lake at 2145 (sunset at 2154) suggesting a nearby roost. They fed unperturbed above and around the bulb string lights.

- 30 minutes after sunset, light levels under the bulb string lights was 3 lux, compared to 16 lux outside the tree canopy.
- Daubenton's bats were recorded feeding in the eastern half of the bisected Central lake and came within 5m of the pontoon once the area was in general darkness. At 2230 two Daubenton's bats appeared in the western half of the Central Pond and fed there for 20 minutes before leaving the area. These bats must have crossed through the woodland or over the pontoon as they were recorded feeding in the eastern half shortly after.
- Common and Soprano pipistrelle bats were recorded feeding over the lake and around the rear of the stage itself.
- During times of potential disturbance such as the main exit period (2300-2330) there was no evidence of bat activity declining with some Daubenton's bats flying within 2m of the edge of the pontoon. There was no notable response during the pyrotechnic display on the 3rd July.
- On the 4th July there was notable increase in Leisler's bat activity after the concert had finished. This was not in the direct glare of the white stage lights projected toward the east but more to the north east over Marlay House.
- No interference with bat echolocation was recorded. The sound engineers for the concerts reported that output over 17kHz was cut off so in theory this would not interfere with bat echolocation when flying and feeding which, for most species covers the range of 20-80kHz.
- Bat activity was low overall but widespread and showed no apparent preference or avoidance of certain areas.

Photo 1: Bulb string lights

Photo 2: High levels of pedestrian movements over pontoon

Photo 3: Lighting post-performance.

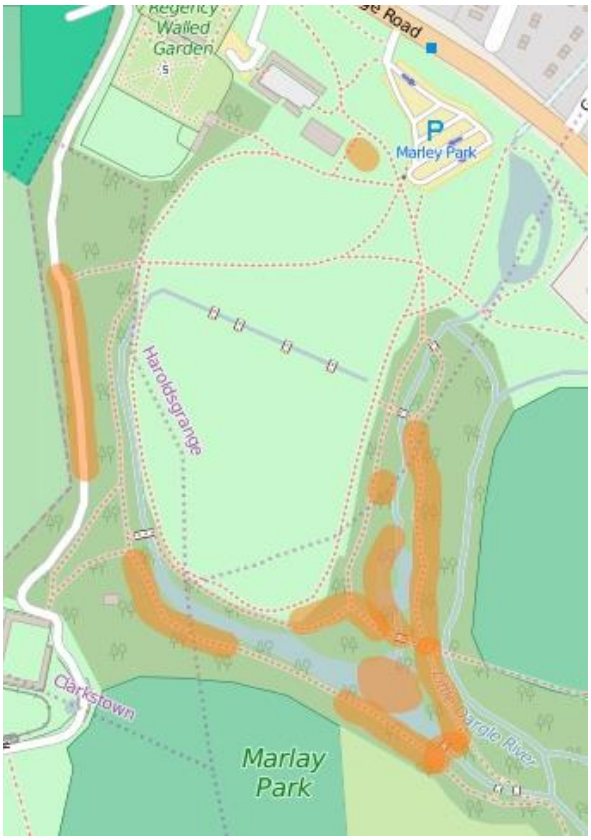

Figure 4: Bat activity hotspots during concerts

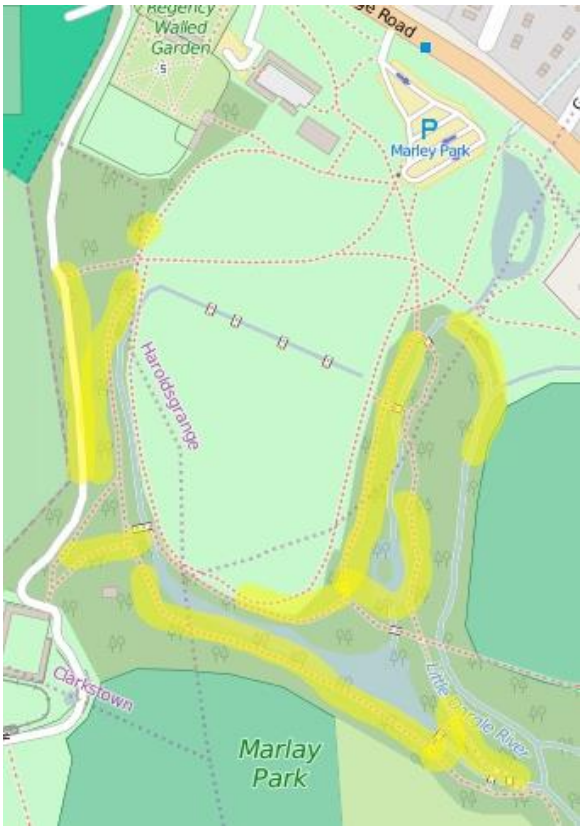

Figure 5: Bat activity hotspots at end of the Summer

Birds:

- At 1730-1830, there were 2 juvenile Little grebe and a single adult and a single juvenile and two adults to the east of the Central lake and 4 adult Little Grebes and 1 juvenile to the West of the pontoons.
- Approximately 35 mallard hybrid ducks were settled in the far eastern end of the Central lake.
- On the night of the 3rd July, the only birds seen to respond to the pyrotechnics at 2245 were two feral pigeons and a single Grey Heron.
- Two pairs of Little Grebe could be seen roosting amongst roosting Mallard at the eastern end of the lake and were largely unaffected by pedestrian traffic across the pontoon.
- One Moorhen and the juvenile were seen feeding at the edge of the Central lake on the northern bank on the 3rd and 4th July.
- Follow up surveys on 6th and 7th July recorded two pairs of Little Grebe and two juveniles on the Central Lake, feeding normally and showing territorial behaviour.

Photo 4: Waterfowl at the eastern end of the lake.

c. Static Bat Detector Surveys (24th June-10th July 2015)

The results of the static detectors are set out below in Table 1. The highlighted cells indicate the nights of the two concerts.

Table1: Results of Static bat detector surveys

Location 1: Path on eastern side of concert field facing concert.					
Date	Unidentified Pipistrelle	Leisler's bat	Common Pipistrelle bat	Soprano Pipistrelle Bat	**Grand Total**
24/06/2015			23	12	**35**
25/06/2015			14		**14**

26/06/2015	1		5	12	**18**
27/06/2015		1	23	4	**28**
28/06/2015		3			**3**
29/06/2015			3	3	**6**
30/06/2015	0	4		2	**6**
01/07/2015		12	4		**16**
02/07/2015	1			23	**24**
03/07/2015	2	17		9	**28**
04/07/2015	6	31		18	**55**
05/07/2015	1	8	2	7	**18**
06/07/2015	0	2		2	**4**
07/07/2015	2	4			**6**
08/07/2015				2	**2**
10/07/2015		2			**2**
Grand Total	**13**	**84**	**74**	**94**	**265**

Location 2: Southern Edge of Central Lake facing toward Concert						
Date	Unidentified Pipistrelle	Leisler's Bat	Common Pipistrelle bat	Soprano Pipistrelle bat	Myotis bat	**Grand Total**
24/06/2015	23		45	34	34	**136**
25/06/2015	12		76	21	21	**130**
26/06/2015	15	3	91	21	2	**132**
27/06/2015	153		854	62	124	**1193**
28/06/2015	54		227	98	14	**393**
29/06/2015	129		380	107	90	**706**
30/06/2015	5		28	7		**40**
01/07/2015	1		6	2	32	**41**
02/07/2015	20		34			**54**
03/07/2015	43		21			**64**
04/07/2015	22		52	2	12	**88**
05/07/2015	45		65	6		**116**
06/07/2015	65		45		12	**122**
07/07/2015	34		78	12	46	**170**
08/07/2015	34	4	99	34		**171**
09/07/2015	76		105		76	**257**
10/07/2015	98		110	32	34	**274**
Grand Total	**829**	**7**	**2316**	**438**	**497**	**4087**

Location 3: Control, eastern end of Central Lake.							
Date	Myotis Species	Unidentified pipistrelle	Leisler's bat	Common Pipistrelle bat	Soprano pipistrelle bat	Brown Long-eared bat	**Total**

24/06/2015	2	34	12	3	6	2	**59**
25/06/2015			17	4	12		**33**
26/06/2015		2	18		3	7	**30**
27/06/2015		9	2	2	11		**24**
28/06/2015		3	9	2	12	2	**28**
29/06/2015	7	8	23	2			**40**
30/06/2015		8	49		4		**61**
01/07/2015		6	18		9	3	**36**
02/07/2015	8	4	35			2	**49**
03/07/2015	5	14	26	5	19		**69**
04/07/2015	5	28	10	2	214		**259**
05/07/2015		10	25	4	72		**111**
06/07/2015		29	68		4		**101**
07/07/2015		13	26	3	18		**60**
08/07/2015		2			8		**10**
09/07/2015		4	10		89		**103**
10/07/2015		8	13		59		**80**
Grand Total	**27**	**182**	**361**	**27**	**540**	**16**	**1153**

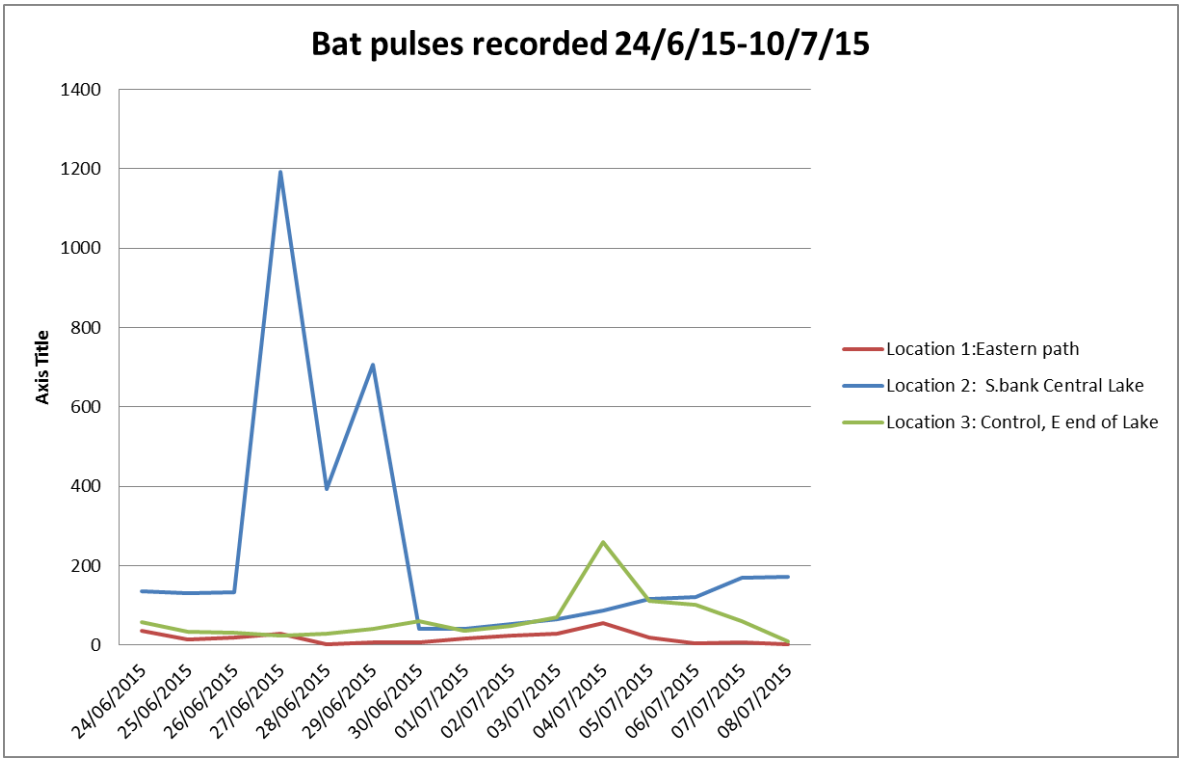

Figure 6: Total bat pulses (calls) recorded over the Study period.

The results can be summarised as follows:

- Bat activity was highest overall at Location 2 (south side of lake) but only markedly so in the days preceding the 30th June 2015. This was likely to be due to warm and damp weather conditions whereas the weekend of the concert was drier and may have had less insect life around the pond. Bat activity was lowest overall along the eastern path.

- Bat species using all three locations include (in decreasing order of representation):
    - Common pipistrelle bat (most common along the edge of the Lake at Location 2),
    - Soprano pipistrelle bat (found at all locations),
    - Unidentified[1] pipistrelle bats,
    - Myotis bat species (which appeared to be almost entirely Daubenton's bats recorded on the lake, none along the path),
    - Leisler's bats (mostly recorded over the Lake in Location 3 on the eastern path- likely to be bats foraging over the grassland in the Concert field).
    - Brown Long-eared bats (only occasional bats recorded at Location 3).

- Subtle differences in species numbers recorded at each location may be attributed to changes in the light environment but not necessarily connected to a drop in bat activity:
    - At Location 1, along the path to the east, there did not appear to be any significant changes in usage by bats. There was a notable rise in Leisler's bats activity on the 4th July 2015 which coincided with a concert and also with observations of Leisler's bats feeding near the house. However the number of calls was still very low overall for the entire period of monitoring. Leisler's bat calls were consistently higher in the Control location for all dates and did not show any marked change during the concerts.
    - At Location 2 on the south bank of the lake the highest levels of bat activity were recorded and were dominated by Pipistrelle bat species. After the 30th June 2015 the level of activity dropped significantly but this was not coincident with any increase in illumination or disturbance in the Park. The concert nights of the 3rd and 4th showed a small increase in level of activity but not significantly so. There was a steady rise in bat activity from the 1st July, through the concert period to the 10th July.
    - At Location 3 (Control) there was a steady number of bat calls recorded prior to the concerts until the second concert night of the 4th July when there was a near threefold increase in bat activity (mostly Soprano pipistrelle bats) although the level of activity was still rather low. There were no other marked changes in activity levels for other bat species in this location.

d. Post Event Impact Monitoring Surveys (2nd September 2015)

Conditions for this survey were calm, overcast and mild (14 degrees Celsius). The first bat recorded by the manual observations was a Common pipistrelle bat flying along a dark section of the eastern path at 14 minutes after sunset. At 30 minutes after sunset at the eastern end of the Central lake there were regular recordings of Soprano Pipistrelle bats, Daubenton's bat and an unidentified Myotis bat in the woodland.

Common and Soprano pipistrelle bats were then regularly recorded along the south bank of the Main Lake and also around the Woodland lake and the western path in the

[1] Common pipistrelle bats echolocate at or around 45kHz and Soprano Pipistrelle bats at 55kHz. However the peak frequency often varies somewhat depending on behaviour and environment and so frequencies that are clearly Pipistrelle in origin but peak between 48 and 52kHz were labelled as unidentified Pipistrelle bats.

darker areas. A small number of Daubenton's bats (3-4) were seen feeding along the entire area of the Central lake with no obvious preference for any one area.

Only one Leisler's bat was recorded in the Study Area, on the Western side of the concert field feeding high over the tree canopy. Overall, the bat distribution and density of bats recorded was comparable to that recorded pre-Concert set up.

Four Little Grebes were sighted at the eastern end of the Central Lake and all appeared to be adults. The pair of Mute Swan and cygnets were on the Central lake and the Woodland Lake. Approximately 25 Mallard were on the Central Lake. Two Grey Heron were recorded feeding on earthworms at night in the Concert Field. Overall, the bird diversity and distribution recorded was comparable to that recorded pre-Concert set up.

4. Conclusions

a. Bats

The rise in Leisler's bat activity in Location 1 on the night of the 4th July 2015 could possibly be attributed to more activity near the floodlights. Leisler's bat are one of the few bat species that feed around strong lighting, due to large moth and other insect food items being attracted to the light. Most bat species will show a negative correlation between illumination and activity. However the levels of bat activity are so low as to be inconclusive as this area.

- There is no evidence to suggest adverse impacts on bats on the Lake near the pontoon. Bat activity near this location declined *before* the concerts for unknown reasons and then steadily increased from 1st to the 10th July 2015. There was no significant drop in activity at any location during the concerts
- The increase in Soprano Pipistrelle activity at the Control location on the night of 4th July could possibly be attributed to displacement of a small number of bats from disturbed locations. But again the numbers of bat calls was still relatively low and the increase from 69 calls to 259 calls could be caused by a shift in a small (2-3) number of bats.
- The manual survey was extremely valuable in observing bat behaviour. There was no indication that bats were affected by the lighting in the area near the lake, which was very unobtrusive and within the normal foraging illumination level for Leisler's and Pipistrelle bats. Myotis bats are often regarded to be more sensitive to light and prefer dark corridor of less than 3 lux. It is possible that bats made discrete feeding preferences for darker corridors but that this was not observable using the static detectors.
- The continued use of the three areas after the concerts by similar numbers of bats suggests that the local bat population was unaffected in the short and medium-term by the changes in the light and noise environment.

b. Birds

- The results suggested that Little Grebe, the primary conservation concern due to its relatively sparser distribution, was unaffected by the concert. Birds are likely to have been settled on each side of the pontoon before dusk and did not

show signs of distress during the installation or post-installation stages of the concert.

- All birds including Mallard, Heron, Moorhen and Little Grebe were able to feed and move around during the concert in daylight hours. Duck showed sensitivity to disturbance later in the evening and tended to roost at the far eastern end of the main pond. However they were never disturbed to the extent that they took flight.
- The continued use of the three areas after the concerts by similar numbers and of birds and the same species suggests that the local bat population was unaffected by the changes in the light and noise environment.

Overall, the response of fauna to the setting up and operation of outdoor concerts on 3rd and 4th July 2015 did not suggest significant disturbance to the local population. Bats may have responded by minor adjustments to feeding preferences and flight paths but there was no evidence for desertion of foraging resources. Therefore it was our opinion that a derogation licence would not be required as the local population of bats using Marlay park appeared to be unaffected.

Similarly, waterfowl did not appear to be stressed or affected during or after the installation of the pontoon or the operation of the concert and the fact that there are breeding populations of Little Grebe, Moorhen and Mute Swan in a restively busy park suggest that the Concerts are not affecting these species.

Despite its calm and tranquil setting, Marlay Park is a busy park used by hundreds of visitors every day. Large events involving visual and noise stimuli such as the Saturday morning runs have created habituation for waterfowl. Good screening by vegetation exists around the edge of the lake and serves to create more protected zones.

This study produced the following recommendations to be adopted for future events and for general park management:

- Lighting along footpaths in woodland to be restricted to the bulb string lights;
- Some woodland paths to remain unlit along their length;
- Vegetation removal around the ponds to be on a phased basis to prevent excessive opening up of significant areas.
- Bat boxes to be erected on mature trees at eastern end of Central pond and near Woodland Pond.

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