



ECOLOGICAL MONITORING AND SUPERVISION REPORT

LONGITUDE 2017

MARLAY PARK, RATHFARNHAM, CO. DUBLIN.

Dún Laoghaire-Rathdown County Council

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1. INTRODUCTION AND SCOPE

1.1. OVERVIEW

In 2015 and 2016, Scott Cawley Ltd., ecological consultants were commissioned by Dún Laoghaire-Rathdown County Council to undertake ecological monitoring and supervision services within Marlay Park (see Figure 1) to facilitate the protection of ecological features during the Longitude festival (hereafter described as “the event”) between 14th and 16th July 2017.

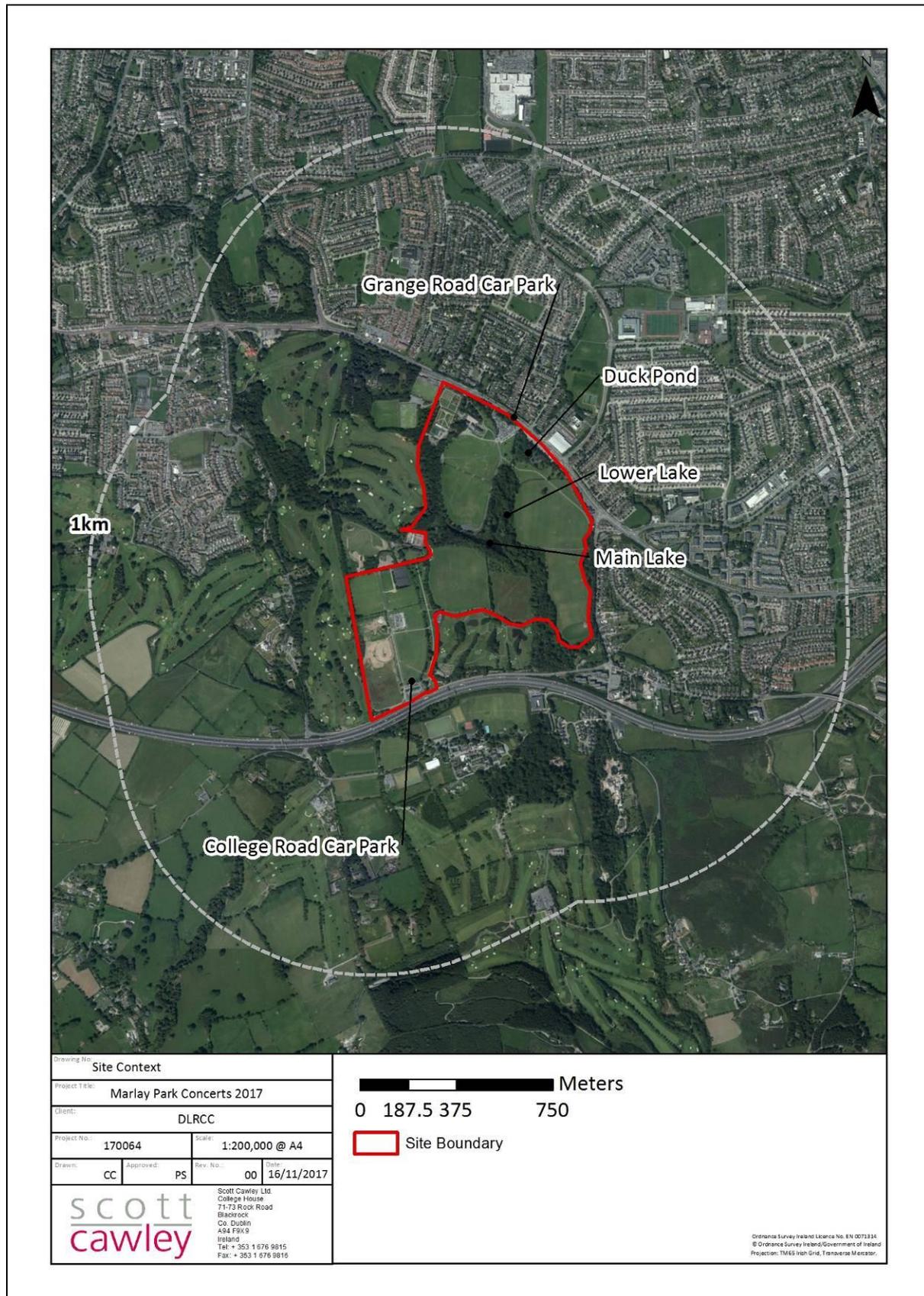
The ecological monitoring and supervision services were undertaken to comply with recommendations made within the previous report *Monitoring of Ecological Impacts of Outdoor Concerts in 2016* (Scott Cawley, 2016). The services were also undertaken to ensure compliance with legislation protecting wildlife and minimise any potential impacts arising from the event.

1.2. SCOPE

The scope of the monitoring and supervision services in 2017 comprised the following:

1. Undertaking breeding bird checks within the Main Lake prior to the installation of pontoons crossing the lake;
2. Ongoing monitoring of nesting birds within the Main Lake before, during and after the concerts;
3. Supervision of the installation, relocation and removal of pontoons crossing the Main Lake;
4. Inspection of flood lighting orientation and organise re-orientation where necessary;
5. Monitoring of bat activity before, during and after concerts by undertaking manual transects and filming bat activity at the Main Lake;
6. Monitor usage of bat boxes;
7. Checks of potential mammal resting places (badger setts and/or otter holts) for signs of activity and provision of recommendations to avoid any potential disturbance.

Figure 1: Event boundary in the context of Marlay Park and its surroundings.



2. BACKGROUND

Scott Cawley Ecologists, attended the event area throughout set-up, during and decommissioning of previous events in 2015 and 2016 within Marlay Park to ensure all environmental measures relevant to the ecological features were delivered.

Specifically, the following services have carried out the following since 2015:

- Baseline surveys over three years (2015 – 2017 inclusive) to establish the key ecological receptors of Marlay Park;
- Held meetings with the event organisers prior to the concerts to provide input to the design of the events to avoid significant impacts on the important ecological features;
- Site staff are advised of existing / new constraints each year by Scott Cawley;
- Provided recommendations in relation to protecting the key ecological features which have been implemented by Dún Laoghaire-Rathdown County Council and the event organisers;
- Provided monitoring of the key ecological features pre- and post-events on an ongoing basis;
- Carried out assessments of impact of the events on the key ecological features.
- Consulted with NPWS in relation to the assessments and monitoring.
- Liaised with Dún Laoghaire staff including Marlay Park staff.

The following recommendations with regards to event management, supervision and monitoring were made after the completion of monitoring surveys of Marlay Park Concerts in 2016 (Scott Cawley, 2016):

- Ecologist should ensure that breeding bird checks are undertaken at least twice in the 3 weeks prior to the installation of the pontoon;
- Ecologist should be on site to supervise/monitor the installation, relocation and removal of the pontoons;
- Ecologist to inspect floodlighting orientation and liaise with organisers to re-orient luminaires if required;
- Ecologist to carry out pre- and during-event manual transects of bat activity to determine if bats are using the same areas as before- this will inform further lighting changes if required.
- Lighting in the woodland during future events will also be checked and adjusted where necessary.
- Any further expansion of the events should be in open grassed areas rather than woodland to minimise need to fell trees or erect safety lighting close to previously undisturbed areas.
- All barriers erected in the streams to prevent unauthorised entry need to be passable for otters and will be inspected by the ecologist;
- No works within 50m of the main badger sett will be permitted checks will be undertaken in 2017 to verify that no new setts or holts are present.

3. MONITORING OF LOCAL BAT POPULATIONS IN 2017

3.1. SURVEYS OF POTENTIAL ROOST SITES

In order to update the baseline information for the Park and to ensure that any potential sensitivities were identified before the events in 2017, specific buildings and trees adjacent to the main areas of the event were assessed for their suitability for roosting bats. The buildings identified as being relevant consisted of Marlay House and courtyard, the Coffee Shop at the entrance to the Regency Gardens, and Laurelmere Cottage. External and internal inspections were carried out of these buildings and emergence/re-entry surveys were undertaken of the buildings in early July 2017 by Paul Scott, Colm Clarke, and Maeve Maher-McWilliams of Scott Cawley.

External and internal inspections of buildings within the park found no evidence of roosting bats in 2017 (Scott Cawley, 2017). Similarly, the pre-dawn re-entry and dusk emergence surveys carried out in early July 2017 did not identify any bats entering or emerging from these buildings. No evidence of roosting bats was found within the park in 2015 and 2016 (Scott Cawley, 2015; Scott Cawley, 2016)

3.2. LIGHTING CHECKS

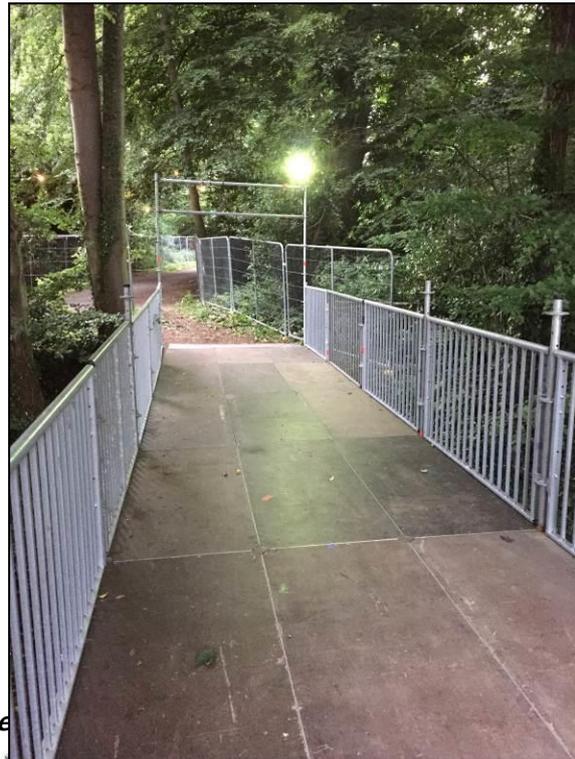
Bats are sensitive to increased illumination (Bat Conservation Ireland, 2010) and may avoid foraging in areas of strong lighting or may react adversely to lighting near roosts. In accordance with recommendations, an ecologist undertook inspections of lighting arrangements for the event in order to ensure minimisation of light pollution in potential foraging habitats (*i.e.* in woodlands and close to watercourses).

Lighting inspections were undertaken during set-up on the mornings of 13th and 14th July 2017. Adjustments to the direction of lighting installed on pontoons in woods east of Stage 4 was made to prevent excess light spill on the surrounding woodland canopy. No other changes to lighting direction were required.

Plate 1: Lighting along woodland paths



Plate 2: Adjusted luminary near Stage 4



lake



3.3. MANUAL TRANSECT SURVEYS

As per previous years of ecological monitoring, manual transects of bat activity were undertaken within Marlay Park before, during, and after concerts in order to determine if bats are active within the same areas as previous years, and to determine if the event is resulting in displacement of bats during concert nights.

Manual transect surveys were undertaken along three routes within the park. The routes were identical to those undertaken in 2016 and are illustrated in Figure 2, Figure 3 and Figure 4 along with point data for surveys. They comprise the following:

1. East Woods – A 1km route beginning at the “duck pond” adjacent to the Grange Road car park in the north of the park, moving southwards past the lower lake, and skirting the main lake before ending in woods just west of the dog park in the southern part of the park;
2. West Woods – An 800m route beginning just south of Marlay House, passing through woods past Laurelmere and the main lake, before ending just south of the main lake; and,
3. Car Parks – A 700m route beginning south of the entrance to the model train track, passing west to the western boundary of the park, skirting this boundary and that of the current playground before ending at north of the entrance from the College Road.

Surveys commenced 30 minutes after sunset, and were walked at a slow and steady pace (less than 3km/hour). The transects were undertaken by Colm Clarke and Maeve Maher-McWilliams. Surveyors used Elekon Batlogger M detectors, which record bat calls in addition to GPS information and temperature data.

Surveys were undertaken on:

- 28th and 29th June 2017,
- during the nights of the event on 14th, 15th and 16th July 2017,
- post-event on 27th July 2017,
- post-event on 30th August 2017.

The results for each transect have been summarised within Table 1.

Table 1: Results of manual transects in Marlay Park.

Location	Pre Event		Event			Post-event	
	28 th June 2017	29 th June 2017	14 th July 2017	15 th July 2017	16 th July 2017	27 th July 2017	30 th August 2017
East Woods	3 species 16 passes	3 species 17 passes	2 species 46 passes	3 species 10 passes	2 species 14 passes	6 species 39 passes	3 species 25 passes
West Woods	1 species 8 passes	2 species 35 passes	3 species 8 passes	1 species 2 passes	1 species 20 passes	4 species 50 passes	1 species 6 passes
Car Parks	-	2 species 18 passes	2 species 9 passes	2 species 25 passes	2 species 2 passes	2 species 18 passes	2 species 6 passes

Details of each survey are presented in Appendix 1 of this report.

Transect results have been organised by timing and illustrated in Figure 2, Figure 3, and Figure 4. Results are described in detail as follows:

1. East Woods

- Pre-event nights:
 - 28th June 2017: Three species of bat were recorded, with a total of 16 bat passes. Soprano pipistrelle bats (nine passes), an unidentified species of the genus *Myotis* (four passes) and Leisler's bat (three passes) were identified following completion of call analysis. Soprano pipistrelle bats were recorded in the vicinity of the duck pond at the Grange Road Car Park, and north of the Lower Lake. Leisler's bat was recorded at the Main Lake and in the woods south of this. The unidentified species of *Myotis* bat was recorded north east of the Lower lake and in the woods east of the main lake.
 - 29th June 2017: Three species of bat were recorded, with a total of 17 bat passes. Soprano pipistrelle bats (15 passes) were recorded in the vicinity of the duck pond at the Grange Road Car Park and again at the main lake and in the southern part of the transect. Leisler's bat was recorded (one pass) in the southern part of the transect, and Daubenton's bat (one pass) was recorded at the lower lake.
- Nights of the event:
 - 14th July 2017: Two species of bat were recorded, with a total of 46 bat passes. Soprano pipistrelle (10 passes) were recorded in the vicinity of the "duck pond" close to the Grange Road Car Park. Leisler's bat (36 passes) were recorded in the woods east of both the lower and main lakes.
 - 15th July 2017: Three species of bat were recorded, with a total of 10 bat passes. Leisler's bat (six passes) were recorded flying over the main stage area, and in the woods close to the lower lake. Soprano pipistrelle bat (three passes) were recorded in the vicinity of the main lake. Common pipistrelle bat (one pass) was recorded in the southern part of the transect.
 - 16th July 2017: Two species of bat were recorded with 14 bat passes. Soprano pipistrelle (11 passes) were noted foraging close to the "duck pond" at the Grange Road and in the woods east of the Main Lake. Leisler's bat (three passes) were recorded adjacent to the Grange Road Car Park.
- Post-event nights:
 - 27th July 2017: Six species of bat were recorded, with a total of 39 bat passes. Soprano pipistrelle bat (15 passes) was recorded both at the "duck pond" adjacent to the Grange Road Car Park, and in woods at the southern end of the transect. Several other species of bat were observed in the southern part of the transect, including common pipistrelle bat (two passes) an unidentified member of the genus *Myotis* (seven passes), and brown long-eared bat (two passes). The latter species have quiet echolocation calls and are often have a lower encounter rate than species with loud calls such as the pipistrelle species. Daubenton's bat (seven passes) were recorded

foraging over the main lake, and Leisler's bat (six passes) were recorded foraging above the field south of Marlay House.

- 30th August 2017: Three species of bat were recorded, with a total of 25 bat passes. Soprano pipistrelle bat (16 passes) were recorded foraging close to the duck pond adjacent to the Grange Road Car Park and in the woods towards the southern end of the transect. Leisler's bat (one pass) was detected in a clearing north of the Lower Lake, and an unidentified pipistrelle bat with calls characteristics of Nathusius' pipistrelle bat or was recorded south of the duck pond and over the Main Lake (eight passes).

2. West Woods

○ Pre-event nights:

- 28th June 2017: One species of bat, soprano pipistrelle bat, was recorded, with a total of eight passes. Bats were recorded at the start of the transect south of Marlay House, and again north of the Parks depot.
- 29th June 2017: Two species of bat were recorded, with a total of 35 bat passes. Soprano pipistrelle bat (26 passes) were recorded west of Laurelmere cottage, and again at the end of the transect alongside the Main Lake. Leisler's bat (nine passes) were recorded along the western boundary with the Grange Golf Club lands and at the western end of the Main Lake.

○ Nights of the event:

- 14th July 2017: Three species of bat were recorded with a total of eight passes. Leisler's bat (five passes) were recorded west of Laurelmere cottage and along the southern side of the Main Lake. Soprano pipistrelle bat (two passes) were recorded close to Laurelmere cottage and an unidentified species of *Myotis* bat (one pass) was detected along the Main Lake.
- 15th July 2017: One species of bat was recorded along the route, Leisler's bat, with a total of two passes in along the southern side of the Main Lake.
- 16th July 2017: One species of bat was recorded along the route, Leisler's bat, with a total of 20 passes. The species was recorded south of Marlay House and in along the south part of the Main Lake.

○ Post-event nights:

- 27th July 2017: Four species of bat were recorded with a total of 50 passes. Soprano pipistrelle bat (nine passes) was recorded along the western boundary of the park. Common pipistrelle bat (14 passes) was recorded south of Marlay House, and on the western boundary of the park. Leisler's bat (10 passes) was recorded south of Marlay House and along the western boundary of the park. Daubenton's bat (18 bats) was recorded both at the start of the transect and at the Main Lake.

- 30th August 2017: One species of bat was recorded, Leisler's bat, with a total of six passes along the western boundary of the park and south of Marlay House.

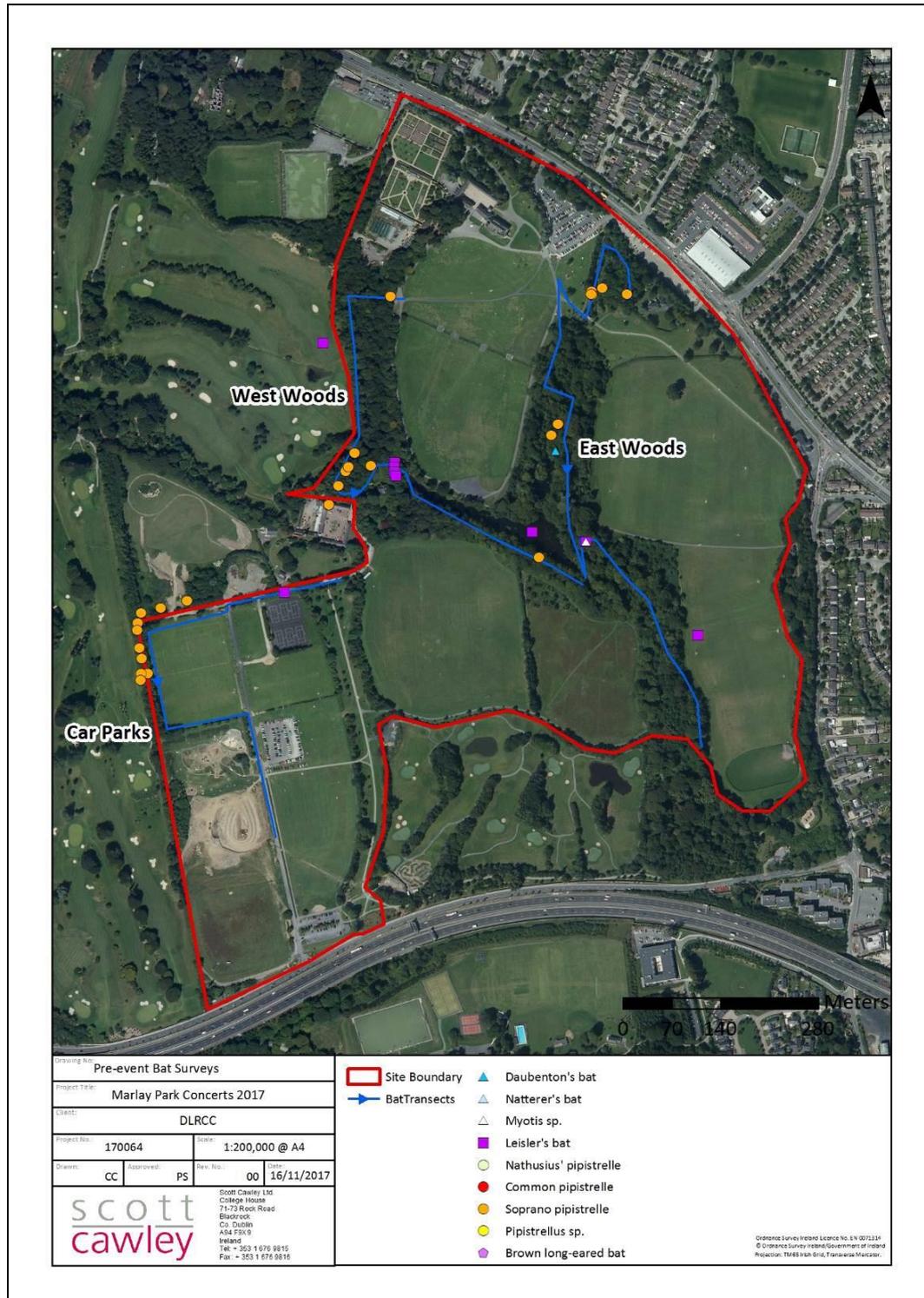
3. Car Parks

- Pre-event nights:
 - 28th Jun 2017: No bats recorded along transect.
 - 29th June 2017: Two species of bat were recorded, with a total of 18 bat passes. Leisler's bat (one pass) was recorded at the start of the transect south of the Parks Depot. Soprano pipistrelle bats (17 passes) were recorded foraging along the hedgerow/treeline that forms the western boundary with the Grange Golf Club.
- Nights of the event:
 - 14th July 2017: Two species of bat were recorded, with a total of nine bat passes. Leisler's bat (six passes) were recorded south of the Parks depot, and again east of the playground. Soprano pipistrelle bat (three passes) were recorded along the western boundary.
 - 15th July 2017: Two species of bat were recorded along the transect with a total of 25 passes. Both common pipistrelle bat (15 passes) and soprano pipistrelle bat (10 passes) were foraging along the western boundary of the park.
 - 16th July 2017: Two species of bat were recorded with a total of two passes; common pipistrelle bat (one pass), and Leisler's bat (one pass). Both were recorded south of the park depot.
- Post-event nights:
 - 27th July 2017: Two species of bat were recorded with a total of 18 passes. Both Leisler's bat (two passes) and common pipistrelle (16 passes) were foraging along the western boundary of the lands.
 - 30th August: Two species of bat were recorded with a total of six passes. Both Leisler's bat (four passes) and common pipistrelle bat (two passes) were foraging along the western boundary of the lands.

Visual observation of bats during the events was an important datum to collect, as "bat passes" is not an indication of numbers of bats or their behaviour. In the case of the East Woods transect, it was noted that small numbers (1-2) of pipistrelle bats were consistently found around the pond closest to the Grange Road, and crossing the path towards the southern end of the transect, whilst Daubenton's bats were observed flying over the surface of the Main Lake and the Lower Lake on several occasions. At the West Woods transect, soprano pipistrelle bats were observed foraging at the start of the transect and close to Laurelmere Cottage. In the case of the Car Park transect, a hotspot for Pipistrelle bat activity was located along the hedgerow separating Marlay Park from the Grange Golf Club. Two to three pipistrelle bats (both common and soprano) foraged parallel to the

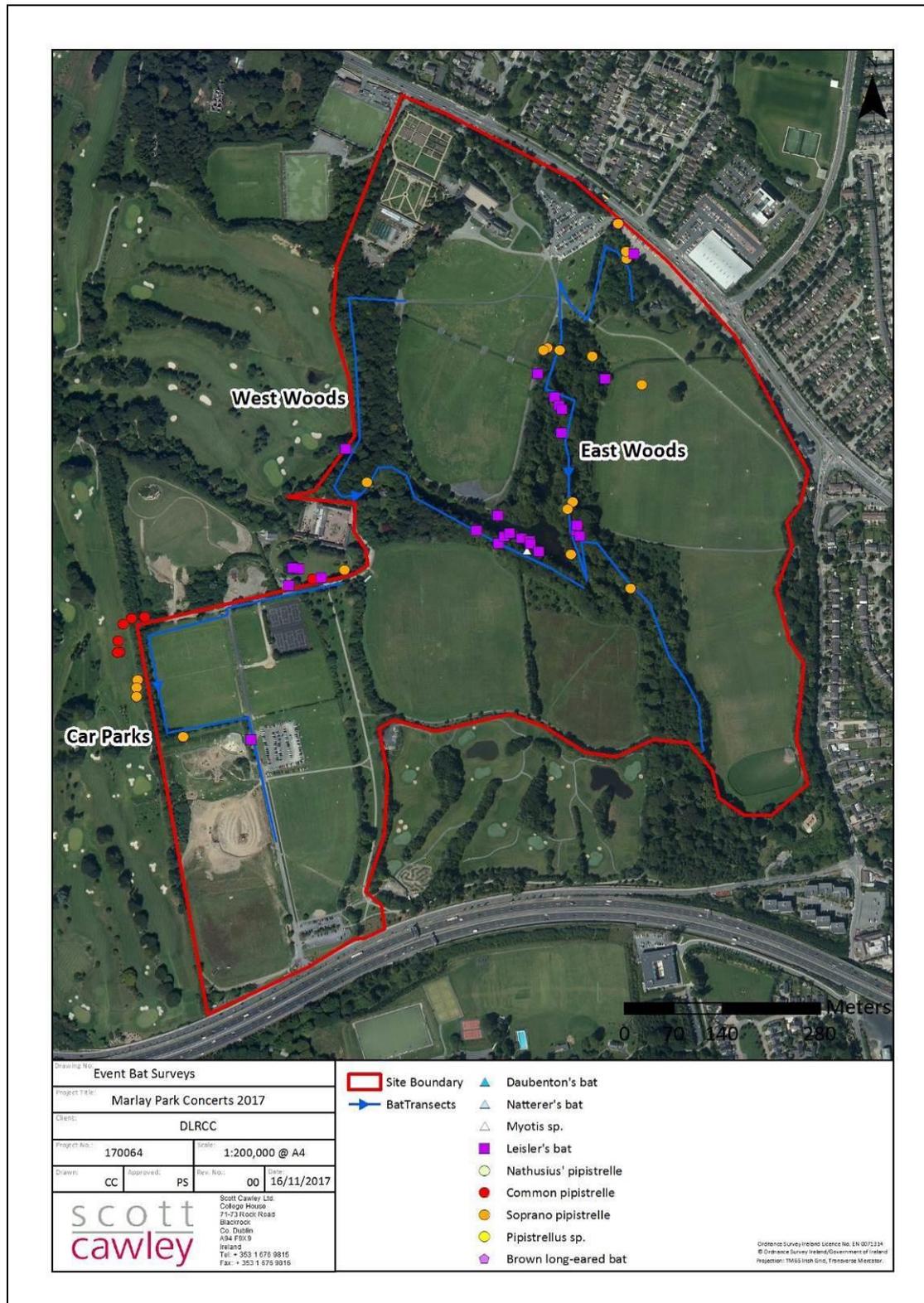
hedgerow at this location. Bat passes in this specific area were relatively high but do not reflect higher numbers of bats.

Figure 2: Pre-event bat manual transect survey results (summation of data collected over two nights)¹



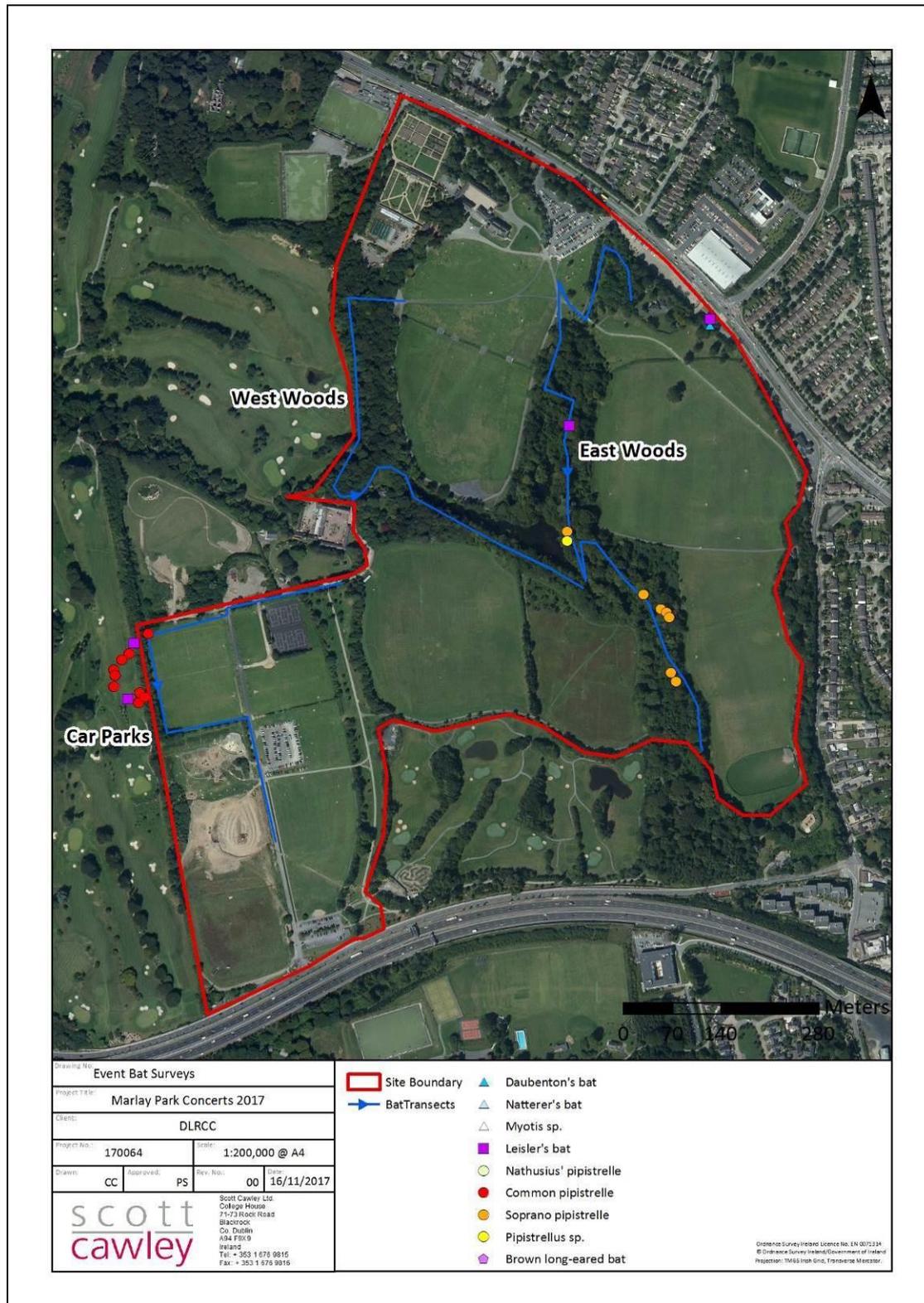
¹ It should be noted that some records are unmapped due to lack of GPS data accompanying point records. Additionally, several points have low-accuracy GPS data and therefore appear outside of the transect route area.

Figure 3: Results from the three event nights²



² It should be noted that some records are unmapped due to lack of GPS data accompanying point records. Additionally, several points have low-accuracy GPS data and therefore appear outside of the transect route area.

Figure 4: Agglomeration of results of post-event manual transects (two nights)³.



³ It should be noted that some records are unmapped due to lack of GPS data accompanying point records. Additionally, several points have low-accuracy GPS data and therefore appear outside of the transect route area.

3.4. VIDEO MONITORING OF DAUBENTON’S BATS

Following the outcome of baseline surveys conducted within the park prior to the event in 2017, it was recommended that an Ecologist undertake video monitoring of Daubenton’s bat activity on the Main Lake on dates before the concert, on the concert nights, and on a night after the concert had finished. The purpose of this monitoring was to inform the lighting design of the concert, and to ensure that lighting is not affecting foraging activity of this species at the Main Lake.

Bat activity was filmed under licence 013/2016 from the National Parks and Wildlife Service (NPWS) using a Canon XA20 with infrared illuminators and with the aid of a BatBox duet for the acoustic playback of bat echolocation calls. Filming was undertaken immediately after the completion of manual transects (*i.e.* commencing approximately one hour after sunset) on 28th and 29th June 2017, 14th, 15th, 16th, and 27th July 2017 and 30th August 2017. Video footage was analysed and activity has been converted into passes per fixed time period (see Table 2). This consists of the number of times a bat entered the camera frame, and is an indication of the overall level of activity recorded on the lake. Additional observations of activity are tabulated within Appendix 3 of this report.

Daubenton’s bats were observed feeding above the surface of the Main Lake on all survey nights, with between one and three bats observed feeding at the same time. Activity was relatively low on the nights preceding the concert, but higher on the nights of the concerts, and particularly high (140 passes) on 27th July 2017. On the concert nights, bats were observed foraging up to the edge of temporary pontoons installed across the waterway, coinciding with the end of the event. The nights with largest number of individual Daubenton’s bats foraging at the lake were 15th July (*i.e.* the second night of the event) and 27th July 2017.

Table 2: Bat passes per 15 minute recording of Daubenton’s bat activity on Main Lake.

Pre Event		Event			Post-Event
28 th June 2017	29 th June 2017	14 th July 2017	15 th July 2017	16 th July 2017	27 th July 2017
7 passes	5 passes	25 passes	65 passes	33 passes	140 passes

3.5. BAT SAMPLING

Following on from surveys in 2016 (Scott Cawley, 2016) and baseline surveys in 2017, it was recommended that bat sampling be undertaken within woodland in the park to attempt to record additional species. Manual acoustic transects tend to under record species with quieter calls such as species of the genus *Myotis* and brown long-eared bat.

One night of sampling using two harp traps and two acoustic lures (Sussex Autobat playing a variety of synthetic calls) (under Section 35 Wildlife Act licence from the National Parks and Wildlife Service Ref C053/2016) was undertaken on 30th August following the completion of manual transects. The aim of this survey was to sample the local bat population to determine the age, sex and species of bats using the Park.

The surveys recorded common pipistrelle and brown long-eared bat. Common pipistrelle was encountered on several of the manual transects, and is a commonly recorded species. Brown long-

eared bat, while having a widespread distribution in Ireland, tends to have a poor rate of detection during transect surveys due to the species quiet echolocation calls (Roche *et al.*, 2014). This is reflected by the fact that the species was only recorded on one occasion during manual transects in 2017 (towards the southern part of the East Woods transect), despite the presence of suitable woodland habitat throughout the park.

Plate 4: Brown long-eared bat sampled within Marlay Park on 30th August 2017.



3.6. IMPACT OF CONCERTS ON BATS

Based on the results of manual transects, video monitoring and bat sampling, there is no evidence of the event having a significant effect on bat activity within Marlay Park. Bats were observed to forage in similar areas of the park along transects before, during and after the event and the level of activity was not observed to differ greatly across the survey nights. Both acoustic and video evidence of bats foraging in areas close to the events indicate a degree of tolerance to the changes in lighting and noise associated with the events.

4. MONITORING OF BIRDS

4.1. PRE-EVENT SURVEYS

It was a recommendation of previous monitoring programmes that an ecologist undertake breeding bird checks at least twice in the three weeks prior to installation of pontoons crossing the Main Lake for the 2017 event. This recommendation was made to inform the positioning of infrastructure at the main lake for the 2017 event, and in light of the presence of breeding birds on the lakes in the Park.

Pre-event bird activity at the Main Lake was recorded using a combination of direct sightings and identification of songs and calls on 28th and 29th June and 3rd, 4th, and 5th July 2017.

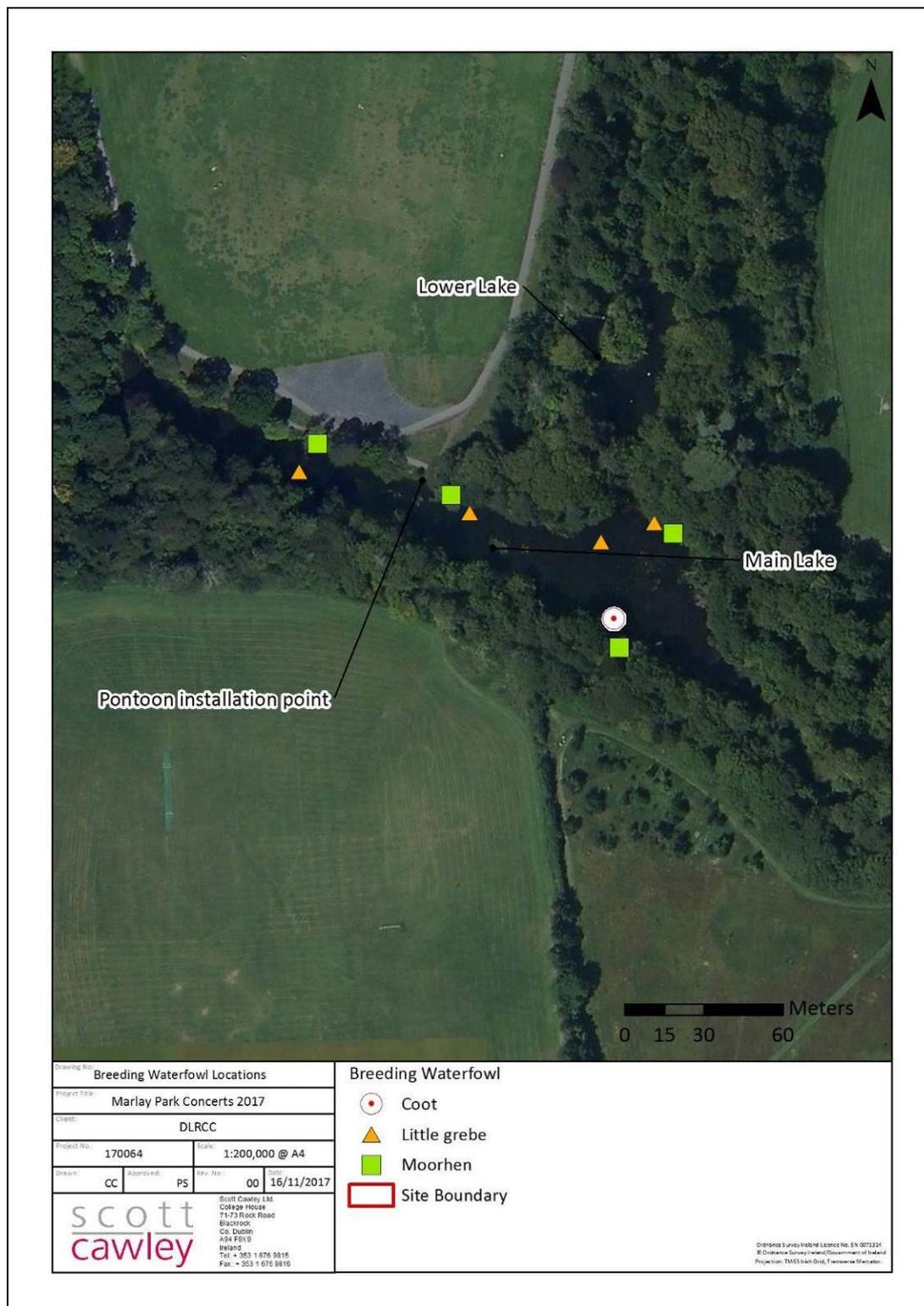
Marlay Park hosts a range of bird species, including wetland species that forage and/or nest in the vicinity of the two artificial lakes in the centre of the park. Mallard, tufted duck, moorhen, coot and little grebe are resident or frequently occur on the lakes in the park and all with the exception of tufted duck, breed with regularity in the park⁴. Three little grebe territories were identified on the Main Lake in June and July 2017 (see Figure 5), with three pairs sitting on nests in the week preceding the event (See Figure 5), although no juvenile birds were observed in this time frame and it is considered unlikely that there was a successful breeding attempt prior to the commencement of the event in July 2017.

One nest was c. 20m east of the pontoon. The other little grebe nests were c. 35m west (the western pair) and c. 65m east (the eastern pair) of the pontoon location, respectively.

Three pairs of moorhen (a further pair were found nesting during the concert) and one pair of coots were nesting within the lake in the weeks preceding the event, with one juvenile moorhen noted during pre-event surveys. Several mallard chicks were resident in the area but were generally independent of adults.

⁴ Tufted Duck were apparently breeding in the Marlay Park Golf course in 2017.

Figure 5: Location of nesting waterfowl in Marlay Park



4.2. MONITORING AND SUPERVISION OF WORKS ON THE MAIN LAKE

As recommended previously, ecologists supervised the installation, relocation and removal of temporary pontoons installed at the Main Lake for the event to minimise the disturbance to birds and their nests. The results of monitoring are presented in detail as a bird observation diary in Appendix 5 of this report, and are summarised below:

The scope of ecological monitoring expanded to continuous observation of activity on and adjacent to the lakes between 7th July and 20th July 2017 in light of the presence of nesting birds close to the pontoon crossing location. Further checks were undertaken on 27th July and 9th August 2017.

Observation of birds at the lakes in Marlay Park found that birds reacted to the concerts in several ways. Mallard numbers on the Main Lake, which generally range between 70 and 80 birds decreased on the day after the concert to 54 birds. This may be a response to the lack of artificial food from members of the public, as the lake area was closed off for the duration of the concerts and birds on the Main Lake may be influenced by the availability of food provided by humans. It is considered likely that the birds dispersed to other feeding territories on this date, however numbers recovered in the days following the event.

On the days of the concerts, mallard and other waterfowl on the main lake moved towards the eastern shore, away from the concert area, suggesting a response to noise and/or increased human activity.

Several moorhen pairs successfully raised chicks within the main lake in the 2017 nesting season, including a pair that nested immediately adjacent to the pontoon. Although several chicks were lost over the duration of the survey between 8th and 20th July, the mortality rate is considered most likely to be a result of factors unrelated to the concert, such as predation by gulls.

With regards to the little grebes nesting on the lake, the central pair were closest to the pontoons crossing the lake, having nested within 20m of the pontoon location. The installation of the pontoons on 10th July 2017 did not appear to result in a negative response from the adult birds, and they successfully hatched two chicks on 12th July, two days before the commencement of concerts. One chick was lost between the end of surveying on 14th July and beginning of survey on 15th July. The territory of the central pair was reduced by the installation of the pontoons, which would have resulted in the temporary loss of foraging habitat. The central pair were observed aggressively defending their territory against the eastern little grebe pair on 15th July. While this territoriality could relate to changes to territory resulting from the installation of the pontoons, little grebes are known to display increased territoriality immediately after hatching of chicks (Snow & Perrins, 1998), and were observed showing exhibiting territoriality towards mallards and other birds within the vicinity of their nest. The central little grebe pair were observed to change nesting site on 15th July, which was possibly a response to increased human activity on the pontoons.

Although foot traffic on the pontoons was partially screened from the grebes through the installation of mesh netting over Heras fencing, increased noise and human presence on may have triggered the changing of nest locations. The loss of the second chick between 17th and 18th July meant that the nesting attempt by the central little grebe pair failed. It remains unclear if its loss was connected to the event. It should be noted that the eastern little grebe pair failed to successfully breed within the Main Lake in the 2017 breeding season, and there was no evidence of disturbance to these birds as a result of the event. Only one pair of little grebe successfully bred on the Main

Lake late in the 2017, based on observations of members of Protect Our Parks⁵. These birds fledged following the completion of surveys in the park in summer 2017.

Following the outcomes of bird monitoring surveys, recommendations have been made for any potential future events in the park, which will further reduce the risk of causing disturbance to nesting birds.

5. MONITORING OF OTHER MAMMALS

Scott Cawley Ecologists have recorded signs of otters within Marlay Park including sprainting posts (territorial scent marking locations), and have recorded otter on camera between the Main Lake and the Lower Lake in 2016. Holes along river banks in the park were monitored by camera prior to the commencement of the event in 2017, however no otter activity was recorded at any of these and therefore no otter holts (underground resting places) have been confirmed from within the park in recent years.

Active badger setts (underground resting places) are known from three locations within the park, and feeding signs have also been recorded from the park.

Both of the aforementioned species are afforded protection in Ireland under the *Wildlife Acts (as amended)*, and additionally through the *Birds and Habitats Regulations (2011)* in the case of otter.

5.1. VIDEO MONITORING OF OTTERS

In order to assess use of the site by otter over the concert period and in accordance with previous recommendations, passive video monitoring of otter activity was undertaken between the Main Lake and the Lower Lake during and after the concert.

Bushnell HD Trophy Cameras were deployed at two locations within the park where otter spraints were observed during pre-concert ecological surveys. The locations were:

1. Under the concrete bridge north of the Lower Lake; and,
2. Under a bridge separating the Main Lake and the Lower Lake.

Cameras were deployed for 49 nights from 28th June and were collected on 30th August 2017. Cameras were visited every 7-14 days to replace batteries and memory cards.

An otter was recorded on the camera between the Main Lake and the Lower Lake at 00:16 hrs on 10th August 2017. Otter were not recorded at the location at any other time over the survey period.

Based on evidence from both 2017 and 2016, when cameras were deployed for an extended period, otter appear to only occasionally visit sprainting posts within the park. In Ireland, otter are known to hold territories along rivers of between 1.5km to 12.3km length (Reid *et al.*, 2013). It is possible that the territory within the park represents a small part of an otter territory within which otter are only intermittently active.

5.2. SUPERVISION OF WORKS IN RELATION TO PROTECTED MAMMALS

⁵ Based on publication of photography on the Protect Our Parks Facebook Page dated 4th October 2017 (www.facebook.com/protectourparks Accessed 13/12/2017)

In order to ensure that security barriers inserted in-stream were passable for otters, they were inspected by an Ecologist. Checks of otter holts and badger setts prior to the event were also undertaken to verify that no new resting places are present and that no works be undertaken within 50m of any badger setts.

No new setts or holts were identified within the park. All works within the park were in excess of 50m of badger setts.

An inspection was undertaken by Colm Clarke of Scott Cawley on 13th and 14th July 2017 to check the temporary bridge in the East Woods. All bridges inspected had Heras fencing secured to the underside to prevent unauthorised access to the event, however the gaps underneath these were all deemed sufficiently large to allow otters pass up and downstream (see Plate 5).

Plate 5: Heras fencing installed on bridges to prevent unauthorised access to event.



6. BANKSIDE HABITATS

During the installation of the pontoons some removal of bankside vegetation, mainly composed of yellow iris *Iris pseudacorus* was undertaken on the banks of the main lake (see Plate 6 and 7).

Plate 6: Installation of pontoon on north bank of Main Lake



Plate 7: Plugs of vegetation awaiting replacement at the edge of the bank. Vegetation that necessitated removal for installation of pontoons.



This vegetation was removed to permit tying in the pontoon to the bankside. Restoration of the vegetation was allowed to happen by natural recolonisation however further monitoring in Spring 2018 may require intervention to provide more vegetation cover. The area of disturbed bankside is also used by Mallard for feeding and roosting and experiences erosion and trampling as a result.

7. CONCLUSIONS

As a result of the pre-event baseline surveys and implementation of mitigation measures before and during the event in Marlay Park in 2017, it was concluded that there was no significant adverse effects on the biodiversity within the Park. Impacts were recorded at a temporary, localised individual scale with reactions from waterfowl negatively reacting to concert goers. It was clear that after the event had finished there was a quick restoration to normal behaviour and distribution of birds. Similar to previous years, bat populations did not seem to be adversely affected with bats feeding and flying in the same areas before, during and after the event.

The diversity of bird and mammal species using the Park (several of which would be sensitive to disturbance) would also suggest that there are unlikely to have been long-term impacts from previous events.

8. RECOMMENDATIONS

Whilst it was concluded that there was no significant adverse effects on the biodiversity within the Park, it was considered appropriate that a set of recommendations be made in relation to any future events to be undertaken within the park in order to further protect wildlife. In particular how short-term acute disturbance during specific times in the events can be minimised or avoided altogether.

8.1. PROTECTION OF BATS

Monitoring surveys undertaken in 2017 found that bats continued to use the park throughout the concert nights, including Daubenton's bat, which was observed foraging on the Main Lake adjacent to a temporary illuminated pontoon. The following recommendations are considered appropriate for the protection of bats during future events at the Park:

- Any further expansion of the events will be in open grassed areas rather than woodland to minimise need to fell trees or erect safety lighting close to previously undisturbed areas;
- Where an event requires lighting, an ecologist will be consulted for recommendations on suitability of lighting schemes at the pre-licencing stage. During the event set-up, an ecologist will be on-site to inspect lighting orientation and liaise with organisers to re-orient luminaries if required. Timing of lighting will be a consideration, and it is recommended that lighting be switched off outside of event hours. These measures are proposed in order to minimise potential impacts of lighting on bats within the park;
- Where events coincide with the season of peak activity for bats (*i.e.* between May and August), it is considered appropriate that an ecologist undertake manual surveys along the east woods, west woods and car parks transects on two nights prior to the proposed event, on the nights of the proposed event and on two nights subsequent to the proposed event.

The purpose of this recommendation is to assess if the events are have any measurable effect on bat activity within the park. While previous surveys within the park found no evidence of changes to bat activity in response to events, it is considered appropriate to continuously analyse activity of these protected species;

- An ecologist will undertake video monitoring of Daubenton's bat activity on the main lake prior, during and after any proposed event to assess if the event if there is any change to species foraging behaviour.

8.2. PROTECTION OF BREEDING BIRDS

Surveys of the park prior to the event in 2017 identified several birds nesting within the Main Lake, including a pair of little grebes which nested within 20m of a pontoon constructed for the 2017 event. Disturbance due to the passage of the concert goers may have occurred and in light of this the following recommendations are made:

- Breeding bird checks will be undertaken at least twice in advance of the set-up of any future events;
- Where nesting birds are identified within or adjacent to the footprint of proposed works (e.g. a temporary pontoon is required to be constructed within the Main Lake, and where nesting birds are within the vicinity), works will not be permitted until birds and their young have vacated their nests and breeding activity has ceased;
- Monitoring of breeding birds will be undertaken over the course of any future events;
- Consideration will be given to trimming back overhanging trees and removing aquatic plants in the vicinity of the pontoons to reduce the risk of waterfowl establishing nests in proximity to the pontoons; and,
- Opaque screening material will be erected along the sides of each of the pontoon fencing to prevent concert goers being seen from the lake.

8.3. PROTECTION OTHER MAMMALS

Surveys of the park undertaken in 2017 found no evidence of otter resting places, and no changes to badger resting places. The following recommendations are considered appropriate for continued compliance with legislation protecting mammals and their resting places during future events:

- Checks and video monitoring of holes in river banks adjacent to works areas will be undertaken in the months prior to the commencement of events. It is recommended that these checks be undertaken at least one month in advance of any event to allow sufficient time to monitor for otter or badger activity;
- No works will be permitted within 50m of the resting place of a mammal protected under the *Wildlife Acts (as amended)* and/or the *Birds and Habitats Regulations (2011)*;

8.4. PROTECTION OF BANKSIDE HABITATS

It is recommended that banksides where pontoons were installed are revegetated with quick-establishing grasses such as *Festuca rubra* varieties and that bankside vegetation of yellow iris be re-established. Exclusion of ducks from the bankside may be required during establishment of the grass.

9. REFERENCES

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APPENDIX 1: BAT SURVEY DATES AND SURVEYORS

Survey Date	Sunset Time	Transect Walked	Start	Finish	Surveyor	Bat Detector	Temperature (degrees Celsius)
28/06/2017	21:57	East Woods	22:26	22:52	Colm Clarke	Batlogger 2486(M)	13C
28/06/2017	21:57	West Woods	22:26	22:41	Maeve Maher-McWilliams	Batlogger 2578(M)	13-14C
28/06/2017	21:57	Car Parks	22:49	23:00	Maeve Maher-McWilliams	Batlogger 2578(M)	13C
29/06/2017	21:57	East Woods	22:27	22:53	Colm Clarke	Batlogger 2486(M)	11-12C
29/06/2017	21:57	West Woods	22:27	22:43	Maeve Maher-McWilliams	Batlogger 2578(M)	11-12C
29/06/2017	21:57	Car Parks	22:55	23:02	Maeve Maher-McWilliams	Batlogger 2578(M)	12C
14/07/2017	21:46	East Woods	22:16	22:42	Colm Clarke	Batlogger 2486(M)	18-19C
14/07/2017	21:46	West Woods	22:16	22:33	Maeve Maher-McWilliams	Batlogger 2578(M)	20-22C
14/07/2017	21:46	Car Parks	22:39	22:50	Maeve Maher-McWilliams	Batlogger 2578(M)	19C
15/07/2017	21:45	East Woods	22:15	22:43	Colm Clarke	Batlogger 2486(M)	19C
15/07/2017	21:45	West Woods	22:15	22:29	Maeve Maher-McWilliams	Batlogger 2578(M)	20-21C
15/07/2017	21:45	Car Parks	22:37	22:48	Maeve Maher-McWilliams	Batlogger 2578(M)	19C
16/07/2017	21:44	East Woods	22:14	22:43	Colm Clarke	Batlogger 2486(M)	15-16C
16/07/2017	21:44	West Woods	22:15	22:26	Maeve Maher-McWilliams	Batlogger 2578(M)	16-17C
16/07/2017	21:44	Car Parks	22:34	22:44	Maeve Maher-McWilliams	Batlogger 2578(M)	15-16C
27/07/2017	21:29	East Woods	22:59	22:24	Colm Clarke	Batlogger 2486(M)	14-15C
27/07/2017	21:29	West Woods	22:59	22:12	Maeve Maher-McWilliams	Batlogger 2578(M)	15C
27/07/2017	21:29	Car Parks	22:19	23:27	Maeve Maher-McWilliams	Batlogger 2578(M)	14C
30/08/2017	20:19	East Woods	20:48	21:12	Colm Clarke	Batlogger 2486(M)	15-17C

30/08/2017	20:19	West Woods	21:48	21:01	Maeve Maher-McWilliams	Batlogger 2578(M)	14C
30/08/2017	20:19	Car Parks	22:08	21:16	Maeve Maher-McWilliams	Batlogger 2578(M)	13C

APPENDIX 2: MANUAL TRANSECT DATA

APPENDIX 3: ANALYSIS OF VIDEO FOOTAGE OF DAUBENTON'S BAT ON MAIN LAKE

Date Recording	& Time	Recording and description
28/06/2017 MVI_44.MP4	05:57- 06:02	One Daubenton's bat enters frame from right and passes through
28/06/2017 MVI_44.MP4	11:40- 11:47	Pipistrelle bat heard overhead. Does not pass through frame
28/06/2017 MVI_44.MP4	11:50- 12:00	One Daubenton's bat crosses in front of frame
28/06/2017 MVI_44.MP4	12:33- 13:20	One Daubenton's bat crosses in front of frame several times, foraging above lake surface
28/06/2017 MVI_44.MP4	14:08- 14:15	Daubenton's bat call can be heard but does not come within view of camera
28/06/2017 MVI_44.MP4	14:20- 14:30	Pipistrelle bat call can be heard in background. Does not come into view of camera
28/06/2017 MVI_44.MP4	14:40- 15:00	Daubenton's bat call can be heard but bat does not cross frame
29/06/2017 MVI_46.MP4	00:15- 01:40	Very faint Daubenton's bat call can be heard in the background. Does not come within range of camera
29/06/2017 MVI_46.MP4	02:20- 02:25	Daubenton's bat crosses within frame but at far end of lake
29/06/2017 MVI_46.MP4	03:18- 03:20	Pipistrelle bat can be heard on detector. Does not cross frame
29/06/2017 MVI_46.MP4	04:20- 04:30	Daubenton's bat flies into frame from right
29/06/2017 MVI_46.MP4	05:00- 05:15	Daubenton's bat call can be heard but bat does not cross frame
29/06/2017 MVI_46.MP4	05:20- 06:00	Daubenton's bat call can be heard but bat does not cross frame
29/06/2017 MVI_46.MP4	07:00- 07:15	Daubenton's bat call can be heard (very faint) but bat does not cross frame
29/06/2017 MVI_46.MP4	08:55- 09:05	One Daubenton's bat flies across frame
29/06/2017 MVI_46.MP4	09:30- 09:35	Two Daubenton's bats fly across frame. Coincides with little grebe call
29/06/2017 MVI_46.MP4	12:25- 12:35	Faint Daubenton's bat call can be heard
29/06/2017 MVI_46.MP4	12:55- 13:00	Faint Daubenton's bat call can be heard

14/07/2017 MVI_050.MP4	00:54- 01:20	One Daubenton's bat enters frame and circles around pond
14/07/2017 MVI_050.MP4	01:27- 02:30	Two Daubenton's bat enter frame and forage in a figure of eight pattern over Main Lake
14/07/2017 MVI_050.MP4	03:25- 03:30	One Daubenton's bat enter crosses frame
14/07/2017 MVI_050.MP4	04:30- 05:40	One Daubenton's bat crosses in front of frame intermittently. It forages both close to the water's surface and at c. 2m above water level.
14/07/2017 MVI_050.MP4	06:09- 06:30	Daubenton's can be heard on BatBox Duet but is not within frame. Foraging within locality
14/07/2017 MVI_050.MP4	08:00- 08:10	One Daubenton's bat crosses in front of frame at water level.
14/07/2017 MVI_050.MP4	09:50- 09:55	Faint Daubenton's call although bat does not enter frame
14/07/2017 MVI_050.MP4	10:25- 10:30	One Daubenton's bat enters frame and flies over water towards pontoon
14/07/2017 MVI_050.MP4	12:20- 12:35	One Daubenton's bat enters frame and flies over water towards pontoon
14/07/2017 MVI_050.MP4	12:52- 13:00	One Daubenton's bat flies from pontoon back along middle of lake
14/07/2017 MVI_050.MP4	13:46- 14:12	One Daubenton's bat foraging within middle of frame, circling over lake surface
15/07/2017 MVI_052.MP4	00:00- 01:15	Three Daubenton's bats foraging in circles above water. Speakers and crowd from event closing can be heard in background
15/07/2017 MVI_052.MP4	01:30- 10:45	Between one and three Daubenton's bats circling over water foraging in frame
16/07/2017 MVI_053.MP4	00:00- 03:20	Between one and two Daubenton's bat continuously foraging above water level within camera frame
16/07/2017 MVI_053.MP4	04:45- 06:40	One Daubenton's circling above water in front of camera
16/07/2017 MVI_053.MP4	06:45- 07:00	Leisler's bat call can be heard
16/07/2017 MVI_053.MP4	10:50- 10:55	Pipistrelle bat heard passing through. Not visible on camera
16/07/2017 MVI_053.MP4	12:00- 14:00	One Daubenton's bat continuously foraging within view of camera
27/07/2017 MVI_056.MP4	00:00- 11:50	Two to three Daubenton's bats foraging in circles over the water and intermittently within cameras view
27/07/2017	03:45-	Soprano pipistrelle bat can be heard simultaneously with Daubenton's bats.

MVI_056.MP4	03:55	
27/07/2017 MVI_056.MP4	06:40- 06:50	Leisler's bat call can be heard on detector, although does not come within range of camera
27/07/2017 MVI_056.MP4	12:00-14	Two to three Daubenton's bats foraging in circles over the water and intermittently within cameras view

APPENDIX 4: EXAMPLES FOR ECOLOGICAL EVALUATION FROM NRA GUIDANCE

Ecological Valuation Criteria
<p>International Importance:</p> <ul style="list-style-type: none"> • 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. • Proposed Special Protection Area (pSPA). • Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). • Features essential to maintaining the coherence of the Natura 2000 Network.⁶ • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. • Resident or regularly occurring populations (assessed to be important at the national level)⁷ of the following: <ul style="list-style-type: none"> ○ Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and / or ○ Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. • Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). • World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). • Biosphere Reserve (UNESCO Man & The Biosphere Programme). • Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). • Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). • Biogenetic Reserve under the Council of Europe. • European Diploma Site under the Council of Europe. • Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).⁸

⁶ See Articles 3 and 10 of the Habitats Directive.

⁷ It is suggested that, in general, 1% of the national population of such species qualifies as an internationally important population. However, a smaller population may qualify as internationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

⁸ Note that such waters are designated based on these waters' capabilities of supporting salmon (*Salmo salar*), trout (*Salmo trutta*), char (*Salvelinus*) and whitefish (*Coregonus*).

Ecological Valuation Criteria

National Importance:

- Site designated or proposed as a Natural Heritage Area (NHA).
- Statutory Nature Reserve.
- Refuge for Fauna and Flora protected under the Wildlife Acts.
- National Park.
- Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); Statutory Nature Reserve; Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park.
- Resident or regularly occurring populations (assessed to be important at the national level)⁹ of the following:
 - Species protected under the Wildlife Acts; and/or
 - Species listed on the relevant Red Data list.
- Site containing 'viable areas'¹⁰ of the habitat types listed in Annex I of the Habitats Directive.

County Importance:

- Area of Special Amenity.¹¹
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level)¹² of the following:
 - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
 - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
 - Species protected under the Wildlife Acts; and/or
 - Species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.
- County important populations of species, or viable areas of semi-natural habitats or natural heritage features identified in the National or Local Biodiversity Action Plan (BAP) if this has been prepared.
- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

⁹ It is suggested that, in general, 1% of the national population of such species qualifies as a nationally important population. However, a smaller population may qualify as nationally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

¹⁰ A 'viable area' is defined as an area of a habitat that, given the particular characteristics of that habitat, was of a sufficient size and shape, such that its integrity (in terms of species composition, and ecological processes and function) would be maintained in the face of stochastic change (for example, as a result of climatic variation).

¹¹ It should be noted that whilst areas such as Areas of Special Amenity, areas subject to a Tree Preservation Order and Areas of High Amenity are often designated on the basis of their ecological value, they may also be designated for other reasons, such as their amenity or recreational value. Therefore, it should not be automatically assumed that such sites are of County importance from an ecological perspective.

Ecological Valuation Criteria

Local Importance (higher value):

- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;
- Resident or regularly occurring populations (assessed to be important at the Local level)¹³ of the following:
 - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
 - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
 - Species protected under the Wildlife Acts; and/or
 - Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality;
- Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (lower value):

- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;
- Sites or features containing non-native species that are of some importance in maintaining habitat links.

¹² It is suggested that, in general, 1% of the County population of such species qualifies as a County important population. However, a smaller population may qualify as County importance where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

¹³ It is suggested that, in general, 1% of the local population of such species qualifies as a locally important population. However, a smaller population may qualify as locally important where the population forms a critical part of a wider population or the species is at a critical phase of its life cycle.

APPENDIX 5: BIRD OBSERVATION DIARY

Date	Observation
07/07/2017	<p>Survey of nesting birds in and around lakes area near concert arena, Coot with 2 chicks at east end of lake. Little grebe pair nesting c. 20m to east of where pontoon is to be positioned under an overhanging willow (central pair).</p> <p>Another at east end c. 65m (eastern pair) from pontoon location holding territory and have built a nest platform but without eggs or young. A third pair c. 35m west (western pair) of the proposed pontoon site but no evidence of nesting as yet found. A Moorhen pair with 3 chicks located west end of main lake.</p> <p>Count of other birds on lake: 1 heron, peak count of 76 mallard (including three sets of young - two chicks and two sets with four chicks), four grey wagtail, mistle thrush with recently fledged young at west end of lake. Two Swan and one well-grown juvenile moorhen on the lower lake (not breeding).</p>
08/07/2017	<p>All three little grebe pairs on site and holding territory. The central pair didn't move off nest site despite a cherry picker installing lights in a Scot's pine tree immediately overhead in the morning.</p> <p>The mallard pair lost one of their two chicks overnight.</p> <p>One coot chick is absent, and therefore only one remains. Lesser black-backed gull, a predator of chicks was observed at the eastern end of the lake and could have predated the chick, although other factors could have contributed to its loss. Moorhens with three chicks at west end of main lake continue to forage as normal</p> <p>Count of other birds on lake: one heron, one male tufted duck, peak count of 68 mallard, two buzzard overhead in morning, two grey wagtail and juvenile bullfinch near the proposed pontoon site.</p>
09/07/2017	<p>The remaining coot chick has gone missing, although the adult pair remain at the lake. Three little grebe pairs still present. The central pair were observed taking turns incubating the nest, and switching periodically. The eastern pair were observed prospecting for a nest and gathering nest-building materials. Later-on the day, the western pair were observed building a nest c. 35m from the pontoon location. The nest is screened from footpaths by dense vegetation.</p> <p>Moorhen pair with three chicks still at west end and tending to them.</p> <p>Count of other birds on lake: One male tufted duck, bullfinch with young, five grey wagtail, 59 mallard, one grey heron and two swans on lower lake.</p>
10/07/2017	<p>Three little grebe pairs all present, the two pairs nesting and the pair prospecting. Two eggs noted in the nest c. 20m east of the proposed pontoon.</p> <p>Now just four mallard chicks remaining of the three pairs. Unattended by parents but seemingly doing well.</p> <p>From 11.00 a.m. the insertion of the pontoon started. Workmen advised to lower rafts slowly to water level and avoid striking vegetation to minimise noise and vibration disturbance. Some increased vigilance noted for central grebe pair but remain on nest throughout with the exception of one occasion where they left the nest unattended for three minutes to forage. The site of the pontoon was installed along the territorial border between the western pair and the eastern pair: both pairs had been observed displaying territoriality here in previous</p>

	<p>days.</p> <p>From about 14.00 hrs a pair of moorhen were observed continually entering under a willow and onto a bank next to the central grebe nest with small food items, undoubtedly brooding chicks in an unseen nest. This went on despite the continuing pontoon construction. The Moorhen pair at west side of pontoon with 3 chicks also doing fine, approaching as close as 20m to the newly installed pontoon with their chicks. Pontoon construction continued until 19.00 hrs.</p> <p>A pair of lesser black-backed gull arrived on lake at 15.45 hrs and made an attempt to predate one of the remaining mallard chicks, however chicks escaped into bank.</p> <p>Count of other birds at lake: One grey heron, two coot, peak count of 67 mallard, two grey wagtail.</p>
11/07/2017	<p>Pontoon now complete and green netting attached on east side as screening to mitigate disturbance. Netting is semi-transparent but largely shields human traffic from viewpoint of nesting birds to the east. Three little grebe pairs still on site.</p> <p>Four mallard chicks still at east end with a peak count of 75 mallard at 11.05 hrs. Moorhen pair still brooding young in nest next to central grebe pair. Moorhen pair with three young still at west end and coming as close as 20m to pontoon.</p> <p>At 15.15 hr a large fish species (at least 20-30 cm long) was observed to jump clear from water at west end of main lake. While the lake appears not to be suitable for trout, there is some possibility that pike has been introduced. If present, this species could be another predator of aquatic birds in the lakes.</p> <p>Other birds species noted: Two grey heron, five grey wagtail</p>
12/07/2017	<p>One of the three moorhen chicks at the west end has gone missing since yesterday (the smallest one), two now with parents at west end. Separate moorhen pair still brooding young at nest east of pontoon.</p> <p>Three little grebe pairs still present. At 15.00 hrs the central pair hatched a chick, being fed and brooded alternatively by both parents, by 17.00 hrs the second chick hatched out, both chicks being tended to by parents. Overall work activity at pontoon quiet throughout day.</p> <p>Four mallard chicks still east end.</p> <p>Other bird species noted: Peak count of 76 mallard, two coot, three treecreeper, five bullfinch, two families of blackcap, five lesser black-backed gull, 16 black-headed gull, two swans on lower lake.</p>
13/07/2017	<p>Central little grebe pair attending to both chicks throughout day, by end of day being left alone in nest while both parents looked for food. Some increased vigilance noted. Western pair of little grebe incubating.</p> <p>Moorhen pair still visiting nest next to central little grebes, brooding young. Pair of Moorhen with two young still at west end of main lake. Non-breeding pair of little grebe still prospecting at east end of main lake. Pair of coot also at east end, occasionally sitting on old nest.</p> <p>Other bird species noted: Two swans on lower lake, Peak of 81 mallard, one bullfinch, two treecreeper.</p>
14/07/2017	<p>Concert-goers arriving from 14.00 hrs onwards, one of the two moorhen chicks at west end noticed missing at 16.00 hrs, now one remaining. Three moorhen chicks have left nest next to pontoon at east end and being tended to by both parents. Staying along bank and under</p>

	<p>willow about 20 m east of pontoon into evening.</p> <p>From 14.00 hrs and with the arrival of large volumes of concert goers the entire mallard flock drifted further east towards the viewing platform. Several birds observed day-roosting and remained like this for the duration of the concert. Little grebe chicks still being tended to by parents near pontoon with no unusual activity noted.</p> <p>Four mallard ducklings still present east end of main lake.</p> <p>Other bird species noted: Two swans on lower lake, four treecreeper, blackcap family at east end, one Grey Heron.</p>
15/07/2017	<p>Heavy use of pontoon by concert-goers noted. Mallard tend to congregate at eastern end of lake away from pontoon as in observation from 14th July. Count of 78 mallard at peak. The central pair of little grebes has lost a chick and has moved their nest east away from the pontoon by c. 10m. Some territorial displaying and fighting noted between the central and eastern pair of little grebes at 20:15 with the remaining chick being left alone on the nest during this period (approx. 3-5 minutes). Central grebes also acting aggressively towards mallards that come close to the nest. The moorhens west of the pontoon are down to one remaining chick.</p> <p>Other bird species noted: Two coots. Four mallard ducklings remain on the main lake.</p>
16/07/2017	<p>One remaining moorhen chick at west end of main lake. Western little grebe pair still incubating two eggs, with no signs of disturbance to them. The birds are occasionally noted feeding up to the edge of the pontoon. Once again like on 14th once the main body of concert goers arrived from 14.00 hrs onwards, the flock of mallard drifted eastwards for concert duration, though numbers still normal (72 peak count).</p> <p>Mallard ducklings (x4) continually try to traverse the pontoon and have to be herded out of the path of concert-goers.</p> <p>Moorhen pair with 3 chicks still just east of pontoon and doing fine. Being cared for by parents and appear unperturbed by concert goings on. The central little grebe pair moved their single chick a further 6m up along bank onto a new nesting platform. It is not clear whether this is a result of displacement from noise from the pontoon or whether their original nest had become unstable. Both birds attending chick. Occasional territorial disputes with their non-breeding neighbours to the east.</p> <p>Other bird species noted: One grey heron, two coot, three grey wagtail, two treecreeper.</p>
17/07/2017	<p>Some new arrivals in the area overnight, four moorhen chicks at the west end of the lake being attended to by parents, this is adjacent to the 'Red Bull stage'. It is considered most likely that these birds have been nesting in this location over the previous days unobserved and that the brood is very recently hatched.</p> <p>Closer to the pontoon the single Moorhen chick was still being attended to. Three moorhen chicks still east of pontoon in around willow trees being tended to by both parents. New moorhen nest found in southeast corner of main lake c. 15m up a tree, nest changeover observed several times so birds presumably still incubating.</p> <p>Western pair of little grebe still incubating at west end of lake. Central little grebe still tending to one remaining chick. Parents finding lots of food and offering it sticklebacks that were too big for it to consume at times. A herring gull that got close to chick was chased away by parents in morning. Eastern little grebe pair occasionally sitting on nesting platform although no evidence of eggs.</p> <p>Four mallard chicks still on main lake at east end. Mallard numbers down a little - peak of 53</p>

	<p>birds. It is possible that this reflects reduced level of feeding from members of the public over the concert timeframe, due to restricted access to the lake area. Coot pair still at far east end, occasionally sitting on last nest that was used.</p> <p>Other bird species noted: Two mute swans in lower lake, 20+ black-headed gull, four lesser black-backed gull, two Mediterranean gull, two different blackcap broods around lake, moorhen pair with well-grown juvenile in the lower lake. Two treecreepers.</p>
18/07/2017	<p>Low mallard numbers in morning recovered to a peak of 67 birds by mid-afternoon.</p> <p>Moorhen pair with four chicks still at far west end of main lake. Pair with single chick closer to pontoon and pair east of pontoon with two chicks (one chick gone missing overnight) Pair still nesting in tree far east end.</p> <p>The sole remaining little grebe chick of the central pair has not been observed since the previous evening. The parents are still in the same area and defending the territory. The western little grebe pair are still incubating and feeding next to pontoon at times. The eastern pair appear to be non-breeding.</p> <p>No sign of four mallard chicks today.</p> <p>Coots still at east end though not sitting on old nest much. A well-grown wood pigeon chick that probably fell out of a nest and into the water in the coots territory was drowned by the coots.</p> <p>Other bird species noted: Two grey heron, two swans in lower lake, four + treecreeper, 12+ black-headed gull.</p>
19/07/2017	<p>*Pontoon removal day (started at 11.00 hrs and completed 19.15 hrs)*</p> <p>The two moorhen pairs with their respective young (x4 and x1) still at west end and doing well, the single chick and parents often right up next to pontoon. Moorhen pair with two chicks still east of pontoon. And pair nesting in tree still at far east end.</p> <p>The little grebe pair east of pontoon still around willows and sitting on nest platform, defending area from the pair farther east despite having lost chick. At end of day when pontoon removed they also started feeding in this area. Pair still incubating at west end.</p> <p>Coot pair still at east end occasionally sitting on nest.</p> <p>Four mallard chicks returned to area today having not been seen yesterday. Mallard numbers back up - peak of 76, public back in feeding them.</p> <p>Removal of the pontoon started at 11:00 and continued until 19:15 hrs. The pontoons were removed in sections by crane. No signs of disturbance to bird species was noted. Mallard and little grebe started using area almost as soon as the pontoons were removed.</p> <p>Other bird species noted: One grey heron, two swans in lower lake, 18+ black-headed gull</p>
20/07/2017	<p>Moorhens with their respective young (x4 and x1) still at west end, and Moorhen pair with two chicks east of pontoon. All three Little Grebe pairs still in situ including pair incubating at west end. No signs of hatching in latter pair.</p> <p>Coot pair still at east end.</p> <p>Mallard peaking at up to 84 birds now. No sign of Mallard young today. Both mallard and the central pair of little grebe now using the area that was covered with the pontoons.</p> <p>Other bird species noted: One grey heron, 16 black-headed gull, two lesser black-backed gull.</p>
27/07/2017	<p>Western little grebe pair still sitting on nest although no signs of brood. Constant sitting suggests that the pair is still on eggs. Central pair no longer sitting on nest platform, and both</p>

	<p>were observed foraging in the central part of the main lake. One of the eastern grebe pair was noted sitting on a nest platform although no eggs or young were observed. One of the moorhens has commandeered the central grebes nest and added to it and is sitting with one chick. No sign of moorhens at western end of lake, although pair immediately west of pontoon location still with chick, which is now quite well grown. Coot noted sitting on nest platform, although no eggs or young noted. All four mallard ducklings still present, and starting to grow their first pin feathers.</p> <p>Peak count of 74 mallard on main lake.</p>
09/08/2017	<p>Moorhens observed in central area of main lake with single chick, and second pair at western end of lake observed with single chick also. Four little grebes were observed within the main lake, but no signs of chicks. There was no sign of the pair at the western end of the lake, suggesting that this brood was unsuccessful.</p>