Bat Assessment of Bishop Lucey Park, Cork City

Report prepared by

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Report prepared for

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Summary

Bishop Lucey Park in Cork City Centre is proposed to be developed with enhanced amenities as a park and enhanced pedestrian permeability by day and by night. A bat survey of the park was undertaken during June 2021 using a variety of methods; dusk emergence survey, dawn return survey, bat activity transects/spot counts, and automated acoustic monitoring of bat activity.

Four bat species were recorded by automated detector monitoring within the park (2 detectors for 5 nights each); Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat, and Brown Long-eared Bat. However, Common Pipistrelle dominated, with >97% of the total bat registrations. The other bat species only flew over or visited the park briefly. A small number of Common Pipistrelles (as low as two individuals) foraged around the tree canopies in the park continuously throughout the night each night. Bat activity was very low along the surrounding city streets and a nearby stretch of the River Lee.

While some suitable roosting locations were identified within/bounding the park, no observations of roosting bats were made during daylight searches, and no bats were observed leaving or returning to roosts during dusk/dawn surveys. However, automated acoustic monitoring recorded clear pulses of Common Pipistrelle at just 5 minutes past sunset on one of the evenings. This is suggestive of it having emerged from roosting near the bat detector, within the park.

The main impact of the proposed development on bats will be an increase in the level of artificial lighting due to opening the park at night. This will have a permanent negative impact on a small number of bats (mainly Common Pipistrelle) at the local scale, but would not impact the overall conservation status of bat species. Mitigation measures are recommended to reduce impacts on bats.

1. Introduction

1.1 Background

Dr. Isobel Abbott, Abbott Ecology, was commissioned by Brady Shipman Martin, on behalf of Cork City Council, to conduct a bat assessment of Bishop Lucey Park and to comment on the currently proposed lighting design in relation to bat conservation.

1.2 Assessment Constraints

Bat surveys were carried out at an optimal time of year for detecting summer roosts (June 2021) and in suitable weather conditions. A ground-based tree survey was also conducted in June, which is outside of the optimum timeframe (December to March) while leaves are few on trees (Collins 2016). However, trees were easily visible in this urban parkland setting, and this survey timing was not considered a significant constraint.

1.3 Legal Protection of Bats

Bats comprise one of the most highly diverse mammalian groups. There are over 1,200 species of bat worldwide, with nine confirmed as resident in Ireland to date. Due to sharp declines in many bat populations in recent decades, all bat species in Europe are legally protected under the European Habitats Directive, 1992 (92/43/EEC). The Habitats Directive seeks to "*maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community Interest*". It contains lists (in '*Annexes'*) of habitats, plant species, and animal species, which are rare or declining on a European scale. It is built around two pillars;

- A **System of Strict Protection** for species of European importance, **including all bat species** (listed under Annex IV, Article 12 of the EU Habitats Directive). This provides protection to the bats themselves, and also prohibits deterioration/destruction of breeding sites and resting places.

- **The Natura 2000 Network of Protected Areas** (Special Areas of Conservation, SACs, and Special Protection Areas, SPAs) (Article 6 of the EU Habitats Directive). The Lesser Horseshoe Bat (*Rhinolophus hipposideros*) is the only Irish bat species listed under Annex II, and for which the Irish government is required to designate SACs. This species occurs almost exclusively in the Atlantic seaboard counties of Cork, Kerry, Limerick, Clare, Galway and Mayo, with sparse records in counties Tipperary, Roscommon, and Sligo.

The EU Habitats and Birds Directives have been transposed into Irish law most recently in the *European Communities (Birds and Natural Habitats) Regulations 2011* (*S.I. No. 477 of 2011).* As a result of this legislation, it is an offence to:

1. *Deliberately capture, injure or kill a bat.*
2. *Deliberately disturb a bat, including in particular any disturbance which is likely:*
   - *to impair bats' ability to survive, to breed or reproduce, or to rear or nurture their young, or*
   - *in the case of hibernating or migratory species, to impair their ability to hibernate or migrate,*
   - *to affect significantly the local distribution and abundance of the species to which they belong.*
3. *Damage or destroy a breeding site or resting place of a bat, whether deliberate or unintentional.*
4. *Possess, control, transport, exchange or sell a bat or parts of a bat, alive or dead.*

Bat Roost Derogation Licenses

Both pillars, (i) the System of Strict Protection and (ii) the Natura 2000 network of SACs and SPAs, allow for exceptions or "derogations" from the protection regimes under Article 6 and Article 16 of the EU Habitats Directive. Application may be made to the National Parks and Wildlife Service for a derogation licence to permit actions affecting bats or their roosts that would normally be prohibited by law. The applicant must demonstrate that there is no satisfactory alternative and that the action will not adversely affect the favourable conservation status of bat species. Each case is considered on its particular circumstances, and an application may be refused. Mitigation to reduce or compensate for any impact of development is generally a condition of the licence and should be proportionate to the impact.

Mitigation measures may require particular timing of operations, protection of existing roosts or the creation of new roosts to replace ones being lost. Monitoring of the effect of the mitigation is usually required (Kelleher & Marnell 2006).

1.4 Bats in Ireland

The nine confirmed resident bat species in Ireland are; Soprano Pipistrelle (*Pipistrellus pygmaeus)*, Common Pipistrelle (*Pipistrellus pipistrellus)*, Nathusius' Pipistrelle (*Pipistrellus nathusii)*, Leisler's Bat (*Nyctalus leisleri)*, Brown Long-eared Bat (*Plecotus auritus)*, Lesser Horseshoe Bat (*Rhinolophus hipposideros)* and three myotid species; Daubenton's Bat (*Myotis daubentonii)*, Natterer's Bat (*Myotis nattereri),* and Whiskered Bat (*Myotis mystacinus)*. Ireland hosts the world population stronghold for Leisler's Bat, and one of the world's population strongholds for Lesser Horseshoe Bat.

There have been confirmed records of a further two species, currently considered vagrant species; Brandt's Bat (*Myotis brandtii)* in Co. Wicklow in 2003 confirmed by DNA analysis (Mullen 2007), and Greater Horseshoe Bat (*Rhinolophus ferrumequinum)* has been confirmed by a single male in Co. Wexford in 2012/2013 (Roche *et al.* 2014), and more recently by acoustic recordings during June and July 2020 in Glendalough, Co. Wicklow (email from Bat Conservation Ireland, 17.7.2020). There have been a few other Irish records of Brandt's Bat, unconfirmed by DNA analysis, and it is possible that Brandt's Bat may have been overlooked because of its close similarity to Whiskered Bat. However, a 2008-2009 re-survey of known Irish sites for Whiskered Bat did not confirm any additional Brandt's Bat through DNA analysis, so it cannot at present be considered a resident species (Boston *et al.* 2010).

Table 1 details the conservation status and legal protection of Irish bat species with respect to; Red List of Terrestrial Mammals (Marnell, Kingston & Looney 2019), the latest assessment of EU protected habitats and species in Ireland (NPWS 2019), the EU Habitats Directive, and the Irish Wildlife Acts (1976 - 2012).

Table 1. Conservation Status, Population Size Estimate and Legal Protection of Irish Bat Species

Bat species	Estimated population size*	Red List Status**	EU Protected Species Assessment***	EU Habitats Directive	Irish Wildlife Acts
Common Pipistrelle *Pipistrellus pipistrellus*	1.2 -2.8 million	Least Concern	Favourable	Annex IV	Yes
Soprano Pipistrelle *Pipistrellus pygmaeus*	0.5-1.2 million	Least Concern	Favourable	Annex IV	Yes
Nathusius' Pipistrelle *Pipistrellus nathusii*	10,000 - 18,000	Least Concern	Unknown	Annex IV	Yes
Leisler's Bat *Nyctalus leisleri*	73,000 - 130,000	Least Concern	Favourable	Annex IV	Yes
Daubenton's Bat *Myotis daubentonii*	81,000 - 103,000	Least Concern	Favourable	Annex IV	Yes
Natterer's Bat *Myotis nattereri*	Unknown	Least Concern	Favourable	Annex IV	Yes
Whiskered Bat *Myotis mystacinus*	Unknown	Least Concern	Favourable	Annex IV	Yes
Brandt's Bat *Myotis brandtii*	Unknown	Data Deficient	Not included (vagrant)	Annex IV	Yes
Brown Long-eared Bat *Plecotus auritus*	64,000 - 115,000	Least Concern	Favourable	Annex IV	Yes
Lesser Horseshoe Bat *Rhinolophus hipposideros*	14,000	Least Concern	Inadequate	Annex II and Annex IV	Yes
Greater Horseshoe Bat *Rhinolophus ferrumequinum*	Unknown, low number	Not included	Not included (vagrant)	Annex II and Annex IV	Yes

** After Roche et al. 2014. ** After Marnell et al. 2019. *** After NPWS 2019*

Bats use different types of roosts during different times of the year and phases of their life cycle (see summary in Appendix A). For example, in early summer, pregnant females gather together to form maternity roosts where they give birth to pups and suckle them until they are weaned by late summer. The pups are flightless for a few weeks and are completely reliant on their mothers' milk. Bats spend the summer months mostly hunting for insect prey at night and sheltering by day. In winter when insect food becomes scarce due to low temperatures, bats seek out winter hibernation roosts where they enter into a torpor, reducing their metabolic requirements, thus surviving through the period of low food availability. They are vulnerable to disturbance in winter roosts, as waking up causes them to burn fat reserves that must last until spring, and they are vulnerable to injury when in a torpid state. Bats also make use of roosts other than their daytime roost. During night-time foraging bouts, they may take temporary shelter from inclement weather or process and digest insect prey in what are called 'night roosts'. These often tend to be close to key foraging areas e.g. for Lesser Horseshoe (Knight & Jones 2009).

Each bat species tends to have its own particular roost requirements and preferences. For example, Lesser Horseshoe Bats cannot use their limbs to crawl into crevices like other species, and they must instead fly directly into a roost through an opening of sufficient size and hang by their specially adapted feet from a suitable perch. For this reason, this species will not use bat roost boxes as other Irish bat species. Pipistrelle species on the other hand are crevice dwellers. They can land and crawl into very tight spaces through access holes as little as 1.2 x 2 cm. Their roosts can be concealed under ridge tiles, in wall cavities, or between slates and felt for example.

Bats, like other wildlife, tend to use habitat corridors with shelter of trees, hedgerows and woodland to move throughout the landscape. Such wildlife corridors provide connectivity between the various roosts, foraging, and mating sites that bats use during different seasons or phases of their life cycle (see Appendix A). Linear vegetated features such as treelines, hedges, riverbanks, and woodland, are often important commuting and foraging habitats for bats. These landscape features provide concentrations of insect prey as well as shelter from wind, rain and predators. However, bats, like any other wildlife, will also move through less sheltered landscapes when exploring new roosting/foraging opportunities or migrating between areas e.g. moving between summer roosts and autumn mating sites or winter hibernation roosts. Loss of connective habitat patches/corridors often impedes bat movements and negatively impact bat populations (Voigt & Kingston 2016).

1.5 Site Description

The development site, Bishop Lucey Park, is a very small urban park in the centre of Cork City. It is surrounded by heavily urbanised areas on all sides, as can be seen in Figure 1 below. It is bounded by the Triskel Christchurch building along much of the northern perimeter, and by street buildings and a stone wall along much of its southern perimeter. It is bounded to the east and west by low stone walls and metal railings, with Grand Parade Street to the east, and South Main Street to the west. There are mature and semi-mature mainly non-native tree species in the park, as shown in Figure 2 and described in the Tree Report accompanying this application. A channel of the River Lee runs parallel with the park at a distance of c. 0.14km south of the park. There is low (almost zero) tree cover in this part of the city, apart from that at Bishop Lucey Park. There is poor connectivity of tree cover between this park and other potential patches of bat habitat in the city.

Figure 1. Site location map showing development site (red outline). Map courtesy of Hall McKnight

Figure 2. Tree retention, removal, planting and protection plan. Courtesy of Brady Shipman Martin

2. Methods

2.1 Overview

This bat assessment was undertaken in accordance with standard guidelines (Kelleher & Marnell 2006; Aughney, Kelleher & Mullen 2008; Collins 2016). Bat activity surveys were conducted during suitable weather conditions at an optimal time of year for detecting summer roosts (Table 2).

Table 2. Overall survey schedule

Date	Field Survey	Times	Weather Conditions	Ecologist*
17/06/2021	Daylight roost search. Deploy 2 passive detectors Dusk emergence survey. City transect and spot counts along river.	20:30-00:10 Sunset: 21:56	Mild, calm and dry throughout. Temperature 13-12°C; Wind F1, Cloud 8/8 Otkas, Precipitation None.	IA, AD'A
22/06/2021	Dawn return survey. Collect 2 passive detectors Further daylight searches.	03:25-06:00 Sunrise 05:15	Mild, calm and dry throughout. Temperature 13-11°C; Wind F0-F1, Cloud 2/8 Otkas, Precipitation None.	IA

* IA = Dr. Isobel Abbott, AD'A = Dr. Alice D'Arcy

2.2 Desktop Review and Consultation

A desktop review of publicly available ecology/bat data for the development site and locality was undertaken (i.e. National Biodiversity Data Centre NBDC). The NBDC online ecology database holds bat records from Bat Conservation Ireland's national bat database. A bat report for the neighbouring Beamish and Crawford development site was also reviewed.

2.3 Visual Building/Structure/Tree Inspections

The potential of structures/trees to support bat roosts, and evidence of bat roosting (examples listed below), were visually assessed using high-powered, directional torch light, an endoscope, and close-focusing binoculars.

- Bat droppings: these can accumulate under established roosting and access locations.
- Feeding remains: discarded insects parts such as moth wings under feeding perches.
- Bat corpses or skeletons.
- Fur oil/grease staining: natural oils in bats' fur rubs onto regularly used surfaces.
- Urine staining.
- Scratch marks: from bats movements in and out of perching/roosting locations.
- Lack of spider webs in holes and crevices: may indicate bats passing.
- Characteristic smells of bats may sometimes (rarely) be detectable
- Pupae of bat parasites such as *Nycteribia kolenatii* may (rarely) be present

2.4 Dusk Emergence and Dawn Return Surveys

One dusk emergence survey and one dawn return survey were conducted, as detailed in Table 2. These were done in order to observe potential bat roosting within/bounding the park. Recordings were observed live, as well as being stored for later analysis. Bat activity was recorded using a combination of bat detectors; Batbox Duet, Wildlife Acoustics EM3+, and Wildlife Acoustics Song Meter SM4BATFS with SMM U2 microphones.

2.5 Bat Activity Transect and Riverbank Spot Counts

Following the dusk emergence survey on 17 June 2021, a transect of the streets surrounding the park was walked while recording geo-positioned bat registrations, where the track of the transect is shown in Figure 2. As part of this transect, four 5-minute spot counts of bat activity along the River Lee were recorded at the points labelled A, B, C, D in Figure 2. Recordings were observed live, as well as being stored for later analysis.

2.6 Automated Acoustic Monitoring of Bat Activity

Automated bat detectors x 2 were used to record all-night bat activity inside the park over a period of five consecutive nights each, between 17-22 June 2021 (Table 3). This involves leaving suitable bat detectors (Wildlife Acoustics Song Meter SM4BATFS with SMM U2 microphone) in position with no observer present, and bats which pass sufficiently close to the detector microphone are recorded and their calls are stored for later analysis. Some bat species have louder echolocation than others and can thus be detected from greater distances, e.g. Leisler's Bat and pipistrelle species, while species with quiet echolocation, such as Brown Long-eared Bat, must fly closer to the microphone to be detected. Recordings were made in full spectrum, retaining all amplitude and harmonic information from the original signal for subsequent analysis, and were stored in WAV format.

The locations of P1 and P2 are shown in Figure 3. Detectors were set to record from half an hour before sunset until half an hour after sunrise each night. One of the detectors (P1, Figure 3) was positioned c. 4m up a tree toward the NW of the park, and the other (P2, Figure 3) was positioned at a height of c. 3m on a drainpipe on a wall with potential roost features toward the south of the park (see Plate 1, results).

Bat sonograms were manually analysed and identified to species level using specialist software, Wildlife Acoustics Kaleidoscope Viewer Pro, noting the time and date of bat registration files. Activity analysis of recorded bat echolocation was defined as registrations/contacts per species within a 15 second (maximum) file. Multiple passes/calls/pulses of the same species within a (maximum) 15 s file count as a single registration - two species within the same 15 s file count as two registrations. Feeding buzzes (indicating a prey capture attempt by a bat), and social calling of bats (used for communication rather than foraging) were also noted. A feeding buzz is a shortening of pulse durations and inter-pulse intervals as the bat homes in on prey.

Table 3. Automated Passive Detector Monitoring Schedule

Detector Reference	Location Notes	Dates Deployed	Nights Running	Nights Analysed
P1	Tree adjacent to Triskel	17-22 June 2021	5	5
P2	Wall with roost features (Plate 1)	17-22 June 2021	5	5

2.7 Observations on Current Artificial Lighting

Observations on the current levels of artificial night lighting at and surrounding the site were made, in order to inform discussion of the current draft proposed lighting design.

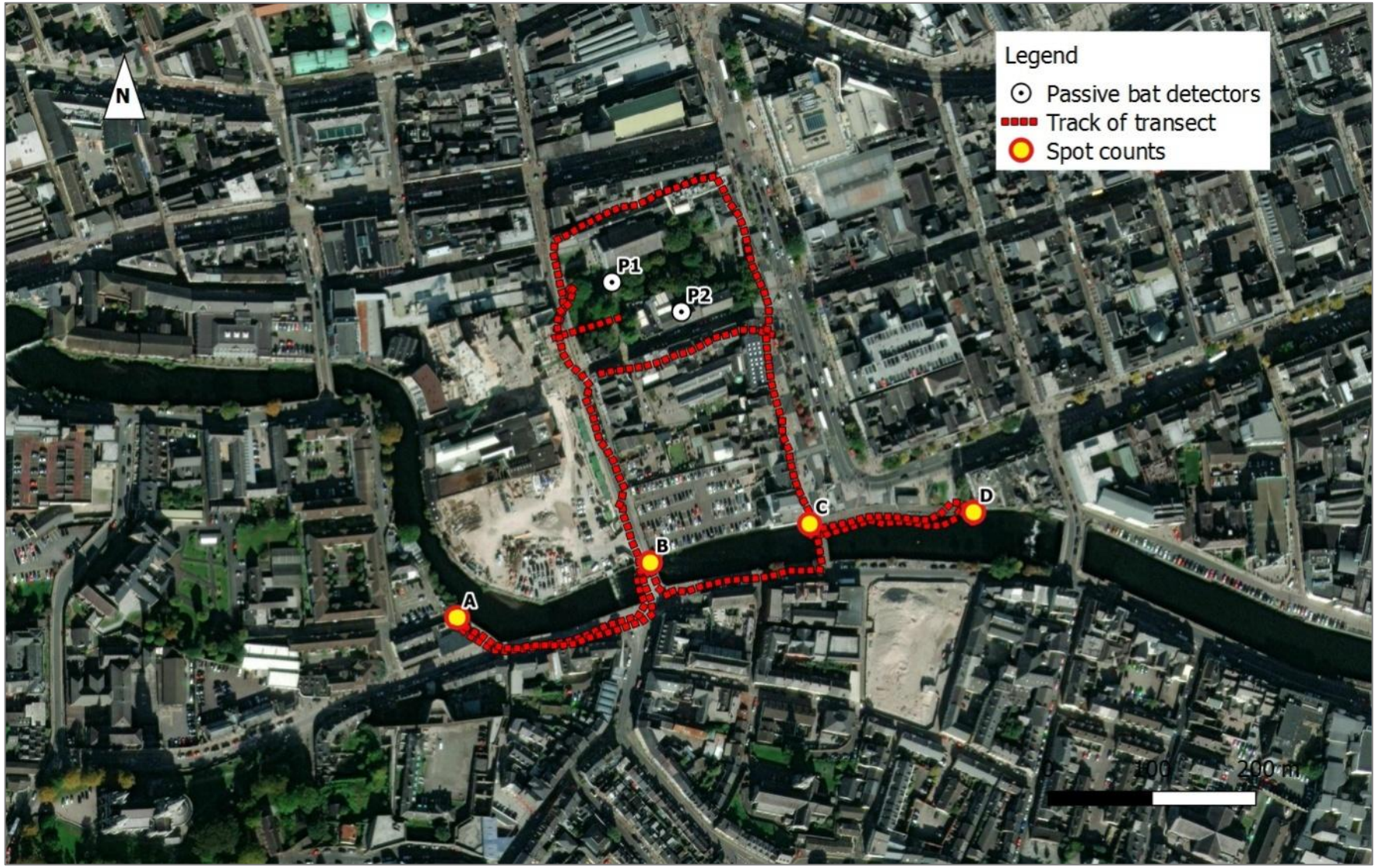

Figure 3. Map showing passive detector locations in the park, P1 and P2, bat activity transect (red dotted line), and locations of 5-minute spot counts along the River Lee, A-D. Aerial imagery ©Microsoft Bing

3. Results

3.1 Desktop Review and Consultation

NBDC Biodiversity Maps[1] for the 1 km grid square in which the site lies (W677) had no records of bat species, while the 2km grid square, W67Q, held one record of Brown Long-eared Bat from 2007, three records of Daubenton's Bat (latest in 2008), three records of Leisler's Bat (latest in 2015), three records of Soprano Pipistrelle (latest in 2015), and two records of *Pipistrellus* sp. *sensu lato* (latest in 2008). A bat survey for the neighbouring former Beamish and Crawford Brewery development site found no bat roosts during a daylight search, and two Common Pipistrelles in flight along the River Lee on 21 October 2010 (Kelleher, C., 2010, bat report prepared for Malachy Walsh & Partners). This site lies to the West/SW of Bishop Lucey Park.

3.2 Daytime Search for Bat Roosts and Potential Roosting Spaces

No visual evidence of bat roosting was observed anywhere in the structures within/bounding the park, and no bats were observed emerging or returning to roosts within/bounding the park during the dusk and dawn surveys (Results Section 3.3). However, monitoring with passive detectors (Results Section 3.5) revealed that there was likely an occasional day roost of a single Common Pipistrelle beside the position of P2 (Figure 2) as shown in Plate 1 below. This passive detector was placed here because of the many potential roosting spaces at this location, as described below.

There were suitable roosting crevices for bats within the stone walls along the southern boundary of the park, near the back corner of Soma coffee shop (park canteen area). There were also many access points into the cavity block walls at this location (Plate 1). Bats could also potentially roost underneath timber wall cladding here (Plate 1). This area remained dark at night.

There was also a deep vertical crack which was suitable for bat roosting at the side of part of the southern stone wall where it joined a concrete wall, as indicated in Plate 2. There were also suitable roost access points for bats underneath the timberwork around the roof of the building at the NE corner of the park, although there light spill from Grand Parade street lighting at this building, making it less likely that bats would roost there. The Triskel Christchurch building bounding the north of the park was very well sealed with no obvious crevices/gaps for bats in walls or around the roof.

There were no suitable potential roost features in any of the trees proposed for removal or crown works.

3.3 Dusk Emergence and Dawn Return Surveys

As mentioned, no bats were observed emerging or returning to roosts within/bounding the park during the dusk and dawn surveys. However, Common Pipistrelle foraged continuously around the park tree canopies from 30 minutes after sunset during the dusk survey (17.6.2021), and until 44 minutes before sunrise during the dawn survey (22.6.2021). It was getting quite bright at this time, and a single Common Pipistrelle that had been continuously foraging in the park was observed flying away from the park to the west to an unknown roost site. There was a maximum of just two individual Common Pipistrelle observed at any one time during both surveys. Many insect capture flight manoeuvres were observed, and feeding buzzes heard. These observations are given more context by the passive bat detector monitoring, which provided evidence that Common Pipistrelle regularly forages throughout the night within the park (Results Section 3.5).

[1] NBDC queried on 17.6.2021

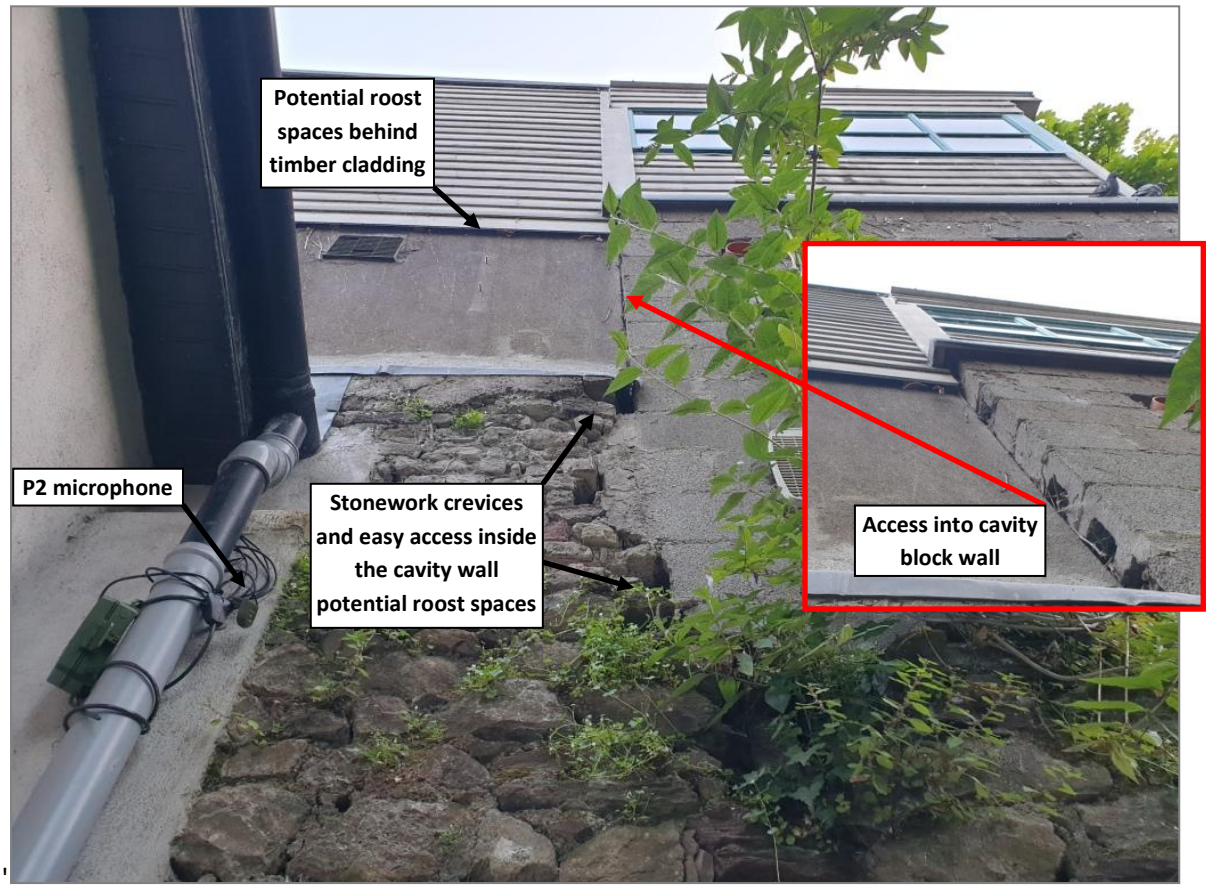

Plate 1. Position of passive bat detector, P2, at wall with many potential roost spaces.

Plate 2. Large vertical crack in wall (inset photograph) at position indicated by arrows

3.4 Bat Activity Transect and Spot Counts

Despite suitable weather conditions, bat activity was very low during the walked transect through the city streets and the riverbank spot counts. There was just a single Common Pipistrelle registration at spot location A, and no bat activity at locations B, C, and D (Figure 2) and. There was no other bat activity along the entire transect until a Common Pipistrelle was recorded on returning to the western gate of Bishop Lucky Park.

3.5 Automated Acoustic Monitoring of Bat Activity

The results of passive detector monitoring at Bishop Lucey Park between 17-22 June 2021 are summarised in Table 4 (passive detector P1) and Table 5 (P2) below. Four bat species were recorded; Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat, and Brown Long-eared Bat.

Common Pipistrelle dominated bat activity in the park (c. 99% of 1978 registrations P1, and 97% of 1546, P2). The timestamps of recordings showed that it was present in the park during every single hour of the night across all five nights. However these bat registrations are likely to have originated with a small number of Common Pipistrelles (as low as one or two individuals) which stay foraging in the park continuously, as observed during the dusk and dawn surveys (Section 3.3).

The times of the onset of Common Pipistrelle activity after sunset, and the end of its activity before sunrise, are also shown in Table 4 and Table 5. The typical emergence time of Common Pipistrelle from its day roosts is c. 20 to 30 minutes after sunset. Strong pulses of the Common Pipistrelle were recorded by P2, the detector at the wall shown in Plate 1, at just 5 minutes after sunset on 18 June 2021. This indicates an unusually early emergence time, and that it may have been roosting somewhere in the aforementioned roosting spaces near the detector (Section 3.2). It is likely to have been an occasional roost of just a single individual male. The return time of 30 minutes before sunrise earlier that day would also be consistent with roosting near the detector, as it is already quite bright by then.

Soprano Pipistrelle in contrast, was only recorded a handful of times (Tables 4 and 5), and never close to sunset or sunrise. The park is therefore not a much-used resource for this species.

Leisler's Bat, as mentioned, has high intensity, far-reaching echolocation calls, and only a few instances of distant pulses of this species were recorded. It was passing over the park and not foraging in it. It was recorded at just 4 minutes after sunset on 21.6.2021. It is not unusual for this larger, fast-flying species to emerge much earlier than other Irish bat species while it is still bright, as it is less susceptible to predation by birds.

Brown Long-eared Bat was recorded in the park during 2 out of 5 nights of monitoring. This is a surprising result, given that it is a very light-averse bat species. As mentioned, this species tends to have low intensity echolocation which is difficult to detect, and so it was flying close to the detector microphones. It was however only recorded for short intervals. It was recorded by P1 detector between 23:43 and 23:46 on 18.6.2021, and at 04:03 later that night, and at 23:48 and 23:49 on 19.6.2021. The P2 detector recorded it between 23:43 and 23:49 on 18.6.2021, and again between 23:46 and 23:56 on 19.6.2021.

Table 4. Summary of Nightly Bat Registrations Recorded by Passive Detector P1 (tree beside Triskel)

	Bat Registrations Per Night Per Species					
Dates	Common Pipistrelle	Soprano Pipistrelle	Leisler's Bat	Brown Long-eared Bat	CP* activity onset (mins after sunset)	CP activity end (mins before sunrise)
17-18 June 2021	440	5	0	0	32	37
18-19 June 2021	446	4	0	4	32	39
19-20 June 2021	205	0	4	2	26	38
20-21 June 2021	551	0	4	0	56	38
21-22 June 2021	308	3	2	0	34	44
Totals	**1950**	**12**	**10**	**6**		
Percentages	**98.6%**	**0.6%**	**0.5%**	**0.3%**		

*CP = Common Pipistrelle

Table 5. Summary of Nightly Bat Registrations Recorded by Passive Detector P2 (wall at park canteen)

	Bat Registrations Per Night Per Species					
Dates	Common Pipistrelle	Soprano Pipistrelle	Leisler's Bat	Brown Long-eared Bat	CP* activity onset (mins after sunset)	CP activity end (mins before sunrise)
17-18 June 2021	777	1	0	0	30	30
18-19 June 2021	384	9	0	17	5	34
19-20 June 2021	254	5	1	19	23	167
20-21 June 2021	10	0	0	0	275	66
21-22 June 2021	69	0	0	0	29	44
Totals	**1494**	**15**	**1**	**36**		
Percentages	**96.6%**	**1.0%**	**0.1%**	**2.3%**		

*CP = Common Pipistrelle

3.6 Current Artificial Light Levels

The park remains relatively dark all night compared to the surrounding streets. Inside the park, there are some standard lamps with a false flame flickering orange light, and there is green lighting directed onto the east wall of the Triskel Christchurch building (Plate 3). This green light is not left on all night (not on during dawn survey), and Common Pipistrelle were observed foraging around the large Sycamore tree canopy beside this green light while it was on. It remains dark around the tree canopies where Common Pipistrelle forages in the centre of the park. Street lighting overspills around the edges of the park.

Plate 3. Photograph of lighting at the park at night

4. Discussion

4.1 Overview and Potential Impacts

The paucity of bat activity in the city around Bishop Lucey Park was very pronounced, with almost a complete lack of bat activity along the street transects and spot counts along the River Lee here. There is very little vegetation/tree cover, and a lot of street lighting around this part of the city, both of which would be detrimental to insect/bat activity, and especially so in combination. While Common Pipistrelle is relatively well adapted to the urban landscape, it shows a strong negative response to relatively local (1 km) areas of gray space, and is reliant on green spaces within the urban fabric (Lintott *et al*. 2016)

A small number of Common Pipistrelle forage around the tree canopies in Bishop Lucey Park throughout the night during summer, and may even roost occasionally in crevices in its boundary walls. Brown Long-eared Bat also visit this small park. Clearly the insects supported by the trees in the park provide a foraging resource to a small number of bats.

Most of the existing trees in the park will be retained and protected during the proposed development. The proposed removal of 7 ornamental trees, as presented in Figure 2, is highly unlikely to negatively impact the existing bat foraging resources, as the more mature trees are being retained. There is also proposed planting of 7 small-sized ornamental trees. There were no potential roost features in the trees in the park. There is no realistic scope for planting of additional native tree species due to the small size of the park.

The existing park is locked at night and bounded by low stone walls and metal railings, with all entrances gated. The majority of these existing walls will be removed to create a more permeable boundary between the park and the city, and it will remain open at night. This will necessitate a new public lighting design with an inevitable increase in lighting levels. It is also envisaged that occasional event lighting can be attached to a proposed tower structure at the west end of the park.

The proposed increase in the levels of artificial lighting at the park will however have a negative impact on the small number of Common Pipistrelles that forage in the park, and may on occasion roost there. This species is one of the most widespread and common bat species in Ireland and in Europe. In the absence of mitigation, the impact of lighting would be permanent negative at a local scale, but would not impact the overall conservation status of the species. The effects of lighting on bats are discussed in the next section, with recommendations for reducing impacts.

4.2 General Impacts of Lighting on Bats

Artificial night lighting negatively impacts bat species by impeding their ability to forage successfully and to move efficiently through the landscape. While some species, such as Leisler's Bat, exploit insects which accumulate around lights on occasion, most Irish bat species are too sensitive to light to benefit from such prey accumulations, and their foraging opportunities and commuting movements are generally negatively affected by lighting (Mathews *et al.* 2015). Furthermore, all Irish bat species require dark conditions for roosting (Bat Conservation Ireland 2010). Brown Long-eared Bats in Ireland have been found to abandon traditional roosts when they become subject to lighting at night (pg. 136 Roche *et al.* 2014). Other cases of roost abandonment, delayed emergence, or reduced growth of bat pups in response to light spill near roosts have also been reported (Downs *et al.* 2003; Boldogh *et al.* 2007).

There are synergistic negative impacts between increased artificial lighting and gaps in tree cover. Common Pipistrelle is perhaps one of the least light-averse species in Ireland. Nonetheless, a recent study in the UK found that the level of illumination required to create a barrier effect for Common Pipistrelle reduced as gap distance in tree cover increased. Movement of this species was severely restricted in some urbanised areas. For those gaps where crossing was recorded, bats selected the darker parts of gaps (Hale *et al.* 2015). This synergistic impact is likely to be even more pronounced for

more light-averse bat species, such as Brown Long-eared Bat. It was therefore unexpected to record this species in a small park in the city centre.

4.3 Bat Mitigation Measures

The following measures are recommended in the interest of bat protection at the park. It is inevitable that the overall light levels increase as the park will be permanently open at night. The overall aim however is to keep the tops of the tree canopies as dark as possible in order to protect the existing bat foraging and commuting opportunities as much as possible.

- The tree canopies at the park should remain as dark as possible by using downward-directed lighting, and light columns should be of minimum height to avoid light spill into tree canopies.
- LED lighting with the minimum intensity necessary for human health and safety should be used.
- Timers or motion-sensors could be used to switch off lighting when it is not needed.
- The wall with potential roosting spaces near the P2 position (Figure 3 and photograph in Plate 1) should remain dark.
- Bat-friendly planting scheme = insect-friendly planting scheme. All plants at the park should have wildlife value, and not solely ornamental value. Plants should be chosen to provide resources to insects throughout the year. There are lists of wildlife-friendly plants available from the National Biodiversity Data Centre/All-Ireland Pollinator Plan website (https://pollinators.ie/resources) and also from the UK Bat Conservation Trust website (Encouraging Bats Guide).
- Consider planting a vertical living wall of wildlife-friendly plants on some of the boundary walls in the park. Climbing plants such as native honeysuckle and night-scented jasmine would also benefit bats. While planting native tree species would benefit bats, there is no realistic scope for this due to the small size of the park.
- **Monitoring**: It is recommended that bat activity surveys and passive detector monitoring would be conducted post-development to measure whether bat activity persists in the park with the new lighting regime.

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5. Appendices

5.1 Appendix A: Roost Types Used by Bats

Text adapted from (Hundt 2012)

- **Transitional Roost (generally April-September/October)**
  On waking from hibernation or in the period prior to hibernation, bats search for roosts in which they stay for only a few days or on some occasions several weeks. These transitional roosts can be occupied by a few individuals or occasionally small groups. The transitional roosts used prior to hibernation are generally cool and thus may allow bats to reduce their energy requirements before going into hibernation.
- **Maternity Roost (generally May-August)**
  Breeding females gather together around the beginning of May to form nursery colonies. During this period gestation begins with births typically occurring between June and July. The females and their young remain within the maternity roost until the young are weaned and independent (late July-August). These roosts tend to break up between August and September. Adult males are rarely found within these colonies. However, the adult males of long-eared bats, Daubenton's, Natterer's and lesser horseshoe bats can be found roosting within maternity colonies with their numbers increasing throughout the active season.
- **Satellite Roost (generally May-August)**
  Breeding females may have alternative roost sites in close proximity to the main nursery colony. These are referred to as 'satellite roosts'. The number of bats using these roosts can vary greatly, from a few individuals, to small groups.
- **Mating Roost (generally September-November)**
  All Irish bats are polygynous i.e. males mate with several females. Mating generally takes place from late summer and can continue through the winter. A number of different mating strategies are used by bats, though males of some species establish mating roosts, whereby they defend territory and display/call to females to mate.
- **Hibernation Roost (generally October-March)**
  Depending on the weather and food availability, bats tend to move to hibernation sites from October. Hibernation roosts can vary greatly in terms of the number of individuals and the diversity of species that occupy them. However, they tend to have a constant cool temperature and high humidity, which allows the bats to use less energy regulating their temperature. Bats will wake occasionally during hibernation to drink and feed.
- **Night Roost (generally March-November)**
  Bats may use roosts other than traditional day roosting sites to rest in during the night. These roosts vary in their conservation significance. Night roosts may be used by a single individual on occasion or they could be used regularly by the whole colony. Studies have shown that night roosts may be of particular importance to some species such as the lesser horseshoe bat, providing key resting places within core foraging areas.
- **Day Roost (generally March-November)**
  These roosts are used during the day to rest in. Males of most Irish species spend the summer roosting alone or in small groups with other males in such roosts. Bats may regularly use a number of day roosts, switching between them on a daily basis, though conversely they may occupy the same roosting site for several weeks.
- **Feeding Roost (generally May-November)**
  These roosts can be occupied by a single animal or a few individuals throughout the active season. They vary in their significance as they may be used by the whole colony or just a few individuals to feed, to shelter from the weather or to rest temporarily. Feeding roosts are often used by Plecotus and Rhinolophus species.
- **Swarming Sites**
  Swarming takes place between August and November, whereby large numbers of bats from several species gather, generally around caves and mines. They are often dominated by the Myotis species and appear to be important mating sites with some bats travelling tens of kilometres to reach these areas. A proportion of the bats that travel to these sites will remain to hibernate.