Bat Survey Report

Cavan Sports Complex

McAdam Design

Project number: 60711314

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Quality information

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1. Introduction

1.1 Background

AECOM was commissioned by McAdam Design (the Client) to carry out a suite of bat surveys at lands located at and to the south of the Royal School Cavan, Cavan, Co. Cavan (the site), to inform a planning application for a regional sports campus (the proposed development). Surveys carried out comprised: a Ground Level Tree Assessment (GLTA) for bats, subsequent emergence surveys, a habitat assessment, and bat activity surveys.

The proposed development includes a new sports arena and building, a synthetic hockey pitch, athletics track with interior sports field, an external synthetic multi-sports pitch, several sand mattress GAA fields, and associated infrastructure including covered stands, a toilet block and new parking facilities. See Drawing No. A2156-100-10 supplied by the client.

The site is located between R212 Dublin Road to the east and Kilnavarragh Lane to the west, at the south of Cavan town centre. Habitats on site consist primarily of agricultural fields bordered by hedgerows with trees, with buildings and hardstanding associated with the Royal School Cavan making up a small proportion of the site. An existing residential development and further agricultural lands lie to the west of the Site, beyond which is Swellan Lough. To the southwest is a small woodland, with several existing sports pitches immediately to the southeast. The approximate central Irish Grid Reference for the site is H4174303901. Plate 1 shows the location of the site.

Plate 1: Site Location.

1.2 Previous Survey

A Preliminary Ecological Appraisal (PEA) of the site, including a Preliminary Roost Assessment (PRA) survey, was previously carried out in May 2023 by MCL Consulting (MCL, 2023). The PRA identified ten trees with suitability for hosting roosting bats which may be impacted by the proposed development and would require further survey. Of these, four trees were considered to be of High

suitability, and six trees were of Moderate suitability. Nine additional trees surveyed were scoped out from potential impacts based on the footprint of the proposed development. Further bat activity survey of the site was also recommended based on the foraging potential of the site.

1.3 Survey Aims

An updated PRA/Ground Level Tree Assessment (GLTA) was carried out initially to identify the potential roost features (PRFs) in the trees identified during PEA. All trees were re-assessed with regards their suitability to host roosting bats, as per BCT guidance (Collins, 2016) and all PRF's described and photographed. The aim of the subsequent bat emergence surveys was to determine whether any PRF's identified were being used by roosting bats, and, if so, to characterise any roost identified.

An appraisal of the habitat suitability on site to support commuting and foraging bats was carried out to categorise the habitat as having Low, Moderate or High suitability for bats as per BCT guidance (Collins, 2016). This informed the requirement for bat activity surveys on site. The aim of activity surveys is to gather information pertaining to baseline use of the site by bats, including recording species present and activity levels, identifying important bat habitats, and assessing landscape connectivity.

This Report presents the findings of these surveys and discusses the likely impacts of the proposed development. This Report will also provide recommendations for mitigation, and enhancement in relation to bats to be incorporated into the proposed development.

1.4 Quality Assurance

This project has been completed in line with AECOM's Integrated Management System (IMS). Our IMS places great emphasis on professionalism, technical excellence, its quality as well as covering all aspects of environmental and Health and Safety management. All staff members are committed to establishing and maintaining our accreditation to the relevant international standards namely BS EN ISO 9001:2008 and 14001:2015 and ISO 45001:2021. In addition, our IMS requires careful selection and monitoring of the performance of all sub consultants and contractors.

2. Legislative and Planning Policy Context

2.1 Relevant Legislation

All bats in the Ireland are European Protected Species (EPS) listed on Annex IV of the Habitats Directive[1]. Listing under Annex IV requires Member States of the European Union (EU) to strictly protect these species wherever they occur. In addition, the lesser horseshoe bat *Rhinolophus hipposideros* is also listed under Annex II of the Habitats Directive, which effectively means that Member States are required to designate Special Areas of Conservation (SAC) for the further protection of this species.

The Habitats Directive is transposed into Irish law by the European Communities (Bird and Natural Habitats) Regulations 2011 (the 'Habitats Regulations'), which provide national legislation for the protection of bats. Under the Habitats Regulations it is an offence to:

- Deliberately capture, injure, or kill any bat.
- Deliberately disturb a bat, particularly during the period of breeding, rearing, hibernation, and migration.
- Damage or destroy a bat breeding site or resting place.

2.2 Relevant Planning Policy and Guidance

2.2.1 Project Ireland 2040 National Planning Framework (NPF)

The *Project Ireland 2040 National Planning Framework* (NPF) (DHPLG, 2018) sets out the Government's planning policies for Ireland and how these should be applied. NPF sets out that to achieve sustainable development, the planning system must incorporate an environmental objective, which should include:

- Integrated planning for green infrastructure and ecosystem services.
- Enhancing the conservation status and improve the management of protected areas and protected species.
- Use natural resources prudently.
- Minimising waste and pollution.
- Mitigating and adapt to climate change, including moving to a low carbon economy.

2.2.2 National Biodiversity Action Plan 2017-2021

The *National Biodiversity Plan 2017-2021* (DCHG, 2017) for Ireland outlines six main objectives to meet commitments under the Convention on Biological Diversity (CBD) and EU Biodiversity Strategy. The *National Biodiversity Plan 2023-2027* is currently being drafted. The objectives of the *National Biodiversity Plan 2017-2021* include:

- Mainstream biodiversity into decision-making across all sectors.
- Strengthen the knowledge base for conservation, management and sustainable use of biodiversity.
- Increase awareness and appreciation of biodiversity and ecosystem services.
- Conserve and restore biodiversity and ecosystem services in the wider countryside.
- Conserve and restore biodiversity and ecosystem services in the marine environment.
- Expand and improve management of protected areas and species.
- Strengthen international governance for biodiversity and ecosystem services.

[1] Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, which is more commonly referred to as the 'Habitats Directive'.

2.2.3 Local Area Development Plans

Other relevant policies that inform this report include the Cavan County Development Plan (CDP) 2022 – 2028 (Cavan County Council, 2022), which sets out the aims, policies, and objectives for topics such as development, green infrastructure, and natural heritage for County Cavan in accordance with the Planning Acts. The strategic aim of this plan relative to the natural environment is set out in Chapter 10: Natural Heritage, and is to:

- Protect conserve and enhance biodiversity, natural heritage, amenity and landscape in order to provide economic, social and well-being benefits for current and future generations of Cavan's citizens and its visitors.

Chapter 10 of the CDP also includes specific policy objectives for a number of themes and environmental features, including: designated and non-designated sites, geological heritage, invasive species, wetlands, woodlands, trees, hedgerows, forest parks, lakes, inland waterways, and landscape and amenity areas.

3. Methods

3.1 Desk Study

The desk study sought to identify the landscape-scale suitability index of the site and surrounds for different bat species (from Lundy *et al*., 2011). The National Biodiversity Data Centre (NBDC) online map viewer was used to identify the suitability index of the 5 km grid square surrounding the site. The index values are ranked into five broad suitability categories per species (very low, low, moderate, high, and very high). It must be noted that this relates to the 5 km grid square and may not be reflective of conditions at a finer scale, e.g. onsite.

3.2 Roosting Bats

3.2.1 Preliminary Roost Assessment

A GLTA of trees within the site and habitat appraisal was conducted following standard methodology recommended in Bat Surveys: Good Practice Guidelines (3rd Edition), produced by Bat Conservation Trust (BCT) (Collins, 2023). The survey was carried out on 26 June 2023 by AECOM Ecologist Dr Emma Boston under suitable weather conditions for survey. Following an extension to the redline boundary to encompass several field parcels to the south of the existing site, a further PRA was carried out on 30 August 2023 by AECOM Ecologist Seanin Maxwell.

The GLTA was carried out to search for the presence of potential roost features (PRFs) in trees (e.g. cavities, trunk and branch splits, rot holes, knot holes etc.). In addition to presence of PRFs, evidence of the presence of roosting bats was also searched for. External signs that bats are using a tree as a roost site include:

- Bat droppings: black droppings, 5-10 mm long that crumble to a fine dust when crushed and may be located on the ground or stuck to the tree.
- Staining: secretions from bat fur, which can cause oily brown stains in the vicinity of roost entrances. Urine stains which may be present below the entrance to the roost.
- Audible squeaking from within the roost site.
- Odour, which may be indicative of a large roost.
- Flies around the entrance of a roost, attracted by the smell of bat droppings.

The results of the PRA were used to grade trees as having Negligible, Low, Moderate, or High suitability for roosting bats in general accordance with BCT guidelines (Collins, 2016).

3.2.2 Endoscope Survey

One tree (T2) classified as having Moderate suitability for roosting bats had PRFs which were difficult to access for emergence surveys. This tree was subject to an endoscope survey from the ground carried out under licence (DER/BAT 2022-133) by AECOM Ecologist Jenny Hunter (licensee) on 27 July 2023, by which the features were fully inspected to gain a better understanding of the PRF's suitability to host roosting bats. In this case, the features were "downgraded" from Moderate to Negligible, and no follow-up emergence surveys were recommended.

Another tree (T41) classified as having Moderate suitability for roosting bats within the extended site boundary was inspected with an endoscope under licence (DER/BAT 2022-133), by AECOM Ecologist Scott McCollum on 3 October 2023 This was carried out with the aim further describe and characterise the PRFs, and to determine whether or not a PRF's is being used by roosting bats, as a substitute for an emergence survey. The classification as Moderate was upheld.

3.2.3 Emergence Surveys

Survey methods followed standard methodology in accordance with good practice as highlighted in Bat Surveys: Good Practice Guidelines (3rd Edition), produced by BCT (Collins, 2016). In addition, the survey method has been informed by the recent Interim Guidance Note (BCT, 2022) which supersedes Collins (2016) and details the new requirement for night vision aids (NVA; e.g. infrared

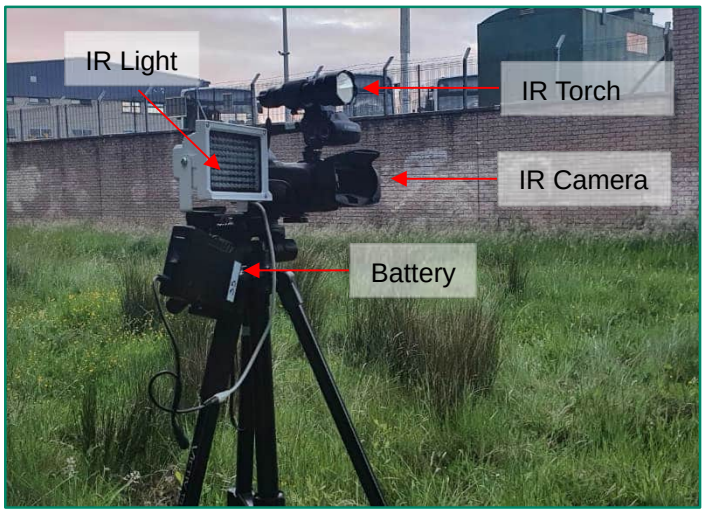
(IR) cameras) during roost surveys (to be phased-in in full by 2024) and provides comments on the efficacy of pre-dawn surveys.

Following Collins (2016), trees which are likely to be impacted by the development with High suitability for roosting bats were subject to three dusk surveys, while trees with Moderate suitability were surveyed twice, except for tree T41 (see Limitations Section 3.6). Trees with Low suitability do not require further survey. Dusk emergence surveys commenced at least 15 minutes prior to sunset and ended 1.5 to 2 hours after sunset.

Surveyors positioned themselves with clear views of potential access features identified during the PRA prior to the start of the survey. Trees were watched and if any bats emerged or re-entered, the surveyors attempted to pinpoint the roost location, and identify and count the number of bats emerging / re-entering, where light conditions permitted. Bat detectors were employed as a means of recording bat echolocation calls and identifying species present. Surveyors listened for bats using detectors and on hearing a bat, they attempted to identify species, flight direction, height, and bat behaviour.

During emergence surveys, infrared (IR) cameras were deployed both remotely and paired with a surveyor. Where cameras were deployed remotely, these were paired with a bat detector. The cameras were set up to face potential access features and were equipped with a torch-style IR light (for pin-pointing features) and a larger IR light to give a wider field of view. Such a setup is optimal for survey where light conditions fade rapidly. IR lights do not disturb bats. A thermal camera, comprising a single scope-style camera on a tripod, was deployed alongside the surveyor for the first dusk emergence survey of Tree 1. An indication of the IR camera setup is presented in Plate 2.

Plate 2: Indicative IR Camera setup (not from within the Site).



3.3 Bat Activity

3.3.1 Transect Surveys

Bat activity surveys were carried out within the site on four occasions between June and September 2023. The surveys used the transect method, based on Bat Surveys: Good Practice Guidelines (3rd Edition), produced by Bat Conservation Trust (BCT) (Collins, 2016). Three different transects were surveyed a varying number of times, depending on the suitability of the habitats.

Habitats to the north of the site were categorised as having Moderate suitability for foraging and commuting bats given the nature of the hedgerows and treelines delineating field boundaries. This section of the site was covered by two transects (Transect 1 & 2) walked on three occasions June to September. The fields to the south of the site (where the red-line boundary was extended) were categorised as having Low suitability for foraging and commuting bats given that the majority of the hedgerows were low, with only sparse trees, and the proximity of 3G lighting from the adjacent

pitches, and Kingspan Breffni stadium (Transect 3). This transect was walked on two occasions August - September. Transect routes are illustrated in Figures 2 -5.

Following standard methodology, activity surveys commenced at sunset and continued for at least two hours. Given the size of the site, several different transects were walked. Spot counts (i.e. listening points) were determined along the transect route at suitable locations, at which surveyors listened at a stationary position for five minutes.

Surveyors listened for bats using detectors with headphones and on hearing a bat, attempted to identify flight direction, height, and bat behaviour. Surveys were carried out by experienced AECOM ecologists Dr Emma Boston, Dr Paul Lynas, Jenny Hunter, Scott McCollum, Paul Donaghey and Seanin Maxwell, with assistance provided by Ecological Placement Students Helen Fleet and Ellen McGeough.

3.3.2 Static detectors

Transect data was supplemented by data collected using static automated bat detectors. One Song Meter (SM) 4 static detector was deployed on a tree in a mature treeline north of the school (SD01, Irish Grid H4192504210), mounted at a height of 3 m from the ground. Another SM4 static detector was deployed within a hedgerow along the Cavan River at the northern end of the Kingspan Breffni stadium (SD02, Irish Grid H4194803903). Detectors were programmed to continuously record from sunset to sunrise, and the locations of the detectors are shown in Figure 2.

3.4 Data Collection and Analysis

All bat calls were digitally recorded. The equipment used for the transect surveys comprised Batlogger M and M2 detectors. Weather details were recorded using the Batlogger inbuilt thermometer, and descriptions of other conditions were recorded subjectively. Equipment used for emergence surveys comprised Batlogger M2 bat detectors, SM Mini static detectors, Canon XA11 IR cameras, and a Guide TrackIR Pro 19 thermal camera.

Data collected during surveys were stored and subsequently analysed using Kaleidoscope Pro sound analysis software to identify any bats not heard in the field by the surveyors, but recorded, and to confirm species identifications made in the field. Camera footage was reviewed in VLC Media Player at a maximum speed of x2.

In addition to recording bat locations as observed during transect surveys, heat maps of bat activity were produced to provide an indication of “hotspots” within the site during walked transect surveys. The data used to create these maps are based on the number of bat registrations per species, and the results of all transect surveys combined. The result is that hotspots may be influenced by the larger numbers of passes at a listening point, for example. However, these maps are considered a robust estimation of bat activity, as Batloggers record in broadband, and all species have equal opportunity to be recorded. In addition, the heat maps are created based on where the detector was located based on GPS, as opposed to where the bat may have been. A buffer of 10 m around each bat pass point was used when creating hotspots, to alleviate this bias and error associated with GPS.

3.5 Personnel

Dr Emma Boston BSc (Hons) MCIEEM MRSB is a Principal Ecologist with over 18 years’ professional experience in the survey of bats for research, conservation, and consultancy. Emma has expertise in the survey methods for bats using of a range of survey methods, techniques, and equipment, including acoustic call analysis. She has carried out bat surveys for small to large developments and infrastructure schemes and has been involved in many projects where she has had to design and prescribe specific mitigation for bats. She has held licences in Northern Ireland and the Republic of Ireland to disturb or catch bats for education and research purposes.

Dr Paul Lynas BSc (Hons) MRes MCIEEM is an Associate Director with over 18 years’ professional experience in conservation and consultancy. Paul has vast experience in bat survey, particularly roost and activity surveys. Paul also has experience in prescribing mitigation, particularly for large, linear schemes. Paul has held licences in Northern Ireland to disturb and destroy bat roosts.

Jenny Hunter BSc (Hons) MSc AMRSB is a Principal Ecologist with over nine years' professional experience of ecological consultancy. Jenny has extensive experience in the survey of bats using of a range of survey methods, techniques, and equipment, including acoustic call analysis. She has carried out bat surveys (PRA, nocturnal roost surveys, and activity surveys) for a range of small to large developments and infrastructure schemes. Jenny has held licences for tree inspection with an endoscope, assisted in licensed roost closures, and has experience in designing and prescribing specific mitigation for bats. She has provided inhouse training to junior colleagues on bat surveys and is well versed in relevant legislation and survey guidance.

Scott McCollum BSc (Hons) is a Consultant Ecologist with six years' professional experience of ecological consultancy. Scott has carried out ecological surveys and Preliminary Ecological Appraisal for a variety of projects including road schemes, railway works, housing and other large-scale private sector developments. Scott has carried out numerous bat surveys, including roost assessments, roost surveys, and activity transects.

Paul Donaghey BSc (Hons) MSc is a Consultant Ecologist with over four years' professional experience of ecological consultancy. Paul has carried out numerous bat surveys, including activity transects and emergence / re-entry surveys for a range of large- and small-scale projects. Paul also has extensive experience in bat call analysis, and regularly assists colleagues in Great Britain with bat analysis.

Seanin Maxwell BSc (Hons) MSc ACIEEM is a Consultant Ecologist with four years' professional experience of ecological consultancy. Seanin has extensive experience in the survey of bats using a range of survey methods for a variety of small- and large-scale projects. Seanin holds a Natural England Level 1 Class Licence for bats. She has surveyed a variety of structures, including buildings, walls, trees, and a cave. Seanin has assisted on bat box surveys in both Northern Ireland and England, as well as participating in voluntary roost counts for lesser horseshoe. Seanin has a good understanding of bat ecology, bat conservation issues and relevant legislation. Seanin also has experience in bat call analysis.

Ellen McGeough has carried out numerous bat surveys, including activity transects and emergence / re-entry surveys for a range of large- and small-scale projects. She has gained experience in survey methods, techniques, equipment, and bat report writing. Ellen has surveyed various structures including houses, trees, and walls. She assisted in carrying out analysis of data from bat roost surveys. Ellen has strong skills with statistical analysis through R Studio and Microsoft Excel.

Helen Fleet BSc (Hons) carried out an industrial placement with AECOM as part of an MSc in Animal Behaviour at Queen's University Belfast. Helen has volunteered for the Cumberland Bat Trust for three years, where she did occasional bat walks and transect surveys. She also spent a surveying season as a subcontractor for ArbTech carrying out bat roost surveys.

3.6 Limitations

BCT updated its standard survey guidance in September 2023 (Collins, 2023). The 4th Edition of the guidelines introduced changes to bat survey methods, such as changes to how trees are graded for suitability for roosting bats. However, all bat surveys were carried out prior to the release of the updated guidelines and followed the 3rd Edition of the guidelines (Collins, 2016). This does not pose a constraint to the findings of the surveys or this Report.

Tree T7 while categorised as High, was not accessible for health and safety reasons, with cattle present during the surveys. It is to be retained, and impacts are expected to be minimal. T41 was surveyed by endoscope inspection, rather than emergence surveys given it was identified as being impacted by the proposed development in late September.

In addition to number of bats observed (or heard but not seen) during surveys, numbers of bat registrations are also used to provide an indicative assessment of bat use of the site. However, it must be noted that number of registrations do not indicate individual bats, but rather the number of times a bat call was registered on the Batlogger and identified to species. Bat registrations may seem inflated compared to number of passes, as constant activity by one bat will result in multiple registrations for one bat pass.

The SM4 static detectors deployed at location SD02 did not record during its first deployment as the microphone cable became disconnected. This was redeployed in the same location for a period of 22 nights, albeit for one part of the active season, and sufficient data is considered to have been collected to make an assessment of the use of the site in this location by bats, and therefore this is not considered to be a limitation of the report.

The woodland in the eastern part of the site could not be walked at night during transects due to the steep and uneven slopes, however, adjacent woodland edge habitat was surveyed, while the static detector (SD01) was deployed in this treeline, and this is not considered to pose a limitation to the study.

Slight drizzle was noted during the third survey visit, however, this was temporary and is not considered to have limited the survey visit.

No other limitations that would constrain the findings of this report were identified.

4. Results

4.1 Desk Study

The suitability index of the site and surrounds is high for all species combined. Likewise, suitability is high for Leisler's bat, common pipistrelle and soprano pipistrelle, and Daubenton's bat. The site is of moderate suitability for Nathusius' pipistrelle, brown long-eared bat, and Natterer's bat, and of low and very low suitability for whiskered bat and lesser horseshoe bat, respectively. Suitability indices for each bat species is presented in Table 1.

Table 1: Suitability indices for bat species.

Species	Index Value	Suitability
All bat species	29.89	High
Leisler's bat	42	High
Common pipistrelle	45	High
Soprano pipistrelle	43	High
Nauthusius' pipistrelle	26	Moderate
Brown long-eared bat	36	Moderate
Daubenton's bat	30	High
Natterer's bat	35	Moderate
Whiskered bat	10	Low
Lesser horseshoe bat	2	Very Low

Source: NBDC map viewer, Lundy et al. (2011).

4.2 Bat Roost Surveys

4.2.1 Preliminary Roost Assessment

Trees with High or Moderate suitability are detailed in Table 2, whilst trees with Low or Negligible suitability which were highlighted in the PRA (MCL, 2023) are detailed in Appendix A. The reasoning for updated suitability categorisation from the initial PRA to the GLTA are provided in Table 2 and Table 3. All other trees categorised as Negligible during this GLTA are not presented in this report. The codes given the trees by Dr Philip Blackstock are included in brackets.

Table 2: Trees with Moderate or High suitability for roosting bats.

Tree Code	PRA	GLTA	Description	Species	PRF	Orientation	Feature Height (m)	Photograph(s)
T1 (T63)	High	Moderate	Presence of features with Moderate suitability	Alder	Knot-hole Knot-hole	South West	11 11.5	 
T2 (T62)	High	Low	Shallow knot-holes not suitable for large numbers of bats.	Beech	Knot-hole Knot-hole	Southwest Southwest	4 3	 

Tree Code	PRA	GLTA	Description	Species	PRF	Orientation	Feature Height (m)	Photograph(s)
T7 (T108)	High	High	Numerous knot-holes and cracks. Not to be directly impacted by the proposed development. Inaccessible due to H&S.	Oak				Not available
T34 (T92)	Moderate	Low	N/A	Ash	None visible, tree covered in bushy ivy.			

Tree Code	PRA	GLTA	Description	Species	PRF	Orientation	Feature Height (m)	Photograph(s)
T37 (T105)	High	High	N/A	Beech	Tear-out	N/A	6	
T41 (T11)	Moderate	Moderate	N/A	Ash	Knot-hole (Moderate)	West	6	 
					Knot-hole (Low)	South	6	
					Knot-hole (Negligible)	Southeast	6.5	
					Knot-hole (Negligible)	South	10	
					Knot-hole (Low)	Northeast	15	
					Knot-hole (Negligible)	Northeast	4	
					Knot-hole (Negligible)	Northeast	8	
					Frost-crack (Low)	North	12	

Tree Code	PRA	GLTA	Description	Species	PRF	Orientation	Feature Height (m)	Photograph(s)
					Tear-out (Negligible)	South	10	

Table 3: Trees with Low or Negligible suitability.

Tree Code	Initial suitability*	Re-assessed Suitability	Reason for change/suitability
4 (G110)	Moderate	Negligible	The initial assessment appears to be based on the presence of ivy, however the ivy is not particularly mature, and largely provides a semi-transparent mat over the tree trunk. The ivy is not considered to pose a bat roost feature itself. Furthermore, based on the age, size, and apparent health of the tree, it is considered unlikely that the ivy conceals any features of use to roosting bats.
5 (G110)	Moderate	Negligible	The initial assessment appears to be based on the presence of thick ivy, however the ivy is not considered to pose a bat roost feature itself. Furthermore, based on the age, size, and apparent health of the tree, it is considered unlikely that the ivy conceals any features of use to roosting bats.
11 (T76)	Not Assessed	Negligible	Young ivy is present and largely provides a semi-transparent mat over the tree trunk. The ivy is not considered to pose a bat roost feature itself, no other PRFs identified. Furthermore, based on the age, size, it is considered unlikely that the ivy conceals any features of use to roosting bats.
13 (T34)	Moderate	Low	The initials assessment appears to be based on the presence of thick ivy near the top of the tree, however the ivy is not considered to pose a bat roost feature itself, no other PRFs identified. Furthermore, based on the age, size of the tree, it is considered unlikely that the ivy conceals any features of use to roosting bats.
14 (G68)	Moderate	Negligible	Although this tree appears to be dying and has knotted branches up the trunk, this is not considered a PRF.
15 (T69)	Moderate	Negligible	One healed knot-hole which does not lead to internal cavity, and one small up-facing knot-hole present.
18 (T75)	High	Negligible	The initial assessment appears to be based on the presence of ivy on this dying tree. However the ivy is not particularly mature, and largely provides a semi-transparent mat over the tree trunk. The ivy is not considered to pose a bat roost feature itself. Furthermore, based on the age and size of the tree, it is considered unlikely that the ivy conceals any features of use to roosting bats, despite the declining health of the tree.
21 (G80)	Not Assessed	Negligible	A thin covering of ivy is present and largely provides a semi-transparent mat over the tree trunk. The ivy is not considered to pose a bat roost feature itself. Furthermore, based on the age, size, and apparent health of the tree, it is considered unlikely that the ivy conceals any features of use to roosting bats.
23 (T83)	Not Assessed	Low	A mix of live and dead ivy is present and largely provides a semi-transparent mat over the tree trunk. The ivy is not considered to pose a bat roost feature itself. Furthermore, based on the age, size of the tree, it is considered unlikely that the ivy conceals any features of use to roosting bats.
25 (T84)	Not Assessed	Low	Ivy is present and largely provides a semi-transparent mat over the tree trunk. The ivy is not considered to pose a bat roost feature itself. Furthermore, based on the age, size of the tree, it is considered unlikely that the ivy conceals any features of use to roosting bats, other than some gaps which may be used opportunistically by low numbers of bats.

Tree Code	Initial suitability*	Re-assessed Suitability	Reason for change/suitability
27 (G86)	Not Assessed	Low	A dense covering of mature ivy is present but is not considered to pose a bat roost feature itself. No PRFs identified. Furthermore, based on the age, size of the tree, it is considered unlikely that the ivy conceals any features of use to roosting bats.
28 (T88)	Not Assessed	Low	

4.2.2 Endoscope surveys

Following endoscope surveys, Tree 2 was downgraded from High to Low suitability due to a presence of two shallow knot-holes assessed as having only Low suitability due to the inadequate space to support larger numbers of roosting bats. Tree T41 contained 9 PRFs, of which two were sufficient in scope to be investigated with the endoscope. All PRFs were assessed to be of Low or Negligible suitability except for a single knot-hole of 5x2cm which continues up and into a dry cavity, which was assessed as having Moderate suitability.

4.2.3 Emergence Surveys

As a result of the PRA and endoscope inspections, emergence surveys were carried out on two trees (T1 & T37), due to their potential to be impacted, on a total of four occasions in 2023. T41 was identified later in the survey season and was subject to the endoscope survey only. Survey dates, weather conditions and start and end times are presented in Table 4. The locations of the trees surveyed are shown in Figure 1.

Table 4: Weather conditions recorded during emergence surveys.

Time		Temperature (°C)	Cloud cover (%)	Wind description	Precipitation	Surveyors	Tree reference
29/06/2023	**Sunset:**	**22:05**					
Start:	21:50	18	40: Scattered clouds	2: Light breeze	Dry	SMa with IR Camera	T37
End:	23:35	16	100: Overcast	5: Fresh breeze	Dry		
27/07/2023	**Sunset:**	**21:37**					
Start:	21:37	17	10 – 30: Few clouds	0: Still	Dry	PD with IR and Thermal camera	T1
End:	23:53	15	40 – 50: Scattered clouds	1: Light breeze	Dry	IR camera (paired with Static detector)	T37
30/08/2023	**Sunset:**	**20:26**					
Start:	20:26	16	60-90: Broken / heavy clouds	0: Still	Dry	IR camera (paired with Static detector)	T37
End:	22:18	13	100: Overcast	0: Still	Drizzle		
20/09/2023	**Sunset:**	**19:34**					
Start:	19:20	12	10: Few clouds	0: Still	Dry	JH with IR Camera	T1
End:	21:25	11	0: Clear	1: Light air	Dry		

No bats were observed emerging from or entering into any features within trees surveyed. IR and thermal camera footage was analysed after the survey, and no bats were observed emerging or entering trees. To provide an indication of the span of the IR and thermal cameras, stills from the camera footage are presented in Plate 2. Stills were taken at the darkest time of the survey.

Plate 3: Stills from IR and thermal cameras.

a) T37 - 29/06/2023

b) T37 - 27/07/2023

c) T1 - 27/07/2023

d) T1 - 20/09/2023

e) T1 - 27/07/2023

During the first emergence survey of T37, incidental surrounding activity included a high proportion of soprano pipistrelle registrations (75%), with the rest being common pipistrelle except for three Leisler's bat registrations. During the second survey of T37, soprano pipistrelle was the most frequently recorded species, with only a slightly lower proportion of common pipistrelle recorded. There was a much higher proportion (12%) of Leisler's bat, and small numbers of Nathusius' pipistrelle and brown-long eared bat. Likewise, during survey of T02 on the same night, soprano pipistrelle was the most frequently recorded, however, the proportion of Leisler's bat was even greater (29%), and similar small numbers of Nathusius' pipistrelle and brown long-eared bat were recorded, and Natterer's bat was also recorded.

During emergence surveys on the third and fourth visits, a similar number of soprano pipistrelle and common pipistrelles were recorded as part of incidental surrounding activity except for during the fourth survey, when common pipistrelle was the most frequently heard bat. Small numbers of Leisler's bat, brown long-eared and Nathusius' pipistrelle were also recorded.

4.3 Bat Activity Surveys

4.3.1 Transect Surveys

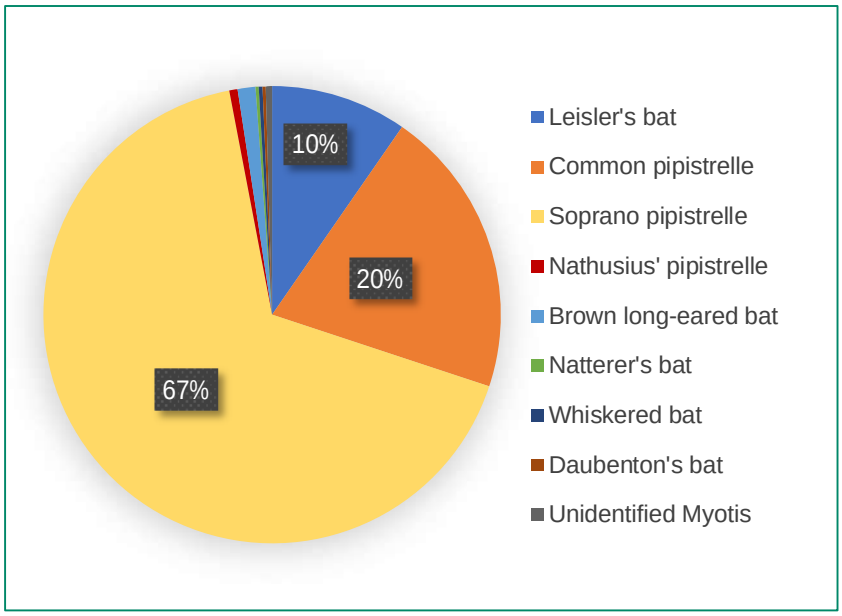
Transects were walked around the site on four occasions in 2023. Survey dates, weather conditions and start and end times are presented in Table 5. The transect routes walked and listening points are presented in Figures 2-5.

Table 5: Weather conditions recorded during activity surveys.

Time		Temperature (°C)	Cloud cover (%)	Wind description	Precipitation	Surveyors
29/06/2023	**Sunset:**	**22:05**				
Start:	22:00	13	60-90: Heavy/broken clouds	1: Light breeze	Dry	PD and EM (Transect 1)
End:	00:03	14	100: Overcast	2: Light air	Dry	
27/07/2023	**Sunset:**	**21:37**				
Start:	21:37	17	10 – 30: Few clouds	0: Still	Dry	SMa (Transect 1) JH and HF (Transect 2)
End:	23:53	15	40 – 50: Scattered clouds	1: Light breeze	Dry	
30/08/2023	**Sunset:**	**20:26**				
Start:	20:26	16	60-90: Broken / heavy clouds	0: Still	Dry	PD (Transect 1) SMcC (Transect 2) SMa and EM (Transect 3)
End:	22:18	13	100: Overcast	0: Still	Drizzle	
20/09/2023	**Sunset:**	**19:35**				
Start:	19:42	10	10 – 30: Few clouds	1: Light air	Dry	PL (Transect 2) EB and EM, (Transect 3)
End:	22:18	10	10 – 30: Few clouds	0: Still	Dry	

During transect surveys, eight bat species were recorded across all surveys: Leisler's bat, Nathusius' pipistrelle, common pipistrelle, soprano pipistrelle, brown long-eared, Natterer's bat, whiskered bat and Daubenton's bat. In total, 871 bat registrations were recorded, with soprano pipistrelle being the most frequently encountered species onsite with 583 registrations, representing 67% of all registrations, see Chart 1. Common pipistrelle was the second most recorded species, with 178 registrations, equating to 20% of all recordings. Leisler's bat was the third most recorded bat, accounting for 10% of registrations (n=84). Only small numbers of the other species were recorded, with 11 registrations for brown long-eared bat, 5 registrations of Nathusius' pipistrelle, and 2 registrations each for the three *Myotis* species. Four registrations of unidentified Myotis were also recorded. It must be noted that number of registrations does not equate to the number of bats present and provides an indication of bat activity to supplement the number of bats actually observed.

Chart 1: Proportion of bats (%) recorded within the site during transect surveys.



Overall activity levels were relatively high, with the majority of activity associated with woodland and linear features across the site such as hedgerows and treelines, although bats were occasionally recorded flying across fields, and also around some areas of hardstanding to the south of the school. Locations of bat activity are presented in Figures 2-5. Over half of all bat recordings were made on Transect 1, which is expected given the woodland, mature hedgerows and treelines which are predominant along this transect, see Chart 2. However, only two transects were carried out along T3 as these areas were added to the survey area later in the season and habitats were considered less suitable than T1, thus direct comparisons between transects cannot be made reliably.

Chart 2: Total number of registrations recorded along each transect.

Activity onsite was highest during the July survey which is likely due to the elevated number of Leisler's bat registrations recorded in July (n=66), compared to their very low numbers recorded during June (n=3), August (n=8) and September (n=7).

During the single June transect of T1, 159 bat registrations were recorded, the majority of which were from soprano pipistrelle (70%, n=111) and common pipistrelle (25%, n=40), see Chart 3. Very low numbers of Nathusius' pipistrelle, Leisler's bat, brown long-eared bat and Myotis species were also recorded, see Chart 4. Activity was largely recorded at the tree line along the northern site boundary, the hedgerow running southwards from the north of the site to just south of the school buildings, and at the woodland edge along the eastern site boundary. The two myotis bats registrations were recorded at this woodland in the east of the site and along the hedgerows south of the school.

During the two July transects of T1 and T2, a total of 290 registrations were recorded, with most of these from soprano pipistrelle (n=144), and similar numbers from common pipistrelle (n=69) and Leisler's bat (n=66), see Chart 3. Eight registrations of brown long-eared bat were also recorded, as well as two registrations of Nathusius' pipistrelle and a single registration of an unidentified Myotis, see Chart 4. Activity was relatively widespread, with most of the activity recorded at hedgerows immediately adjacent to the school buildings, and along the main access road leading to the school in the east of the site. Bats were recorded to a lesser extent along hedgerows in the south of Transect 2. Leisler's bats were recorded in various locations across the two transects, but mostly in the vicinity of the Cavan River in the southeast of the Transect 2. The brown long-eared bats were recorded along treelines and woodland edge along the eastern and northern site boundaries, with the exception of three registrations at hedgerows in the centre and west of the site.

During three transects walked in August, a total of 249 bat registrations were recorded, mostly from soprano pipistrelle (n=177), and common pipistrelle (n=51), see Chart 3. Greater bat activity was recorded in north and south of the site, particularly in the very north and east of the site, and along hedgerows bounding the three most southeast fields. Bat activity recorded in Transect 2 in the centre of the site was significantly lower than any other transect (n=37). Two Daubenton's bat registrations were recorded at the southeast boundary of the site (T3), two whiskered bat registrations were recorded at a hedgerow in the southwest of the site (T3), and single Natterer's bat was recorded at a hedgerow in the centre of the site (T2).

During the September visit, only Transect 2 and 3 were surveyed, however a similarly high number of soprano bats (n=151) were recorded, although low numbers of common pipistrelle (n=18) and Leisler's bat (n=7) were noted (see Chart 3), and no other species were recorded (see Chart 4). Bat activity was greater in the south of the site particularly along the northernmost hedgerow of Transect 3. Soprano pipistrelle dominated the activity in this location and they were frequently observed flying along the hedgerows.

Chart 3: Number of registrations recorded for the three most frequently recorded species across all transects.

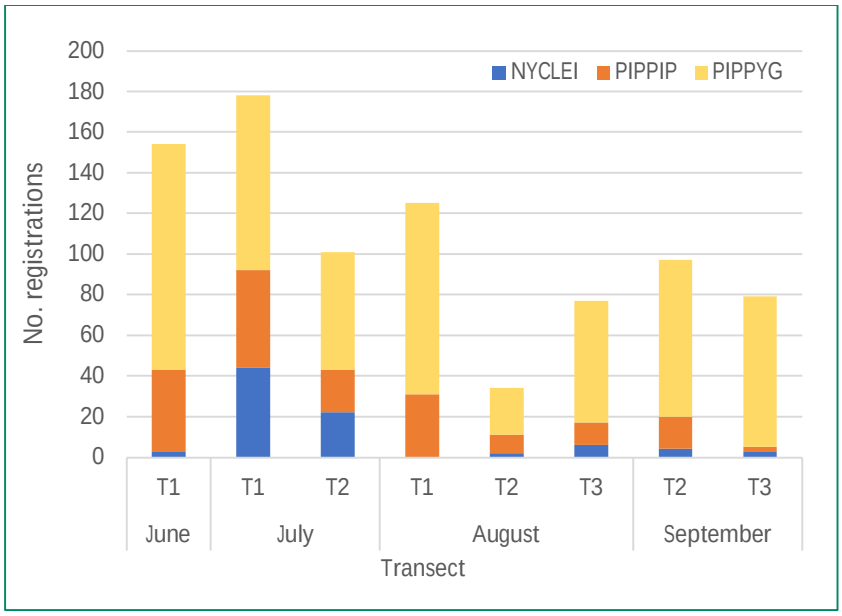
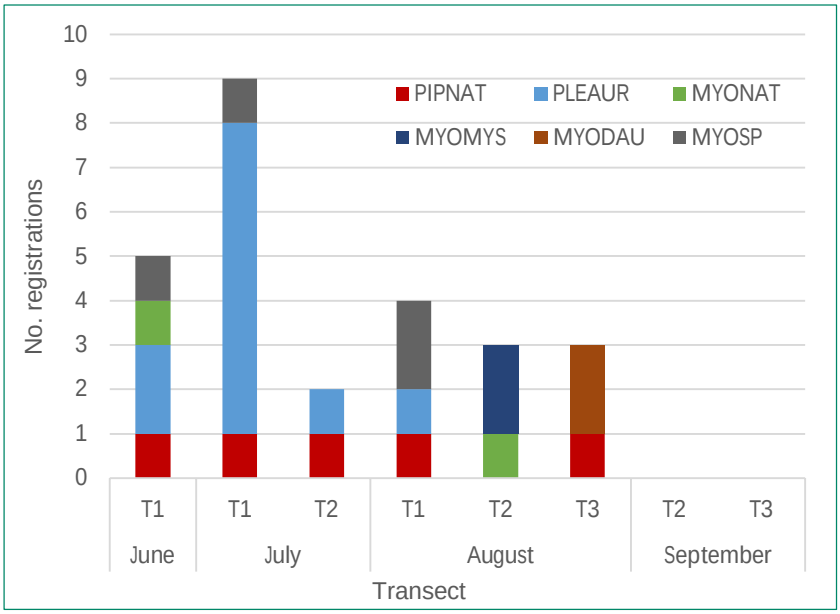


Chart 4: Number of registrations recorded for the less frequently recorded species across all transects.



Usage of the site by the different bat species was relatively variable, as shown by heat maps of recordings across all four survey visits (see Figures 6 – 8). The heat maps provide a better understanding of the geographical use of the site by the various bat species, rather than reflecting their use of the site over time by comparing between Transects which were subject to variable survey effort.

Brown long-eared were only recorded in the northern half of the site, and particularly in close proximity to the woodland and mature tree lines along the boundary, see Figure 6. All registrations of *Myotis* species were combined into a single group due to the small number of registrations. Myotis bats were recorded in the north of the site around the school, however the greatest proportion of *Myotis* bats were recorded along a hedgerow towards the south of the site, see Figure 6. Common pipistrelle activity was centred around woodland along the eastern boundary of the site, see Figure 7, and registrations of this species was noted to be particularly early, suggesting there may be a potential roost in this vicinity. The majority of soprano pipistrelles were recorded at the mature hedgerow in the south of the site, and to a lesser extent along the western and eastern boundaries at the same latitude as the school, see Figure 7. Nathusius' pipistrelle activity was spread evenly across central hedgerows and a hedgerow in the southeast of the site, see Figure 8. Leisler's bat activity was concentrated around the eastern site boundary immediately adjacent to the river, see Figure 8.

4.3.2 Static Detectors

Details of the deployment of static detectors are given in Table 6.

Table 6: Static detectors deployed at the site.

Date		Number of nights recording	Location
Start	End		
29/06/23	16/07/23	17	SD01
29/06/23	Cable disconnected (no data)	0	SD02
27/07/23	02/08/23	6	SD02
30/08/23	08/09/23	10	SD01

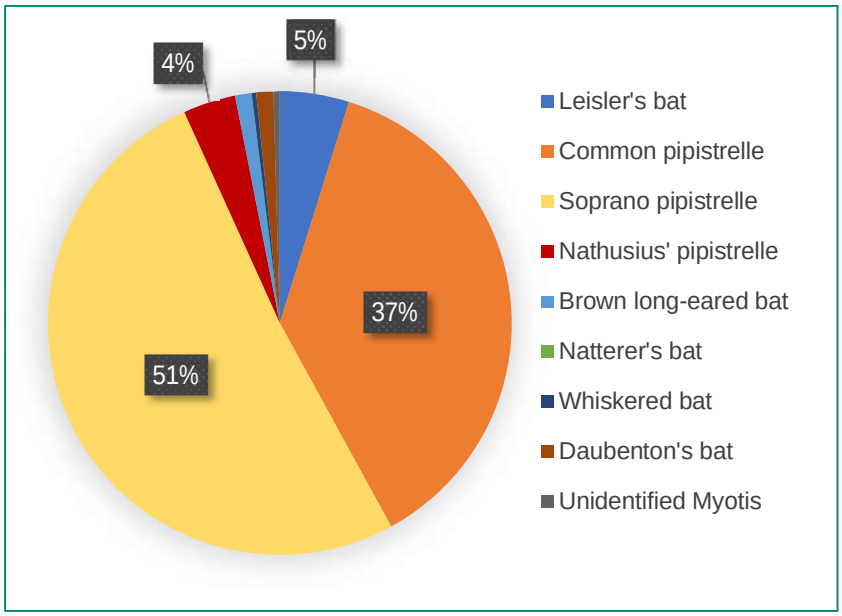
Over the total of 33 nights of static detectors recording bat activity at two locations, a total of 4354 bat registrations were recorded, of which 3760 registrations (86%) were recorded at SD01 in the north of the site. Approximately 65% of all registrations were recorded during the final deployment in August

(n=2848), while only 913 (21%) and 593 (14%) registrations were recorded in the June and July deployments, respectively, despite being deployed for a shorter period of time (10 nights) in the final deployment than the first deployment (17 nights).

Registrations per night at SD01 during the first deployment in June was 53.7, was 98.8 at SD02 in July/August, and was 284.7 at SD01 in August/September, demonstrating greatest activity levels at this detector location. There is some uncertainty as to the cause of this difference in activity level, however, given that rate of activity at SD01 was lower in June compared to SD02 in July, it appears that time of deployment is perhaps a greater factor than the specific location and weather conditions. Much higher activity during the latter part of the bat active season is perhaps due to the warmer temperatures and drier, more settled weather in early September, which are more suitable conditions for foraging.

Species recorded were the same as those as for the transect surveys, with registrations dominated by soprano pipistrelle (51.2%), slightly fewer common pipistrelle (37.2%), relatively low numbers of Leisler's bat (4.8%) and Nathusius' pipistrelle (3.7%), and even lower numbers of Daubenton's bat (1.2%), brown long-eared bat (1.2%), whiskered bat (0.3%), Natterer's bat (0.02%) and unidentified Myotis species (0.4%) see Chart 5.

Chart 5: Proportion (%) of bat species recorded by static detectors.



5. Discussion of Impacts and Recommendations

5.1 Overview of Surveys

The proposed development site consists primarily of improved grassland fields bordered by hedgerows and trees which provide connectivity to the wider rural landscape which consists of semi-improved grassland, woodland, hedgerows, treelines, streams, rivers and lakes.

The bat assemblage identified during this suite of surveys consisted of all species of bat found in Ireland except for lesser horseshoe bat which is generally restricted to the west coast. Soprano pipistrelle, and to a lesser extent common pipistrelle, were the most frequently occurring species recorded across all transect surveys and through static recording. A smaller proportion of Leisler's bat was recorded, while numbers of all other species were significantly lower. No evidence of roosting bats identified emerging from or entering into any of the trees surveyed during dusk emergence surveys, and no evidence of bats were noted during the endoscope surveys.

Generally, bat activity at the site was relatively high due to the abundance of suitable foraging and commuting features, namely woodland edge habitat, mature trees and hedgerows, and the Cavan River. During the transect surveys, most bats were recorded along Transect 1 in the north of the site, predominantly along woodland and mature tree lines to the east and north of the school, and along the mature hedgerow present to the west of the school and which runs to the north of the site. Bats recorded in Transects 2 and 3 were associated with hedgerows bounding the grassland fields. It is considered that activity was particularly low along Transect 3 given the level of light spill from the adjacent pitches and the Kingspan Breffni stadium.

The locations of greatest activity varied across species. Common pipistrelle and brown long-eared bat were predominantly recorded in the northeast of the site close the woodland and mature tree lines, whereas soprano pipistrelle, Nathusius' pipistrelle and *Myotis* species were recorded at various hedgerows across the site.

Static detectors recorded the same assemblage of species, although in different proportions compared to the transect surveys. The proportion of soprano pipistrelle and Leisler's bat registrations, 51% and 5%, respectively, was considerably lower than the proportions recorded during the transect surveys (67% and 10%, respectively). In contrast, a much larger proportion of common and Nathusius' pipistrelles were recorded by the static detectors, 37% and 4% respectively, compared to 20% and 0.6% recorded during transect surveys, respectively. Similar low proportions of the other species of bat were recorded, except for a relatively higher proportion of Daubenton's bat.

The static detector deployed in the woodland north of the school recorded significantly higher activity compared to the static detector at the Cavan River to the south of the school, both in terms of the number of registrations, and rate of activity reflected in the registrations per night which accounts for the variable survey effort i.e. the number of nights detector were deployed for. While there is a difference in the habitats between these two locations, greater activity in the north of the site is perhaps linked to more favourable weather conditions during the latter part of the active season which allowed for greater bat activity.

5.2 Potential Impacts of Development and Recommendations

5.2.1 Habitat loss and damage

To facilitate the proposed development the removal of numerous trees and treelines and approximately 1848m of hedgerow it required, as well as the loss of approximately 2075 m^2 of woodland. Several trees with High or Moderate suitability for roosting bats are present within the footprint of the proposed development. All of those which are to be removed (T1, T41), or have the potential to be impacted (T7, T37) by the proposed development were subject to further survey. No bats were observed emerging from or entering these trees, or not bat evidence was present. However, given the transient nature of tree roosts, pre-construction survey of these trees must be conducted immediately prior to felling to ensure roosting bats are absent. In addition, a further six trees with Low suitability are to be removed to facilitate the proposed development. While no further survey is required, these must be considered with regards to a loss of roosting resource within the site.

The removal of woodland, treelines and hedgerow will significantly reduce the availability of foraging habitat and remove important linear features likely to be used as commuting corridors. Loss of these features is likely to have a negative impact on the local bat population as although there is alternative habitat in the wider landscape, the hedgerows on site are clearly an important resource for bats, specifically for *Myotis sp.* and brown long-eared bats, and soprano pipistrelle which were most frequently recorded at the hedgerow in the south of the site, and Nathusius' pipistrelle which was typically recorded along central hedgerows.

The majority of habitat on site is improved grassland which is suboptimal for foraging bats, possibly due to lower densities of invertebrates (Walsh and Harris, 1996; Russ and Montgomery, 2002), and will be replaced in part by lower value habitats, namely amenity grassland of sports pitches, and artificial surfaces including 4G sports pitches, roads, and car parking. Removal of improved grassland will further reduce foraging habitat, especially for species such as Leisler's bat which is more likely to forage over grassland fields, although this is unlikely to be an important habitat in the wider context with woodland, scrub, lakes and rivers more likely to provide high value foraging opportunities for bats.

5.2.2 Lighting

Bats are known to rely on visual cues in addition to using echolocation for both foraging and commuting, and various studies have revealed that bat vision functions better in low light. Luminance can disrupt bat activity by interrupting vision. Being particularly sensitive to lighting, the use of powerful lighting on wildlife corridors can, for some species, effectively sever connectivity. Additional lighting of the site is likely to deter bats from using adjacent retained habitats, therefore, impacts of lighting on bats must be minimised both during construction and post development.

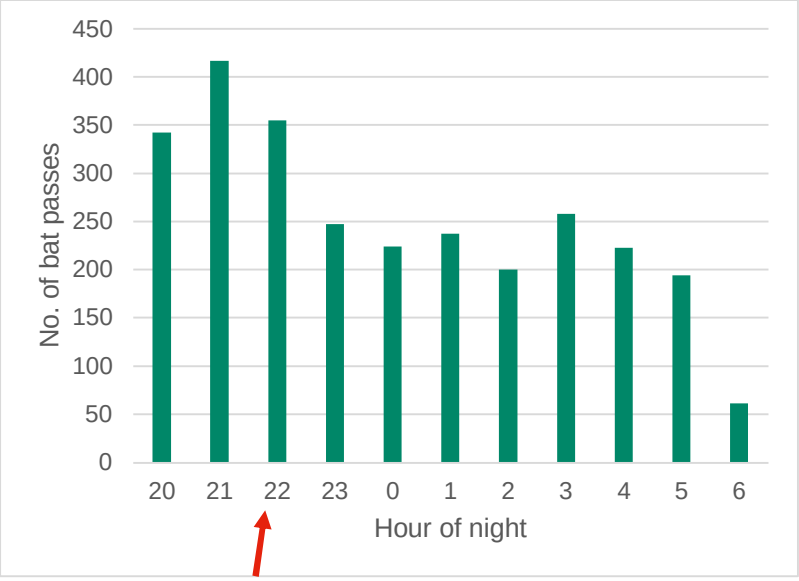
Light-sensitive bat species (i.e. *Myotis* species, brown long-eared bat) were recorded in the north east of site and a significant increase in the lighting of the site is likely to disturb or displace these species. The main hotspot of soprano pipistrelle was concentrated around the mature hedgerow in the south of the site, which according to plans will be immediately adjacent to two sport pitches. Although being less sensitive to lighting than other species of bat, bright illumination of these pitches is nonetheless likely to impact foraging and commuting soprano pipistrelle, and other more light tolerant bats. Of concern also is the potential impact of light spill on any potential bat roosts within the site, in trees of High and Moderate suitability in particular (T37, T7).

Whilst some habitats within the site are already subject to increased light levels, the new floodlighting of the additional sports pitches and proposed athletics track and hockey pitch, in addition to new road and pathway lighting will extend the area currently subject to lighting, and suitable foraging and commuting habitats which are relatively dark may be subject to increased lighting. Species such as the common and soprano pipistrelle and Leisler's bat, all light-tolerant species, were recorded foraging and commuting along the woodland adjacent to the existing GAA sport pitches. The light-sensitive species whiskered bat was also recorded adjacent to the existing pitch on only one occasion and after the lights had been switched off for the night.

The proposed roadway and pathway lighting is to be in use 24hrs a day year-round. While the proposed floodlighting will only be switched on whenever the sports pitch is in use. Bats begin periods of torpor and begin hibernating during October and November (weather dependent). Hibernation lasts until at least March, and bats usually only become fully active by May.

If in use all year, floodlighting would most likely impact bats between August and November, and March and May, when sunset is earlier. See Chart 6, which shows that at present during August bat activity peaked on site at 9pm, with activity tailing off after 10pm. There will likely therefore be disruption or displacement of bats using this site, in particular during these times of year in the absence of mitigation.

Chart 6: Number of bat passes per hour of the night during August static recordings (arrow indicates when floodlights likely switched off).



6. Mitigation

6.1 General Principles of Mitigation

All bats in Ireland are EPS and are subject to a system of strict protection and are therefore a material consideration during the planning process. All works are required to comply with legislation to minimise impacts on protected species when developing on sites where they are present.

Given the impacts outlined in the previous section, mitigation is required to reduce the impacts to bats within the site. Compliance with planning policy requires that the proposed development considers and engages the following mitigation hierarchy where there is potential for impacts on relevant ecological receptors.

1. **Avoidance** – seek options that avoid harm to ecological features (e.g. locating to an alternative site).
2. **Minimisation** – negative effects should be, if avoidance is not possible, through minimisation, either through design or subsequent measures that can be guaranteed (e.g. through a condition or planning obligation).
3. **Compensation** – where there are significant residual negative ecological effects despite the measures proposed, these should be offset by appropriate compensatory measures e.g. by providing suitable habitats elsewhere on the wider site.
4. **Enhancement** – seek to provide net benefits for biodiversity over and above requirements for avoidance, minimisation, or compensation.

This hierarchy requires the highest level to be applied where possible. Only where this cannot reasonably be adopted should lower levels be considered.

The mitigation presented in Section 6.2 is proposed to avoid and minimise impacts to bats due to the loss of foraging and commuting habitats, and from lighting during the construction and operational phases of the proposed development.

6.2 Standard Bat Mitigation Advice

6.2.1 General Good Practice

Bats were recorded foraging and commuting across the site. Where bats are present on or near a site, the following mitigation measures should be applied as a minimum:

- Retain all roosting sites and foraging corridors.
- Retain lines of mature vegetation (e.g. hedgerows), water features and areas of woodland habitat.
- Ensure that lighting does not illuminate habitat features or any bat roosts in the area.
- Plant native species of trees and shrubs to provide foraging habitat and to help retain connections with the existing lines of trees and hedgerows in the surrounding area.
- All watercourses should be retained as a wildlife corridor; additional planting of native trees will provide a dark corridor for foraging bats.

6.3 Specific Mitigation Measures

6.3.1 Pre-construction surveys

Following best practice guidelines (Colins, 2023), prior to felling, all trees identified as having High and Moderate suitability for bats will require further survey to ensure that removal of this tree will not impact roosting bats. This can be either emergence surveys or an endoscope survey (were appropriate) May and September. Trees categorised as Low do does not require further survey but must be retained where possible.

If any of the trees have confirmed roosts, appropriate licencing must be applied for with the assistance of a licenced bat specialist to the NPWS.

Furthermore, an Ecological Clerk of Works (EcoW) must also advise on any required mitigation measures and oversee any mitigation implementation in advance of the commencement of works. Mitigation measures regarding the felling of these trees may include specific timing requirements (i.e., confirmed roosts to be demolished outside of the maternity season, May to August) and the erection bat boxes to mitigate for the loss of roosting bat habitat. The number and types of bat boxes will be determined by the ECoW and implemented prior to felling.

6.3.2 Planting

A Biodiversity Strategy has been prepared for the proposed development which outlines the existing boundary vegetation to be retained and outlining a planting scheme (McIlwaine Landscape Architects, 2024, CSC-MLA-XX-00-DR-L-2001, supplied by the client). This includes the creation of wildlife compensation area to the west of the proposed sports building, arena and multi-sport pitch, to include areas of woodland stepping stones with clearings, marginal native shrubs and species rich grassland / meadow habitats. The translocation of approximately 100 – 200m of hedgerow/scrub habitat along the margins of the wildlife compensation area. A badger commuting corridor is proposed, planted with stepping stones of woodland, marginal native shrubs, and species rich grassland / meadow habitats between the created woodland in the west of the site and the Cavan River. The existing planting along the Cavan River is to be enhanced with additional native species of tree and shrub.

A wildlife garden is to be created to the east of the GAA fields and will be managed by the GAA club. Elsewhere between the proposed pitches and on the margins of the site, species rich grassland and meadow habitats will be planted, and specimen trees will be planted across the site, mainly native species, with non-native confided to areas along avenues for greater amenity value.

It is proposed that the species planted are to be of local provenance and pollinator friendly in the case of the amenity planting areas. These new habitats will provide habitat for invertebrate species and, in turn, provide more foraging opportunities for the local bat population. These will in part provide some level of shielding from the potential impact of lighting on the site.

6.3.3 Lighting

Bats are known to rely on visual clues in addition to using echolocation for both commuting and foraging, and various studies have revealed that bat vision functions better in low light. Luminance can disrupt bat activity by interrupting vision.

Significant lighting of the proposed sports pitches across the site and associated road and pathways will likely have impacts on bats during the operational phase. In addition, construction phase lighting has the potential to impact bats for its duration.

In the absence of mitigation, during both the construction and operation of the pitches lighting will lead to light spill on natural habitat features, including hedgerows, treelines, and the river used by commuting and foraging bats, and potentially roosting bats in trees with suitable PRFs or in the artificial bat roosts provided. The following mitigation recommended by the Bats and Artificial Lighting at Night, Guidance Note, 08/23 (BCT & ILP, 2023) must be adhered to during construction:

- Lighting, particularly floodlighting, must be minimised wherever possible in terms of number of lights and particularly in terms the power of the lights (lux level). LED lighting should be used where possible, and metal halide compact fluorescent sources should not be used;
- Light spill must be minimised on retained or created habitat features (e.g., treelines, hedgerow, and the river), and any artificial roosts which may be erected as compensation and must not be subject to light spill greater than one lux.
- Directional lighting, facing away from surrounding vegetation should be used. This avoidance is particularly relevant to other mature trees on or adjacent to the site. Accessories such as baffles, hoods, or louvres can be used to further reduce light spill and direct light only where it is required.
- A warm white light source (2700 Kelvin or lower) should be adopted to reduce blue light component.

- Light sources should feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats (Stone, 2012).
- Lighting must be turned off when not in use except to meet the minimum requirements for Health and Safety. If required, security lighting should be set on motion-sensors and short timers (e.g. one minute).

During operation the illumination plans for the proposed development show that the proposed luminaires will be LED and directional to reduce light spill, and time clock controlled. The proposed roadway lighting will be < 2700°K with a peak wavelength higher than 500nm, in line with recommendations from the Bats and Artificial Lighting at Night, Guidance Note, 08/23 (BCT & ILP, 2023). As will the proposed pathway lighting along the western and northern boundaries of the site, which will be dark sky compliant, providing 1 lux light levels along the centre of the path.

The floodlighting for the GAA pitches, multi sports pitch, hockey pitch and athletics track must be turned off when not in use. This lighting has a greater potential to impact upon bats using this site, given the height of the proposed luminaires (up to 18m), and the light levels required for health and safety reasons around sporting pitches.

The current timetable of use for the GAA pitches and multi-sports pitch is Monday to Sunday, from 9am-10pm throughout the year, though unlikely to exceed 10pm. The south of the site, where the four GAA pitches are proposed had lower bat activity than the north and east of the site, having less mature hedgerows and already being impacted by adjacent light spill. The light spill diagrams indicate that the light spill will drop off beyond the lower car park, while topography and proposed planting will reduce the light spill from the GAA pitches on the proposed wildlife compensation area to the north. The floodlighting on the multi-sports pitch when in use would illuminate the southern end of the wildlife compensation area, though the majority of this area will remain close to 0 lux. It is likely that when in operation the GAA pitch and multi-sports pitch floodlights will disturb and displace bats, though only likely during the early spring (March to May) and late summer (August – November) when dusk is earlier. It is not anticipated that the increase in light spill as a result of these pitches to the south and centre of the site will have a significant impact on local bat populations.

However, the boundary vegetation to the north and east of the site around the athletics track and the hockey pitch is used by greater numbers and a greater diversity of species of bats, including light intolerant ones including *Myotis* and *Plecotus spp*. In the absence of mitigation this boundary vegetation could experience light spill around 4 lux up to approximately 30/40m from the proposed luminaries, which could impact bats during the early spring, late summer. Including T37 categorised as having PRFs suitable for roosting bats would experience light spill exceeding 1 lux. To mitigate the impact of light spill at this northern section of the proposed development, for the athletics track and hockey pitch will have a curfew of 9pm during March to May, and August to September. This will reduce the likely impact of light spill on bats during these early active times in the season, and will help ensure the north of wildlife compensation area remains largely unlit during early evenings year round.

The proposed new car parking spaces to the upper and central sections of the site will be lit to an average of approximately 11 lux, as will the central access road, which cuts across the Cavan River to access the site from the R212.This road will be lit 24 hours a day and will lead to light spill above 1 lux onto the riparian corridor along the Cavan River. However, given the proposed luminaire specification, including LED, < 2700°K with a peak wavelength higher than 500nm, and proposed enhancement planting this is not anticipated to be significant.

T7 on the edge of the upper car park as illustrated on the illumination plan will not exceed light spill of more than 1 lux when these lights are in operation.

7. Summary

AECOM was commissioned to carry out a suite of bat surveys to inform a proposed sports complex in Cavan, Co. Louth. A summary of the findings is presented below:

- A Ground Level Tree Assessment (GLTA) identified six trees as having High or Moderate suitability for roosting bats, all of which will be directly impacted by the proposed development.
- Emergence surveys of these five trees between June and August 2023 did not identify any bat roosts.
- Four activity transect surveys and the deployment of static bat detectors was carried out monthly across the site between June and August 2023.
- Eight bat species were recorded foraging in and commuting through the site: common pipistrelle, soprano pipistrelle, Nathusius' pipistrelle, Leisler's bat, brown long-eared bat, Natterer's bat, whiskered bat, and Daubenton's bat. Bats were predominantly recorded using linear features such as mature treelines and hedgerows, with light sensitive species only recorded to the northeast of the site which is currently subject to lower light spill.
- Pre-construction surveys are prescribed for the four trees identified as having Moderate or High suitability for roosting bats. If any of the trees have confirmed roosts, appropriate licencing must be applied for with the assistance of a licenced bat specialist to the NPWS.
- The majority of habitat loss will be to improved grassland, however, trees and treelines, and approximately 1848 m of hedgerows, and 2075 m^2 of woodland will be removed to facilitate the proposed development. However, most boundary vegetation will be retained, 100 – 200m of hedgerow will be translocated and boundary vegetation will be enhanced with the planting of an area of woodland, specimen trees and the planting of native shrubs, and species rich grassland / meadow throughout the site.
- Mitigation is prescribed to reduce light spill on features used by bats during the construction phase. During operation, given the luminaire specifications for the roadway, car park and pathway lighting, and the proposed curfewed timing of floodlighting to the north of the site, at the athletics track and hockey pitch, impacts to bats from lighting are expected to be limited to sections of the site, and short windows of the year.

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9. Figures

Aerial Imagery Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.

Title:	Trees surveyed during Preliminary Roost Assessment
Project:	Cavan Sports Complex
Figure No.:	1
Client:	McAdam ENHANCING LOCAL COMMUNITIES

Project No.:	60711314
Date:	December 2023
Drawn By:	EF
Checked By:	PL
Approved By:	PL

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Tel: 028 9060 7200

Title:	Transect survey results - Visit 1 - June
Project:	Cavan Sports Complex
Figure No.:	2
Client:	McAdam ENHANCING LOCAL COMMUNITIES

Project No.:	60711314
Date:	December 2023
Drawn By:	EF
Checked By:	JH
Approved By:	PL

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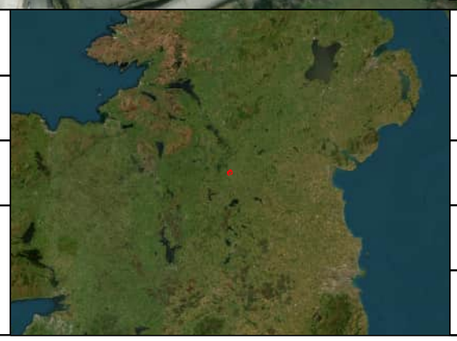
Tel: 028 9060 7200

Title:	Transect survey results - Visit 2 - July
Project:	Cavan Sports Complex
Figure No.:	3
Client:	McAdam ENHANCING LOCAL COMMUNITIES



Project No.:	60711314
Date:	December 2023
Drawn By:	EF
Checked By:	JH
Approved By:	PL

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Title:	Transect survey results - Visit 3 - August
Project:	Cavan Sports Complex
Figure No.:	4
Client:	McAdam ENHANCING LOCAL COMMUNITIES

Project No.:	60711314
Date:	December 2023
Drawn By:	EF
Checked By:	JH
Approved By:	PL

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Title:	Transect survey results - Visit 4 - September
Project:	Cavan Sports Complex
Figure No.:	5
Client:	McAdam ENHANCING LOCAL COMMUNITIES

Project No.:	60711314
Date:	December 2023
Drawn By:	EF
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Tel: 028 9060 7200

Title:	Heat maps of bat activity - Brown long-eared bat and Myotis species
Project:	Cavan Sports Complex
Figure No.:	6
Client:	McAdam ENHANCING LOCAL COMMUNITIES

Project No.:	60711314
Date:	December 2023
Drawn By:	EF
Checked By:	JH
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Title:	Heat maps of bat activity - Common and Soprano pipistrelle
Project:	Cavan Sports Complex
Figure No.:	7
Client:	McAdam ENHANCING LOCAL COMMUNITIES

Project No.:	60711314
Date:	December 2023
Drawn By:	EF
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Title:	Heat maps of bat activity - Nathusius' pipistrelle and Leisler's bat
Project:	Cavan Sports Complex
Figure No.:	8
Client:	McAdam ENHANCING LOCAL COMMUNITIES

Project No.:	60711314
Date:	December 2023
Drawn By:	EF
Checked By:	JH
Approved By:	PL

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Appendix A Photographs of trees with Low or Negligible suitability

4 (Photo from MCL) - Negligible

5 (Photo from MCL) - Negligible

11 - Negligible

13 - Low

14 - Negligible

15 - Negligible

18 - Negligible

21 - Negligible

23 - Low

25 - Low

27 - Low

28 - Low

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