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Marine & Environmental Consultancy

Bat Fauna Impact Assessment for a Proposed Development at Lucan Community College, Esker Drive, Lucan, Co. Dublin.

13th October 2022

Prepared by: Bryan Deegan (MCIEEM) of Altemar Ltd.
On behalf of: Dublin and Dun Laoghaire Education Training Board.

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Document Control Sheet			
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Report	Bat Fauna Impact Assessment		
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SUMMARY

Structure:	The site consists of the existing school which it is proposed to extend.
Location:	Lucan Community College, Esker Drive, Lucan, Co. Dublin
Bat species present:	Within the school site foraging activity of a single brown Long-eared Bat (*Plecotus auritus*) was briefly noted. In addition, a Lesser Noctule (*Nyctalus leisleri*) and two Soprano Pipistrelle (*Pipistrellus pygmaeus*) were also noted. No bats were observed emerging from onsite trees or structures proximate to the subject site. Activity was concentrated to the east of the treeline located to the south east of the school, which is to be removed, and the woodland belt which is to be retained. Lesser Noctule (*Nyctalus leisleri*) and Soprano Pipistrelle (*Pipistrellus pygmaeus*) activity was also noted in Griffith Park. The woodland belt on site would be seen a key feature to foraging activity on site.
Proposed work:	Proposed re-development and extension of school.
Impact on bats:	Bat surveys for bat usage were carried out across the entire school site and immediately adjoining sites to assess roosting and feeding/foraging activities. In addition, an internal inspection of the school for roosting areas was assessed. No evidence of bats roosting were noted within the existing school. No bats were noted emerging from the existing school building. No bats were observed emerging from trees on site. No trees of bat roosting potential are noted on site. No derogation licence or consultation with NPWS is required for the proposed redevelopment of the school building.
.	The lighting plan has been designed to comply with bat lighting guidelines in consultation with Altemar. However, foraging activity on site may be reduced in the short-medium term until the landscaping matures. The proposed development is not in proximity to sensitive bat areas. It should be noted that the proposed development and school is adjacent to Grifeen Valley Park, Lucan Harriers, Weston Park Hockey Club which all contain flood lighting which spills into the proposed development site. These lights were off during the assessment. The lights on Esker Drive did spill into the site. The proposed development will result in the removal of treelines on site which would result in a short to medium term reduction in foraging. In addition, the foraging area on site will be reduced. However, the retention of the woodland belt and replanting of treelines would be seen to be of paramount importance to the retention of foraging on site. No significant impact is foreseen in relation to bats from the proposed development. The potential for collision risk and impact on flight paths in relation to bats is considered is considered low due to the low level of bat activity on site and the buildings would be deemed to be clearly visible to bats.
Survey by:	Bryan Deegan MCIEEM
Survey dates:	12th September 2022, 13th September 2022

Receiving Environment

Background

This Bat Survey has been prepared in response to a formal Schedule of Conditions issued by South Dublin County Council on 15th March 2022 (Decision Order Number: 0589) as part of the Grant of Permission of Planning Ref. **SD22A/0078**.

Specifically, the Schedule of Conditions requests the following:

'*6. Bat Survey.*

Prior to the commencement of development, the applicant/developer shall lodge for the written agreement of the Planning Authority a bat survey for bat usage carried out across the entire site and immediately adjoining sites to assess roosting and feeding/foraging activities and assessing potential impact on these species arising from the proposed development. No building, structure, feature or tree/hedgerow shall be altered, destroyed or removed prior to this assessment. The survey shall be undertaken by a qualified and experienced bat surveyor carrying professional indemnity insurance during the correct time of the year and under the weather conditions appropriate for a survey of such species.

If bats are found to be present on the site or the immediately adjoining sites no development shall take place until the necessary permission/derogation licence has been obtained from the National Parks & Wildlife Service. Any recommendations from the report shall be appropriately incorporated into the development.

***Reason:** In the interests of bat protection as any interference with protected species such as bats and disturbance or destruction of their roosting sites, in particular, is a prosecutable offence under the EU Habitats Directive and S.I. No. 477 of 2011 (European Communities (Birds And Natural Habitats) Regulations 2011).*'

The proposed development consists of the following:

Alterations to the existing single storey school building and the building linked two storey extension to the south and east. The proposed development includes the creation of a new vehicular entrance off Esker Drive with the existing entrance becoming exit only; minor alterations to the elevations and arrangements of functions to the existing single storey school building; the construction of a new one and two storey extension of 5620sq.m to accommodate a Special Education Needs Unit; a PE hall; teaching spaces and associated ancillary functions; the temporary relocation of one existing pre-fabricated building during the construction works; the removal of all pre-fabricated buildings upon completion; the provision of a temporary car parking during construction; the provision of 92 permanent car park spaces and 200 bicycles spaces; the revision of the site layout to now include 6 ball courts; a secure play area for the SEN unit; and the creation of 2 secure pedestrian gates linking the school lands to the adjacent local authority park land and playing fields.

The proposed site outline, location, and layout plan are demonstrated in Figures 1 & 2.

Landscape

The landscape strategy for the proposed development has been prepared by Dermot Foley Landscape Architects to accompany this planning application. The proposed overall landscape plan is demonstrated in Figure 3.

Figure 1. Outline of proposed site.

Figure 2. Site layout plan

Figure 3. Proposed overall landscape plan.

Arborist

An Arboriculture Report has been prepared by The Tree File Ltd. to accompany this planning application. This report outlines the following impact assessment of the proposed development:

'*The expected tree impacts have been represented graphically on the tree impacts drawing "**Lucan Community College Tree Impacts Plan"** and within the narrative of this report. This drawing combines the tree constraints plan information with the current stage development details, including the architectural and services layouts below, thereby allowing for simple direct comparisons between the existing site context and the development proposals regarding new structures.*

In this drawing, trees denoted with "Broken Pink" crown outlines are to be removed, and those denoted with "Continuous Green" crown outlines are to be retained.

Detail of the development proposals where gained from drawings provided by-

- *Wejchert Architects- Architectural Design*
- *Donnachadh O' Brien & Associates Consulting Engineers Ltd – Drainage and Engineering information overlaid on Masterplan*
- *Dermot Foley Landscape Architects*

The evaluation is primarily based on minimum protection ranges as defined in paragraphs 4.6.1, 4.6.2 and 4.6.3 of BS5837:2012. Any structure, action or apparent need to enter or otherwise disturb/convert the "root protection area" of a site tree has been considered likely to have a negative impact, with the potential to render a tree wholly unsuitable for retention, unsafe or unsustainable.

Where applicable, this assessment attempts to consider both direct and indirect implications. The assessment is based on perceived construction requirements and how a tree will likely interact with the development. The assessment appreciates issues including growth, hazard development, light blockage and other social concerns regarding the changing context, including its effect on tree amenity value.'

The tree constraints plan, tree impacts plan, and tree protection plan are demonstrated in Figures 4- 6.

Lighting

A lighting strategy has been prepared by Building Design Partnership Ltd. to accompany this planning application. The proposed site services layout, which demonstrates the location of the proposed LED light street fittings, is demonstrated in Figure 7. The spill from proposed lighting is seen in Figure 8. Lighting was carried out in consultation with Altemar Limited. Lighting in the exterior of the building will be in compliance with bat lighting guidance at 3000^{o}K. Light spill on site is minimised and will allow for bats to continue to forage on site. It should be noted however, that the proposed development and school is adjacent to Grifeen Valley Park, Lucan Harriers, Weston Park Hockey Club and Esker Drive which all contain lighting which spills into the proposed development site.

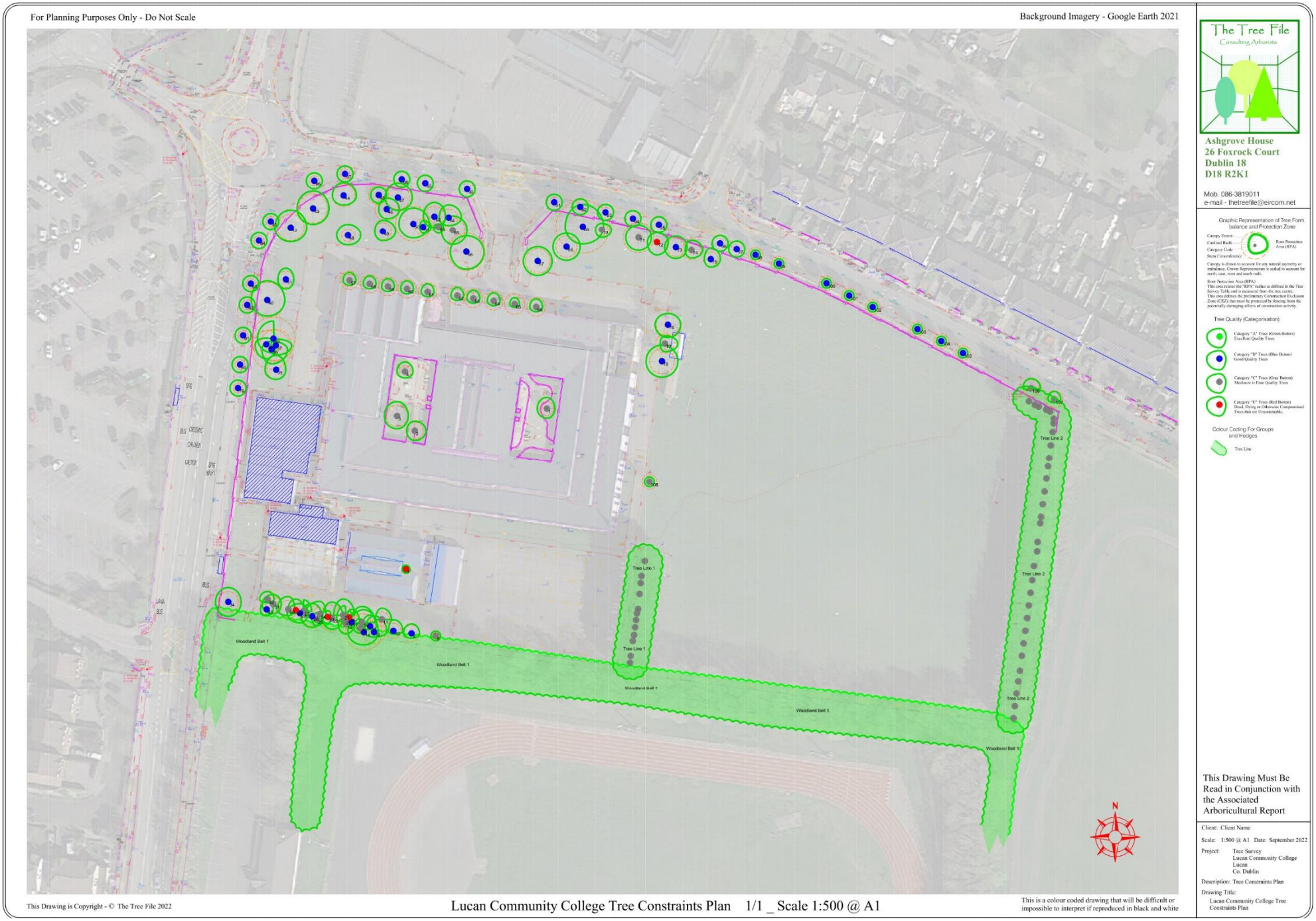

Figure 4. Tree constraints plan

Figure 5. Tree impacts plan

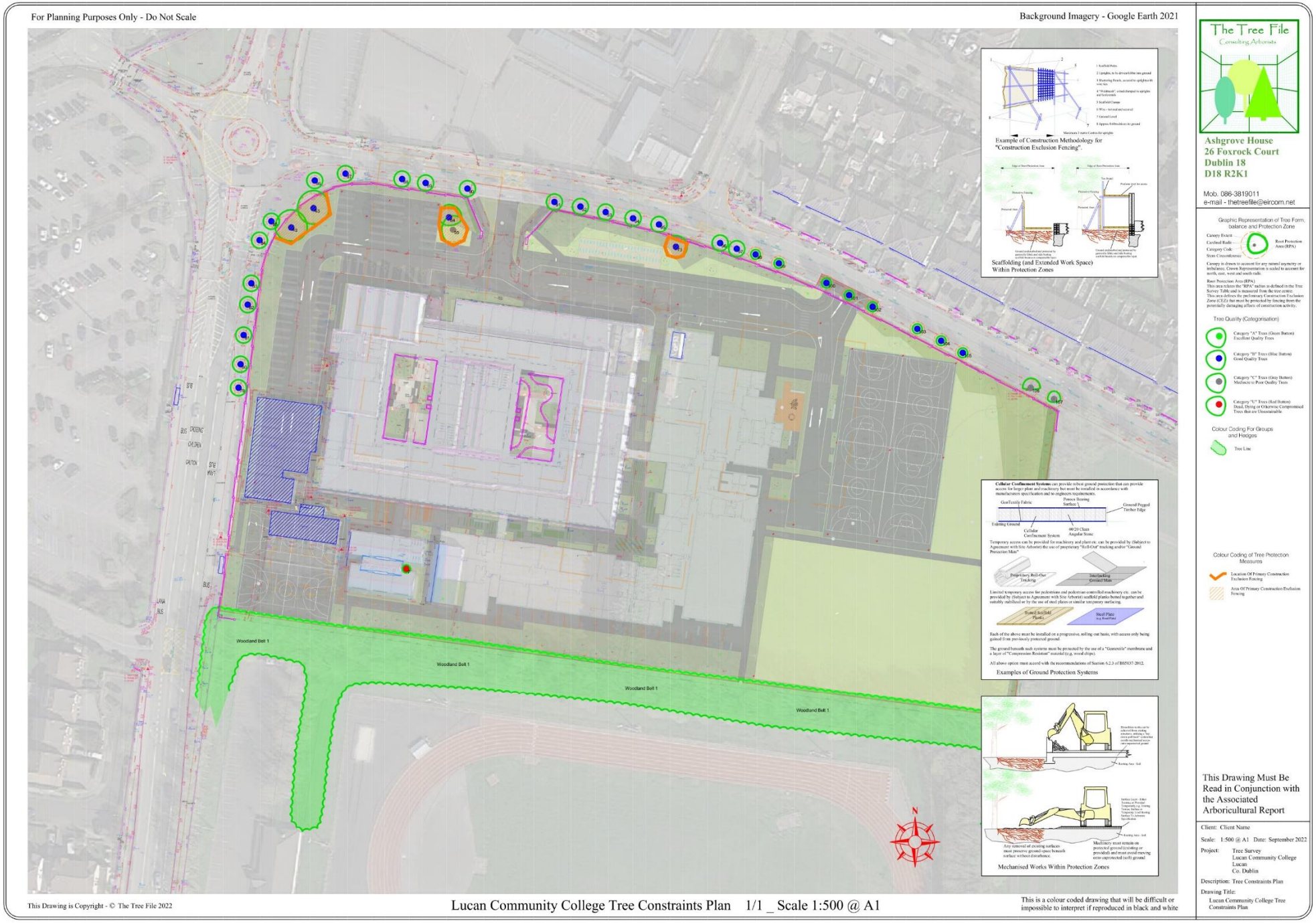

Figure 6. Tree protection plan

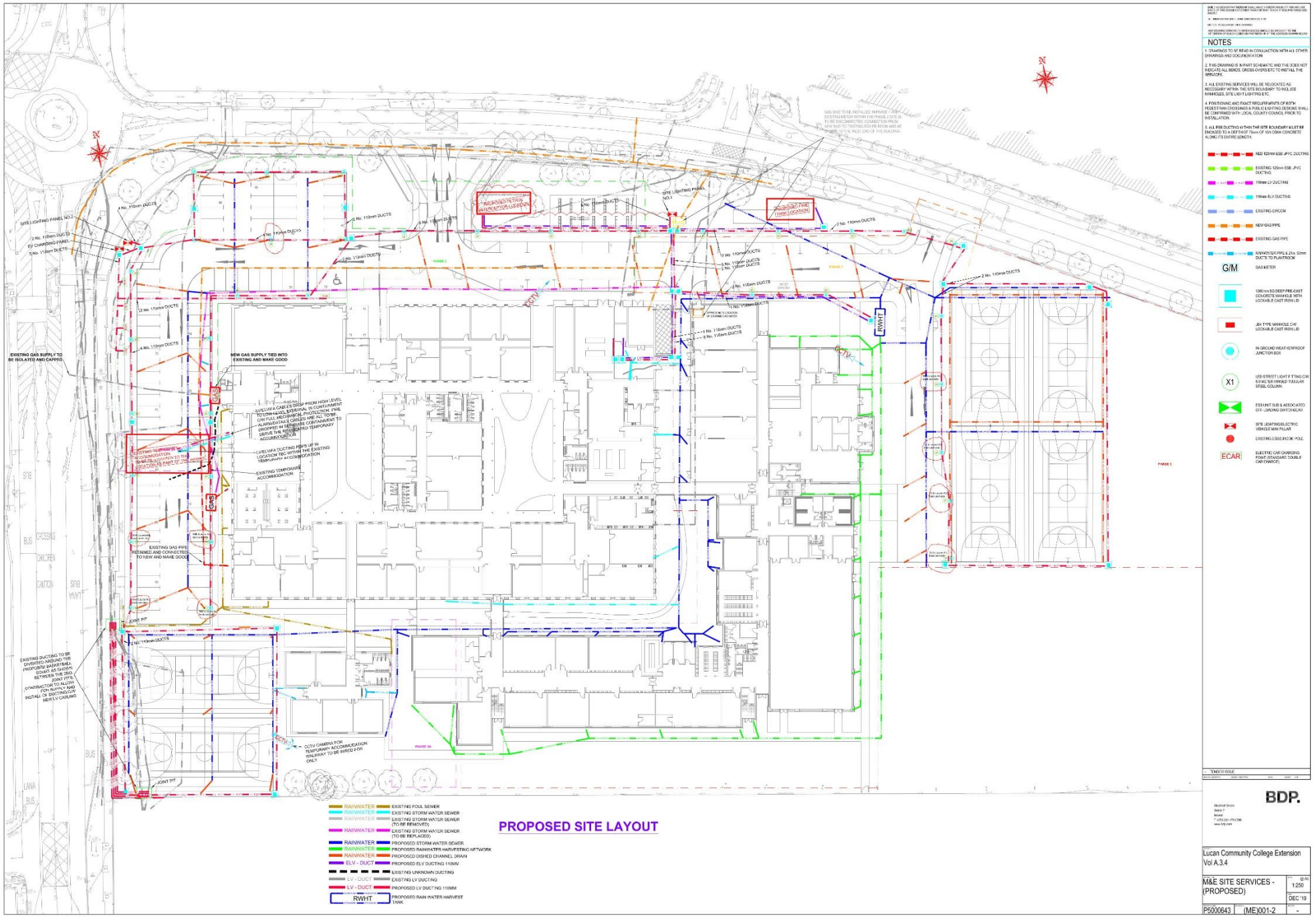

Figure 7. Proposed site services

Figure 8. Predicted Light spill.

Competency of Assessor

This report has been prepared by Bryan Deegan MSc, BSc (MCIEEM). Bryan has over 26 years of experience providing ecological consultancy services in Ireland. He has extensive experience in carrying out a wide range of bat surveys including dusk emergence, dawn re-entry and static detector surveys. He also has extensive experience reducing the potential impact of projects that involve external lighting on Bats. Bryan trained with Conor Kelleher author of the Bat Mitigation Guidelines for Ireland (Kelleher and Marnell (2022)) and Bryan is currently providing bat ecology (impact assessment and enhancement) services to Dun Laoghaire Rathdown County Council primarily on the Shanganagh Park Masterplan. The desk and field surveys were carried out having regard to the guidance: Bat Surveys for Professional Ecologists – Good Practice Guidelines 3rd Edition (Collins, J. (Ed.) 2016) and Marnell, Kelleher and Mullen (2022), Bat Mitigation Guidelines for Ireland V2 (which update and replace the Bat Mitigation Guidelines for Ireland published in 2006).

Legislative Context

Wildlife Act 1976 (as amended by, inter alia, the Wildlife (Amendment) Act 2000).

Bats in Ireland are protected by the Wildlife (Amendment) Act 2000. Based on this legislation it is an offence to wilfully interfere with or destroy the breeding or resting place of any species of bat. Under this legislation it is an offence to "*Intentionally kill, injure or take a bat, possess or control any live or dead specimen or anything derived from a bat, wilfully interfere with any structure or place used for breeding or resting by a bat, wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose. "*

Habitats Directive- Council Directive 92/43/EEC 1992 on the conservation of natural habitats and of wild fauna and flora has been transposed into Irish Law, including, via, *inter alia*, the European Communities

(Birds and Natural Habitats) Regulations 2011 (as amended). See Art.73 of the 2011 Regulations which revokes the 1997 Regulations.

Annex II of the Council Directive 92/43/EEC 1992 on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) lists animal and plant species of Community interest, the conservation of which requires the designation of Special Areas of Conservation (SACs); Annex IV lists animal and plant species of Community interest in need of strict protection. All bat species in Ireland are listed on Annex IV of the Directive, while the Lesser Horseshoe Bat (*Rhinolophus hipposideros*) is protected under Annex II which related to the designation of Special Areas of Conservation for a species.

Under the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended), all bat species are listed under the First Schedule and, pursuant to, *inter alia*, Part 6 and Regulation 51, it is an offence to:

- Deliberately capture or kill a bat;
- Deliberately disturb a bat particularly during the period of breeding, hibernating or migrating;
- Damage or destroy a breeding site or resting place of a bat;
- Keep, sell, transport, exchange, offer for sale or offer for exchange any bat taken in the wild.

Bat survey

This report presents the results of site visits by Bryan Deegan (MCIEEM) on the 12th September 2022 and the 13th September 2022. Inspections of the buildings was carried out on the 12th September 2022. Bat emergent and detector survey were carried out on the 12th September 2022 (within college grounds) and the 13th September 2022 within Grifeen Park. Trees and buildings on site were examined for bat roosting potential.

Survey methodology

As outlined in Marnell et al. 2022 '*The presence of a large maternity roost can normally be determined on a single visit at any time of year, provided that the entire structure is accessible and that any signs of bats have not been removed by others. However, most roosts are less obvious. A visit during the summer or autumn has the advantage that bats may be seen or heard. Buildings (which for this definition exclude cellars and other underground structures) are rarely used for hibernation alone, so droppings deposited by active bats provide the best clues. Roosts of species which habitually enter roof voids are probably the easiest to detect as the droppings will normally be readily visible. Roosts of crevice-dwelling species may require careful searching and, in some situations, the opening up of otherwise inaccessible areas. If this is not possible, best judgement might have to be used and a precautionary approach adopted. Roosts used by a small number of bats, as opposed to large maternity sites, can be particularly difficult to detect and may require extensive searching backed up by bat detector surveys (including static detectors) or emergence counts.'* In relation to the factors influencing survey results the guidelines outlines the following *'During the winter, bats will move around to find sites that present the optimum environmental conditions for their age, sex and bodyweight and some species will only be found in underground sites when the weather is particularly cold. During the summer, bats may be reluctant to leave their roost during heavy rain or when the temperature is unseasonably low, so exit counts should record the conditions under which they were made. Similarly, there may be times when females with young do not emerge at all or emerge only briefly and return while other bats are still emerging thus confusing the count. Within roosts, bats will move around according to the temperature and may or may not be visible on any particular visit. Bats also react to disturbance, so a survey the day after a disturbance event, may give a misleading picture of roost usage.'*

The survey involved the methodologies outlined in Collins (2016) which included the roost inspection methodologies i.e. external methodology outlined in section 5.2.4.1 and the internal survey outlines in section 5.2.4.2 of the guidelines. In addition, the methodologies for Presence absence surveys (Section 7) was carried out for dust emergent surveys.'

As outlined in Collins (2016) 'The bat active period is generally considered to be between April and October inclusive (although the season is likely to be shorter in northern latitudes). However, because bats wake up during mild conditions, bat activity can also be recorded during winter months.'

Survey Results

Trees as potential bat roosts.

A ground level roost assessment was carried and used to examine the trees on site for features that could form bat roosts. Potential roosting features include heavy ivy growth, broken limbs, areas of decay, vertical or horizontal cracks, cracks in bark etc. All trees on site were assessed. No bats, evidence of bats or bat roost were identified in any of the onsite trees. A derogation license or notification of NPWS is therefore not required for the removal of trees on site.

Buildings as potential bat roosts.

An internal and external assessment was carried out of all buildings on site. No evidence of bat roosting was noted within or external or internal inspection were noted. No bats, evidence of bats or a bat roost were identified in any of the onsite buildings. A derogation license is therefore not required for the re-development of buildings on site. There is no requirement to notify NPWS in relation to the redevelopment of the buildings on site.

Emergent/detector surveys.

The detector surveys were undertaken within the active bat season. Weather conditions were good with mild temperatures of 16^{o}C after sunset. Winds were light and there was no rainfall. Insects were observed in flight during both surveys.

As outlined in Collins (2016) in relation to weather conditions '*The aim should be to carry out surveys in conditions that are close to optimal (sunset temperature 10^{o}C or above, no rain or strong wind.), particularly when only one survey is planned…. Where surveys are carried out when the temperature at sunset is below 10^{o}C should be justified by the ecologist and the effect on bat behaviour considered.*' There were no constraints in relation to the surveys carried out. All areas of the site were accessible and weather conditions were optimal for bat assessments.

At dusk, bat detector surveys were carried out onsite and in Griffith Park using a*n Echo meter touch 2 Pro* detector to determine bat activity. Bats were identified by their ultrasonic calls coupled with behavioural and flight observations.

Within the school site foraging activity of a single brown Long-eared Bat (*Plecotus auritus*) was briefly noted. In addition, a Lesser Noctule (*Nyctalus leisleri*) and two Soprano Pipistrelle (*Pipistrellus pygmaeus*) were also noted. No bats were observed emerging from onsite trees or structures proximate to the subject site. Activity was concentrated to the east of the treeline located to the south east of the school, which is to be removed, and the woodland belt which is to be retained. Lesser Noctule (*Nyctalus leisleri*) and Soprano Pipistrelle (*Pipistrellus pygmaeus*) activity was also noted in Griffith Park. The woodland belt on site would be seen a key feature to foraging activity on site.

Bat Assessment Findings

Review of local bat records

The review of existing bat records (sourced from Bat Conservation Ireland's National Bat Records Database) within a 2km^2 grid (Reference grid O03H) encompassing the study area reveals that five of the nine known Irish species have been observed locally (Table 1). The National Biodiversity Data Centre's online viewer was consulted in order to determine whether there have been recorded bat sightings in the wider area. The following species were noted in the wider area: Daubenton's Bat (*Myotis daubentonii*), Brown Long-eared Bat (*Plecotus auritus*), Natterer's Bat (*Myotis nattereri*), Lesser Noctule (*Nyctalus leisleri*), and Soprano Pipistrelle (*Pipistrellus pygmaeus*) (Figures 8 - 10).

Table 1: *Status of bat species within a 2km^2 grid encompassing the subject site (Reference no. O03H)*

Species name	Record count	Date of last record
Brown Long-eared Bat (*Plecotus auritus*)	2	28/04/2011
Daubenton's Bat (*Myotis daubentonii*)	3	28/04/2011
Lesser Noctule (*Nyctalus leisleri*)	4	28/04/2011
Pipistrelle (*Pipistrellus pipistrellus sensu lato*)	3	28/04/2011
Soprano Pipistrelle (*Pipistrellus pygmaeus*)	4	16/05/2008

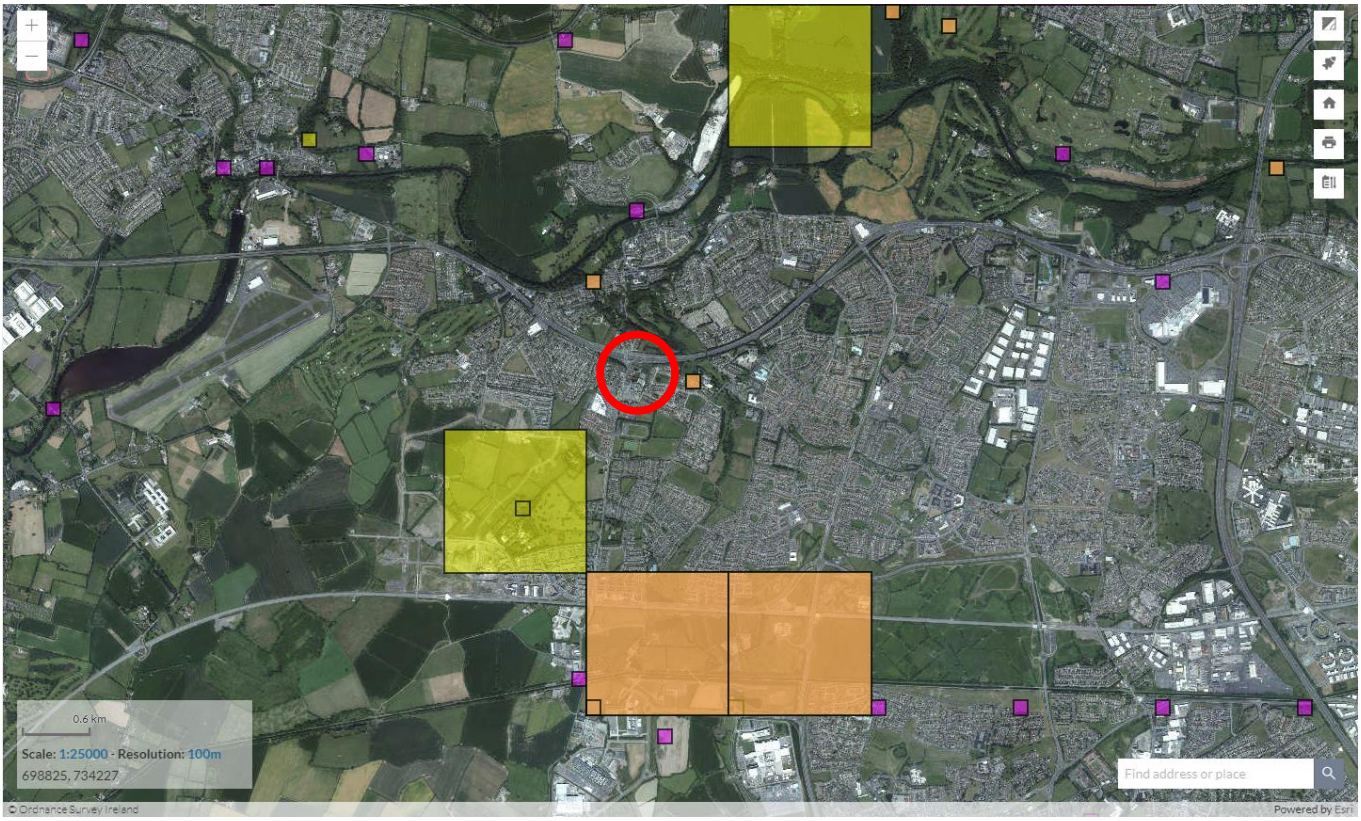

Figure 8. Brown Long-eared Bat (*Plecotus auritus*) (yellow), Daubenton's Bat (*Myotis daubentonii*) (purple), and both Brown Long-eared Bat and Daubenton's Bat (orange) (Source: NBDC) (Site – red circle)

Figure 9. Lesser Noctule (*Nyctalus leisleri*) (purple), Natterer's Bat (*Myotis nattereri*) (yellow), and both Lesser Noctule and Natterer's Bat (orange) (Source: NBDC) (Site – red circle)

Figure 10. Soprano Pipistrelle (*Pipistrellus pygmaeus*) (purple) (Source: NBDC) (Site – red circle)

Specifically, NBDC records show sightings of bat species in locations that are in close proximity to the subject site:

1. Lesser Noctule (*Nyctalus leisleri*) in grid reference O037343. Recorded on 28/04/2011 and located 360m north-east of the subject site.
2. Daubenton's Bat (*Myotis daubentonii*) in grid reference O037343. Recorded on 28/04/2011 and located 360m north-east of the subject site.
3. Brown Long-eared Bat (*Plecotus auritus*) in grid reference O037343. Recorded on 28/04/2011 and located 360m north-east of the subject site.

Evaluation of Results

The bat surveys comply with bat survey guidance documentation including Marnell et al (2022) and Collins (2016). No bats were observed emerging from trees or buildings on site. No evidence of bats roosting in buildings was noted. Bat activity was noted on site by a single brown long-eared bat in addition to Soprano Pipistrelle and Lesser Noctule bats. The woodland belt on site is seen as a key feature for the creation of the bat foraging area on site.

Potential Impact of the development on Bats

Bat surveys for bat usage were carried out across the entire school site and immediately adjoining sites to assess roosting and feeding/foraging activities. In addition, an internal inspection of the school for roosting areas was assessed. No evidence of bats roosting were noted within the existing school. No bats were noted emerging from the existing school building. No bats were observed emerging from trees on site. No trees of bat roosting potential are noted on site. No derogation licence or consultation with NPWS is required for the proposed redevelopment of the school building.

The lighting plan has been designed to comply with bat lighting guidelines in consultation with Altemar. However, foraging activity on site may be reduced in the short-medium term until the landscaping matures. The proposed development is not in proximity to sensitive bat areas. It should be noted that the proposed development and school is adjacent to Grifeen Valley Park, Lucan Harriers, Weston Park Hockey Club which all contain flood lighting which spills into the proposed development site. These lights were off during the assessment. The lights on Esker Drive did spill into the site. The proposed development will result in the removal of treelines on site which would result in a short to medium term reduction in foraging. In addition, the foraging area on site will be reduced. However, the retention of the woodland belt and replanting of treelines would be seen to be of paramount importance to the retention of foraging on site. No significant impact is foreseen in relation to bats from the proposed development.

The potential for collision risk and impact on flight paths in relation to bats is considered is considered low due to the low level of bat activity on site and the buildings would be deemed to be clearly visible to bats.

Mitigation Measures

As outlined in Marnell et al. (2022) "*Mitigation should be proportionate. The level of mitigation required depends on the size and type of impact, and the importance of the population affected*." In addition as outlined in Marnell et. al (2022) '*Mitigation for bats normally comprises the following elements:*

- *Avoidance of deliberate, killing, injury or disturbance – taking all reasonable steps to ensure works do not harm individuals by altering working methods or timing to avoid bats. The seasonal occupation of most roosts provides good opportunities for this*

- *Roost creation, restoration or enhancement – to provide appropriate replacements for roosts to be lost or damaged*
- *Long-term habitat management and maintenance – to ensure the population will persist*
- *Post-development population monitoring – to assess the success of the scheme and to inform management or remedial operations.'*

As a result, the following mitigation will be implemented:

- Lighting at all construction stages should be done sensitively on site with no direct lighting of hedgerows and treelines.
- A post construction bat survey and light spill assessment will be carried out to ensure compliance with the lighting plan.
- Additional treelines outlined in the landscape plan are planted in consultation a ecologist to ensure foraging corridors are maintained.

Predicted Residual Impact of Planned Development on Bats

The present survey found no evidence of roosting bats in any onsite tree or nearby structure therefore the proposed development will not result in the loss of any bat roost as no bats are roosting onsite. No derogation licence or consultation with NPWS is required for the proposed redevelopment of the school building.

The proposed development will change the local environment as existing buildings are to be demolished and vegetation removed. There would be expected to be a short to medium term reduction in foraging until the landscaping and in particular the trees within the landscaping proposal mature. The external lighting for this development has been designed to achieve the performance requirements as set out in the Bats and Lighting – Guidance Notes for Planners, Engineers, Architects and Developers (Bat Conservation Ireland, 2010) and Bats and Lighting in the UK – Bats and the Built Environment Series (Institute of Lighting Professionals, September 2018). All lighting is set at 3000^{o}K in compliance with bat lighting guidelines. In the medium-long term bat foraging would be expected to continue on site and no significant long term effect would be foreseen.

References

Collins, J. (ed.) (2016). *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn). The Bat Conservation Trust, London. ISBN-13 978-1-872745-96-1

Marnell, F., Kelleher, C. & Mullen, E. (2022). *Bat mitigation guidelines for Ireland V2. Irish Wildlife Manuals, No. 134*. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

Chartered Institute of Ecology and Environmental Management (2021). *Bat Mitigation Guidelines: A guide to impact assessment, mitigation and compensation for developments affecting bats. Beta version.* Chartered Institute of Ecology and Environmental Management, Winchester.

Chartered Institute of Ecology and Environmental Management (2018). *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal, and Marine.* Chartered Institute of Ecology and Environmental Management, Winchester.

Institution of Lighting Professionals (2018). *Bats and Artificial Lighting in the UK – Bats and the Built Environment Series: Guidance Note 08/18.* Institution of Lighting Professionals and the Bat Conservation Trust.

Department of Housing, Planning and Local Government (December, 2018). *Urban Development and Building Heights Guidelines for Planning Authorities***.**

Bat Conservation Trust (May 2022). *Interim Guidance Note: Use of night vision aids for bat emergence surveys and further comment on dawn surveys.* The Bat Conservation Trust, London.

Bat Conservation Ireland 2004 on-going, *National Bat Record Database.* Virginia, Co. Cavan

Boyd, I. and Stebbings, R.E. 1989 Population changes in brown long-eared bats (*Plecotus auritus*) in Bat Boxes at Thetford Forest. *Journal of Applied Ecology* **26**: 101 - 112

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1982

Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979

EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive) 1992

Jefferies, D.J. 1972 Organochlorine insecticide residues in British bats and their significance. *Journal of Zoology*, London **166**: 245 - 263

Kelleher, C. 2004, Thirty years, six counties, one species – an update on the lesser horseshoe bat *Rhinolophus hipposideros* (Bechstein) in Ireland – *Irish Naturalists' Journal* **27**, No. 10, 387 – 392

Kelleher, C. 2015 *Proposed Residential Development, Church Road, Killiney, Dublin: Bat Fauna Study*. Report prepared for Altemar Marine and Environmental Consultants

Marnell, F., Kingston, N. and Looney, D. 2009 *Ireland Red List No. 3: Terrestrial Mammals.* National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin

Marnell, F., Kelleher, C., & Mullen, E. (2022), BAT MITIGATION GUIDELINES FOR IRELAND – V2 https://www.npws.ie/sites/default/files/publications/pdf/IWM134.pdf

Racey, P.A. and Swift, S.M. 1986 The residual effects of remedial timber treatments on bats. *Biological Conservation* **35**: 205 – 214

Smal, C.M. 1995 *The Badger & Habitat Survey of Ireland.* The Stationery Office, Dublin

Wildlife Act 1976 and Wildlife [Amendment] Act 2000. Government of Ireland.