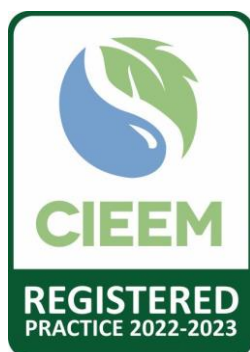


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Ecological Impact Assessment (EcIA) Report



Sycamore Crescent Housing Newcastle West, Co. Limerick



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Ecological Impact Assessment (EclA) Report - Sycamore Crescent Housing Newcastle West, Co. Limerick

Contents

1.0 INTRODUCTION	4
1.1 Purpose of Report	4
1.2 Competent Expertise.....	4
1.3 Project Description.....	5
2.0 ASSESSMENT METHODOLOGY	7
2.1 Desk Based Studies	7
2.2 Assessment of the Effects – Ecological Evaluation Criteria	9
2.3 Duration of Impact	12
2.4 Methodology	12
2.5 Designated Sites	18
3.0 EXISTING ENVIRONMENT	19
3.1 Designated Sites in the Vicinity of the Proposed Development	19
3.2 Habitats and Flora	20
3.3 Aquatic Environment.....	27
3.4 Field Surveys	28
4.0 IMPACT ASSESSMENT	32
4.1 Introduction	32
4.2 Designated Areas	32
4.3 Construction Phase.....	33
4.4 Operational Phase.....	34
5.0 MITIGATION MEASURES FOR ECOLOGY	35
5.1 Flora	35
5.2 Fauna.....	37
5.3 Water Quality Mitigation	39
5.4 Introduction/Spread of Invasive Species	47
5.5 Impact Summary	48
6.0 CUMULATIVE IMPACTS.....	50
7.0 MONITORING	51
8.0 CONCLUDING STATEMENT.....	51

TABLES

Table 1	Criteria used in assessing the ecological importance of sites
Table 2	Definition of Durations (EPA, 2017)
Table 3	Impact Significance Criteria (EPA, 2017)
Table 4	Criteria for assessing impact type
Table 5	Classification and Survey Requirements for Bats in Trees
Table 6	Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of roost features within the landscape, to be applied using professional judgement.
Table 7	SAC and SPA sites within 15km of Proposed Development
Table 8	NHA and pNHA sites within 15km of Proposed Development
Table 9	High Impact Invasive Species in 10km ² Grid Square R23
Table 10	Historical Bat Records in 10km ² Grid Square R23
Table 11	Suitability of the study area for the bat species found in the Newcastle West area (based on the NBDC data) with Irish Red list status indicated
Table 12	Ecological Importance of habitats on site
Table 13	Predicted Impacts
Table 14	Quantification of Impacts

FIGURES

Figure 1	Site location map
Figure 2	Aerial map with Drainage Information
Figure 3	Proposed Site Layout
Figure 4	Proposed Drainage Layout
Figure 5	Special Areas of Conservation (SACs) within 15km of Site
Figure 6	Special Protections Areas (SPAs) within 15km of Site
Figure 7	National Heritage Areas (NHAs) and Proposed National Heritage Areas (pNHAs) within 15km of Site
Figure 8	Catchment Drainage Information
Figure 9	Habitat Map with Aerial Photo
Figure 10	Bat Activity Map

APPENDICES

Appendix A	Registered Practice of CIEEM
Appendix B	Plates
Appendix C	Protected Species in 10km ² R23
Appendix D	Bat Data (May 10 th 2022)
Appendix E	Native Tree Planting, Hedge Planting and Pollinator and Bat Friendly Planting Lists
Appendix F	Mitigation for Water Pollution

1.0 INTRODUCTION

1.1 Purpose of Report

An Ecological Impact Assessment (EcIA) Report was undertaken by Ash Ecology & Environmental Ltd (AEE) on behalf of Limerick City and County Council.

The development is for the Construction of a Housing Development comprising 31 units and all associated site development works and infrastructure provision at Sycamore Crescent Housing, Newcastle West, Co. Limerick (Grid Ref: 52.458690, - 9.051240) and shown in Figure 1 and 2. The proposed site layout is shown as Figure 3.

There is also a Screening for Appropriate Assessment (MKO, August 2021) and Natura Impact Report AEE, May 2022) compiled for this development and should be read in conjunction with this report.

1.2 Competent Expertise

This report has been prepared by Ash Ecology & Environmental Ltd (AEE) whose managing director and leading ecologist is Aisling Walsh who is a full member of the Chartered Institute of Ecological & Environmental Management (CIEEM) while the company, AEE, is a Registered Practice by the CIEEM, see Appendix A.

Aisling's qualifications include M.Sc. (Dist) in Biodiversity and Conservation (TCD) and B.Sc. (Hons) Zoology (NUIG), a diploma in Applied Aquatic Science (GMIT) and a Certificate in Applied Biology (GMIT). Aisling has over 15 years of experience providing environmental consultancy and environmental assessment services. Aisling has written numerous Ecological Impact Assessments (EcIA), Screening for Appropriate Assessment Stage I and Stage II Natura Impact Statements, chapters for Environmental Impact Assessments/Statements (EIAR), Badger Surveys, Bat Surveys, Bird and Habitat Surveys. Aisling is a licenced bat ecologist (example of recent: DER/BAT 2020 – 46 EUROPEAN, DER/BAT 2020 – 48 EUROPEAN, DER/BAT 2021 – 89 EUROPEAN, DER/BAT 2022 – 12 EUROPEAN) and a member of Bat Conservation Ireland.

1.3 Project Description

The proposed development site, measuring 1.5 ha, is located in the townland of Gortboy, Newcastle West, Co. Limerick. The site is located approximately 1.1km to the north of Newcastle West town centre and approximately 36km south-west of Limerick City, Co. Limerick. The site is bordered to the north by Desmond Business Park, by other existing residential developments to the south and west and agricultural fields/wet grassland to the east. Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161) is located approximately 4.7km to the west of the proposed development and is the closest European Designated

Site to the proposal. The site is accessed from the south via Station Road off the N21 Limerick Road.

The proposed development site is 1.5ha in size. The proposed site layout is shown as Figure 3. The proposed development will consist of the provision of 31 no. residential units as follows:

Block A

- 6 no. 3-bed 5 person house (112.4sqm)
- 8 no. 2-bed 4 person house (87.7 sqm)
- 3 no. 1-bed 2 person apartment (47.2 sqm)
- 3 no. 1-bed 2 person apartment (65.8 sqm)
- 1 no. 2-bed 4 person house (87.4 sqm)

Block B

- 1 no. 1-bed 2 person apartment (65.8 sqm)
- 2 no. 2-bed 4 person house (75.4 sqm)
- 1 no. 1-bed 2 person house (47.2 sqm)

Block C

- 1 no. 1-bed 2 person apartment (65.8 sqm)
- 4 no. 2-bed 4 person house (75.4 sqm)
- 1 no. 1-bed 2 person house (47.2 sqm)

The proposed drainage layout is attached as Figure 4.

The development will consist of two Phases. Block A will be delivered in Phase 1 and Block B will be delivered in Phase 2.

Foul water from the proposed development will connect to the existing foul water network servicing the adjacent Sycamore Crescent to the west of the site. A pre-connection enquiry was lodged with Irish Water in relation to the proposed development. Irish Water confirmed that there is capacity to accept the proposed connection to the network. The letter of confirmation from Irish Water is included in Appendix 1 of the Screening Report (MKO, August 2021).

Surface water run-off from all of the development's hard surfaces including roads and roofs, will connect to the existing public surface water drainage network servicing the adjacent Sycamore Crescent. On-site storage (attenuation tanks) and discharge to ground via filtration pits/swales will also be incorporated to minimise outflow from the site. All surface water will pass through a petrol interceptor prior to entering the attenuation tank and will be discharged at a controlled rate via a hydrobrake device. Permeable surface finishes will be used where possible to minimise runoff volumes. In addition to the above, 2 no. filter drains will also be installed within the site. One will be installed along the northern boundary of the site which will collect surface water from the field to the north of the site boundary. This will not include water from the development's hard surfaces. The second filter drain runs through the centre of the site and will connect to the public surface water network.

A Planning Stage Construction Environmental Management Plan (CEMP) will be compiled for the environmental management measures proposed in Section 5.0.

2.0 ASSESSMENT METHODOLOGY

2.1 Desk Based Studies

A number of methodologies were employed in completing this report including detailed desk-based studies, consultation and a general site visit. Further details are provided below.

A desktop study was used to identify features of ecological value occurring within the site and those occurring in close proximity to it. A desktop review also allows the key ecological issues to be identified early in the appraisal process and facilitates the planning of appropriate surveys. Sources of information utilised for this report include the following:

- EPA, Guidelines on the Information to be contained in Environmental Impact Assessment Reports, Draft August 2017
- EPA, Advice Notes for Preparing Environmental Impact Statements, Draft, September 2015
- EPA, Advice Notes on Current Practice (in preparation of Environmental Impact Statements), September 2003
- EPA, Guidelines on the information to be contained in Environmental Impact Statements, March 2002
- Environment, Community and Local Government, Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment, March 2013
- Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities, (Department of Environment, Heritage and Local Government, 2010);
- Appropriate Assessment Under Article 6 of the Habitats Directive: Guidance for Planning authorities;
- Assessment of Plans and Projects Significantly Affecting Natural 2000 sites: Methodological Guidance on the Provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC (EC Environment Directorate-General, 2000).
- CIEEM (2018, updated 2021) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine version 1.1. Chartered Institute of Ecology and Environmental Management, Winchester.
- CIEEM (2017) Guidelines for Preliminary Ecological Appraisal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester
- CIEEM (2017) Guidelines on Ecological Report Writing. Chartered Institute of Ecology and Environmental Management, Winchester.
- Flora (Protection) Order 2015
- Red Data Books & NPWS Red Lists
- The Water Framework Directive (2000/60/EC)
- NRA (2008) Management of Noxious Weeds and Non-Native Plant Species on National Road Schemes
- NRA (2009, Rev 2) Guidelines for the Assessment of the Ecological Impacts of National Road Schemes
- NRA (2005) Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes
- NRA (2006) Guidelines for the Treatment of Otters prior to the Construction of

- National Road Schemes
- NRA (2006) Guidelines for the Treatment of Bats during the Construction of National Road Schemes
- River Basin Management District 2018-2021
- IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters, Inland Fisheries Ireland
- IFI (2020) A Guide to the Protection of Watercourses through the use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning (Including one-off developments)

The following sites have been consulted in the preparation and development of this report;

- National Parks and Wildlife Service (NWPS) on line data (www.npws.ie);
- Status of EU Protected Habitats in Ireland – Backing Documents (NWPS);
- Status of EU Protected Habitats in Ireland (NWPS, 2013);
- Ordinance Survey Ireland Maps and Ariel Photography (www.heritagemaps.ie);
- Data in relation to water quality in the area from the EPA (www.epa.ie);
- EPA Biodiversity Plan <http://www.epa.ie/pubs/reports/biodiversity/>
- National Biodiversity Data Centre (www.biodiversityireland.ie);
- Birdwatch Ireland (www.birdwatchireland.ie);
- EPA Maps: <https://gis.epa.ie/EPAMaps/>
- Water Framework Ireland website: <http://www.wfdireland.ie/maps.html>
- National Biodiversity Data Centre: www.NBDC.ie
- Heritage Maps www.hertiagemaps.ie
- Bing Maps and Google Earth;
- Geohive Maps www.geohive.ie
- Newcastle West Local Area Plan 2014 - 2020

References were also made to the following key legislation and documents:

European

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (The Habitats Directive);
- Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (codified version of Directive 79/409/EEC as amended) (The Birds Directive);
- Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy (The Water Framework Directive);
- Directive 2006/44/EC of the European Parliament and of the Council of 6 September 2006 on the quality of fresh waters needing protection or improvement in order to support fish life (The Fish Directive (consolidated)).

Republic of Ireland

- The Wildlife Act 1976 as amended by the Wildlife Act 1976 (Protection of Wild Animals) Regulations, 1980, the Wildlife (Amendment) Act 2000, the Wildlife (Amendment) Act 2010, European Communities (Wildlife Act, 1976) (Amendment) Regulations 2017. (The Wildlife Act);

- European Communities (Conservation of Wild Birds) Regulations 1985 (S.I. 291/1985) as amended by S.I. 31/1995;
- European Communities (Natural Habitats) Regulations, S.I. 94/1997 as amended by S.I. 233/1998 & S.I. 378/2005 (The Habitats Regulations);
- European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477/2011);
- The Flora (Protection) Order, 1999 (S.I. No. 94/1999);
- National Biodiversity Action Plan 2017-2021;
- Threat Response Plan: Otter 2009-2011 (DEHLG, 2009).

2.2 Assessment of the Effects – Ecological Evaluation Criteria

The impact significance is a combined function of the value of the affected feature (its ecological importance), the type of impact and the magnitude of the impact. It is necessary to identify the value of ecological features within the study area in order to evaluate the significance and magnitude of possible impacts.

The method of evaluating ecological significance used in this study is broadly based on guidelines issued by CIEEM (2016)¹ and the NRA (2009).² The results of the habitat survey and fauna survey were evaluated to determine the significance of identified ecological features located in the study area on an importance scale ranging from international → national → county → local. The local scale is approximately equivalent to one 10 km square. Because most sites will fall within the local scale, this is sub-divided into high local importance and low local importance. The criteria shown in Table 1 have been used in assessing ecological value within the study area. In addition to the criteria listed in Table 1, the evaluation of habitats and species also considers other factors such as potential ecological value, secondary supporting values where habitats may perform a secondary ecological function and social values of an ecological feature such as educational, recreational and economic value.

The assessment of effects has been undertaken in accordance with best practice, legislation and guidance notes. The approach is set out below in Table 1.

Table 1 Criteria used in assessing the ecological importance of sites

ECOLOGICAL VALUATION SCHEME	
International Importance:	
<ul style="list-style-type: none"> • 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. • Proposed Special Protection Area (pSPA). • Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). • Features essential to maintaining the coherence of the Natura 2000 Network. • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats 	

¹ CIEEM (2016) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater and Coastal, 2nd edition. Chartered Institute of Ecology and Environmental Management, Winchester.

² NRA (2009) Guidelines for Assessment of Ecological Impacts of National Road Schemes (Revision 2).

ECOLOGICAL VALUATION SCHEME

Directive.

- Resident or regularly occurring populations (assessed to be important at the national level) of the following:
 - Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or
 - Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
- Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).
- World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972).
- Biosphere Reserve (UNESCO Man & the Biosphere Programme).
- Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).
- Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).
- Biogenetic Reserve under the Council of Europe.
- European Diploma Site under the Council of Europe.
- Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).

National Importance:

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

County Importance:

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

ECOLOGICAL VALUATION SCHEME

and a high degree of naturalness, or populations of species that are uncommon within the county.

- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (higher value):

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

Local Importance (lower value):

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

SAC = Special Area of Conservation; SPA = Special Protection Area; NHA = Natural Heritage Area
BAP = Biodiversity Action Plan (these have been published for many local authority areas)

In line with the EPA Guidelines on information to be contained in Environmental Impact Assessment Reports [Draft] 2017), the following terms in Table 2 are defined when quantifying duration:

Table 2 Definition of Durations (EPA, 2017)

Description of Duration	Corresponding Time Frame
Momentary Effects	Effects lasting from seconds to minutes
Brief Effects	Effects lasting less than a day
Temporary Effects	Effects lasting less than a year
Short-term Effects	Effects lasting one to seven years.
Medium-term Effects	Effects lasting seven to fifteen years.
Long-term Effects	Effects lasting fifteen to sixty years
Permanent Effects	Effects lasting over sixty years
Reversible Effects	Effects that can be undone, for example through remediation or restoration
Frequency of Effects	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

The criterion for confidence levels of the predicted likely impacts are given below in Table 3 and assessment for impact type in Table 4. The impact significance criteria follow EPA guidance (EPA, 2017).

Table 3 Impact Significance Criteria (EPA, 2017)

Significance of Effects	Definition
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment

Table 4 Criteria for assessing impact type

Impact type	Criteria
Positive impact	A change is likely to improve the ecological feature in terms of its ecological value.
Neutral	No effect.
Negative impact	The change is likely to adversely affect the ecological value of the feature.

2.3 Duration of Impact

Unless otherwise noted in the individual sections of this report the following duration of impacts apply:

- Temporary Impact - Impact lasting for one year or less.
- Short term Impact - Impact lasting one to seven years.
- Medium Term Impact - Impact lasting seven to fifteen years.
- Long Term Impact - Impact lasting fifteen to sixty years.
- Permanent Impact - Impact lasting over sixty years.

2.4 Methodology

A terrestrial walkover survey was carried out on May 10th 2022 by Aisling Walsh (MSc MCIEEM) of AEE, to verify the habitats and species understood to be present within the site boundary and also assessed the adjacent habitats around the proposed development.

2.4.1 Flora

Assessing the impacts of any project and associated activities requires an understanding of the ecological baseline conditions prior to and at the time of the project proceeding. Ecological Baseline conditions are those existing in the absence of proposed activities (CIEEM 2018, updated 2021).

A multidisciplinary walkover survey was conducted on the on the 10th May 2022 in line with NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes) by Aisling Walsh M.Sc. MCIEEM) of AEE. This ecological survey was undertaken during the optimal time of year to undertake a habitat and flora survey (Smith et al., 2011).

Habitats were identified and classified according to Fossitt (2000)³ and Smith et al. (2011)⁴. All Plates are contained within Appendix B. During the survey, particular attention was given to the possible presence of habitats or species which are legally protected under Irish or European legislation (Wildlife Acts; EU Habitats Directive; EU Birds Directive), or listed on the Flora Protection Order (2015) or Red Data books.^{5, 6} Plant nomenclature follows Parnell and Curtis (2012).⁷ A list of protected species from the 10km² grid R23 within which the proposed development are located is shown as Appendix C.

All habitats within and adjacent to the works areas were readily identifiable during the site visits. A dedicated invasive species survey was also undertaken during the site visit. During the survey, the site was searched for species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477 of 2011).

2.4.2 Birds

The line transect method was used to survey birds within the survey area. Birds were recorded⁸ by sight and call, with the aid of binoculars where necessary. The nature and type of habitats present are also indicative of the bird species likely to be present at other times of the year.

2.4.3 Protected Mammals (excluding Bats)

A general terrestrial mammal survey was carried out during the field surveys. The presence of otter and other mammals are indicated principally by their signs, such

³ Fossitt, J. (2000). *A Guide to Habitats in Ireland*. The Heritage Council, Kilkenny.

⁴ Smith, G.F., O'Donoghue, P., O'Hora, K. and Delaney, E. (2011) Best practice guidance for habitat survey and mapping. The Heritage Council, Kilkenny.

⁵ Curtis, T.G.F. & McGough, H.N. 1988. *The Irish Red Data Book 1: Vascular Plants*. Stationery Office, Dublin.

⁶ Newton, S., Donaghy, A., Allen, D., Gibbons, D. (1999). *Birds of Conservation Concern in Ireland*. *Irish Birds* 6 (3): 333-344.

⁷ Parnell, J and Curtis, J. (2012). *Webb's, An Irish Flora*. Cork University Press.

⁸ Dempsey, E & O'Clery, M. (2010) *The Complete Field Guide to Ireland's Birds*. Gill and MacMillan, Dublin.

as dwellings, feeding signs, or droppings using signs described by Brown *et al.* (1995).⁹

The walk over survey was conducted in Mayo which is suboptimal for badger surveys as vegetation cover is higher along hedgerows with areas of scrub extending outwards. The habitats present were assessed in general accordance with techniques adopted for the Badger & Habitat Survey of Ireland¹⁰ and from the Otter Survey of Ireland¹¹.

2.4.4 Bats

Treelines onsite were visually assessed for their potential to be bat roosts. There are no affected structures for demolition that could contain bats.

The equipment used included the Elekon Bat Logger M. Visual observations were taken with the aid of a powerful L.E.D. torch (AP Pros-Series 220 Lumens High Performance Spotlight) and Celestron 12x56 Prism Binoculars. A Seek Thermal Reveal Pro High-Resolution Thermal Imaging Camera was also used along with a RIDGID 36848 Micro CA-150 Hand-Held Borescope for inspection of any crevices on bat potential trees for felling. The borescope is fitted with a camera and allows visibility of confined spaces and narrow passages potentially used by hibernating/roosting bats. It allows spaces up to 3m from ground level to be inspected.

A bat activity survey of the site was undertaken May 10th 2022 as surveys can be carried out between April to mid- September.¹² It was undertaken from 20.55 to 23.00 (sunset was 21.17) using the most current guidelines for Ireland.¹³

Bat Potential Trees

Treelines were graded for bats using the classification of Table 5 and features listed below:

- Natural holes (e.g. knot holes) arising from naturally shed branches or branches previously pruned back to a branch collar.
- Man-made holes (e.g. cavities that have developed from flush cuts or cavities created by branches tearing out from parent stems).
- Cracks/splits in stems or branches (horizontal and vertical).
- Partially detached, loose or bark plates.
- Cankers (caused by localised bark death) in which cavities have developed.

⁹ Brown., R.W., Lawrence, M.J. and Pope J. (1995) *Animals Tracks, Trails and Signs*. Octopus Publishing Group, London.

¹⁰ Smal, C.M. (1995). *The Badger and Habitat Survey of Ireland*. The Stationery Office, Dublin.

¹¹ Bailey, M. and Rochford J. (2006) Otter Survey of Ireland 2004/2005. *Irish Wildlife Manuals*, No. 23. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

¹² Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. *Irish Wildlife Manuals*, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

¹³ 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

- Other hollows or cavities, including butt rots.
- Compression of forks with included bark, forming potential cavities.
- Crossing stems or branches with suitable roosting space between.
- Ivy stems with diameters in excess of 50mm with suitable roosting space behind (or where roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk).
- Bat or bird boxes.
- Other suitable places of rest or shelter.
- Certain factors such as orientation of the feature, height from the ground, the direct surroundings and its location in respect to other features may enhance or reduce the potential value.

Table 5 Classification and Survey Requirements for Bats in Trees¹⁴

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey Work / Actions
Confirmed Roost	Evidence of roosting bats in the form of live / dead bats, droppings, urine staining, mammalian fur oil staining, etc.	<p>A National Parks and Wildlife (NPWS) derogation licence application will be required if the tree or roost site is affected by the development or proposed arboricultural works. This will require a combination of aerial assessment by roped access bat workers (where possible, health and safety constraints allowing) and nocturnal survey during appropriate periods (e.g. nocturnal survey - May to August) to inform on the licence.</p> <p>Works to tree undertaken under supervision in accordance with the approved good practice method statement provided within the licence.</p> <p>However, where confirmed roost site(s) are not affected by works, work under a precautionary good practice method statement may be possible.</p>
High Potential	A tree with one or more Potential Roosting Features that are obviously suitable for larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter protection, conditions (height above ground level, light levels, etc) and surrounding	<p>Aerial assessment by roped access bat workers (if appropriate) and / or nocturnal survey during appropriate period (May to August).</p> <p>Following additional assessments, tree may be upgraded or downgraded based on findings.</p> <p>If roost sites are confirmed and the tree or</p>

¹⁴ Bat Surveys for Professional Ecologists: Good Practice Guidelines (J., Collins (Bat Conservation Trust), 2016¹⁴).

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey Work / Actions
	habitat. Examples include (but are not limited to); woodpecker holes, larger cavities, hollow trunks, hazard beams, etc.	roost is to be affected by proposals a licence from the NPWS will be required. After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate.
Moderate Potential	A tree with Potential Roosting Features which could support one or more potential roost sites due to their size, shelter protection, conditions (height above ground level, light levels, etc) and surrounding habitat but unlikely to support a roost of high conservation status (i.e. larger roost, irrespective of wider conservation status). Examples include (but are not limited to); woodpecker holes, rot cavities, branch socket cavities, etc.	A combination of aerial assessment by roped access bat workers and / or nocturnal survey during appropriate period (May to August). Following additional assessments, tree may be upgraded or downgraded based on findings. After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate. If a roost site/s is confirmed a licence from the NPWS will be required.
Low Potential	A tree of sufficient size and age to contain Potential Roosting Features but with none seen from ground or features seen only very limited potential. Examples include (but are not limited to); loose/lifted bark, shallow splits exposed to elements or upward facing holes.	No further survey required but a precautionary working method statement may be appropriate.
Negligible/No potential	Negligible/no habitat features likely to be used by roosting bats	None.

The BCT guidelines were followed for the assessment rating¹⁵ and classified using Table 4.1 of the BCT guidelines (2016) which is shown as Table 6 overleaf.

¹⁵ Bat Surveys for Professional Ecologists, Good Practice Guidelines (2016)

Table 6 Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of roost features within the landscape, to be applied using professional judgement.

Suitability	Description Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions ^a and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation ^b). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential. ^c	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions ^a and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions ^a and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

^a For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.

^b Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten *et al.*, 2015). This phenomenon requires some research in the UK but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in large buildings in highly urbanised environments.

^c This system of categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI, 2015).

Landscape Evaluation for Bats

Ecological survey results were evaluated to determine the significance of identified features located in the study area on an importance scale ranging from international-national-county-local (from NRA, 2009) The local scale is approximately equivalent to one 10km square but can be operationally defined to reflect the character of the area of interest. Because most sites will fall within the local scale, this is sub-divided into two categories: local importance (higher value) and local importance (lower value).

2.4.5 Amphibians, Reptiles and Invertebrates

The survey also included a search for habitats suitable for amphibians and reptiles however as no drainage ditches or streams present on site there was no potential to be used by breeding amphibians. Any protected invertebrates of note were documented.

2.5 Designated Sites

There are four designations which may be applied to areas deemed to require specific ecological protection in Ireland:

2.5.1 Natural Heritage Areas (NHAs) & Proposed National Heritage Areas (pNHAs)

These were derived from the older Areas of Scientific Interest (ASIs) and include the best remaining areas of Ireland's natural and semi-natural habitats. Sites may have been selected by virtue of having special scientific significance for one or more species, communities, habitats, landforms, or geological or geomorphological features, or for a diversity of natural attributes.

Depending on their quality and importance, NHAs may carry other designations including SAC, SPA, Statutory Nature Reserve or National Park. NHAs are protected under the Wildlife (Amendment) Acts 1976-2018. In addition, there are proposed NHAs (pNHAs), which were published on a non-statutory basis in 1995, but have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats.

2.5.2 Special Areas of Conservation (SACs)

These are sites that have been identified to be of conservation importance in a European context, based on the habitats and species; both plant and animal; that they support. The Directive has a number of Annexes. Habitats listed on Annex I are those habitat types of community interest whose conservation requires the designation of Special Areas of Conservation. Some of these are known as priority habitats for which there is a particular obligation for protection. Animal and plant species of community interest whose conservation requires the designation of Special Areas of Conservation are listed on Annex II of the Directive.

All SACs are also proposed Natural Heritage Areas. There is a list of Notifiable Actions which apply to each annexed habitat and species. These are activities for which consent must be sought from the Minister of Arts, Heritage and the Gaeltacht within SACs. SACs are protected under the Habitats Directive of 1992 (EU Directive 92/43/EEC) and the Natural Habitats Regulations of 1997 (S.I.94/97).

2.5.3 Special Protection Areas (SPAs)

These are sites of European importance that have been identified as being of conservation importance on account of the bird species and populations they support. The Directive requires all member states to take measures to protect all wild birds and to preserve a sufficient diversity of habitats for all species naturally occurring within their territories, so as to maintain populations. Species whose status is a cause for concern are specifically identified for special conservation measures in Annex I of the Directive, and SPAs have been designated based on either the presence of these species or the presence of significant numbers of wintering waterfowl.

All SPAs are also proposed Natural Heritage Areas. SPAs are protected under the Birds Directive of 1979 (EU Directive 79/409/EEC) and the Natural Habitats Regulations of 1997 (S.I.94/97).

3.0 EXISTING ENVIRONMENT

3.1 Designated Sites in the Vicinity of the Proposed Development

Appropriate Assessment is a requirement of Article 6[3] and 6[4] of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora, also known as the Habitats Directive.

Appropriate Assessment is an assessment of the potential effects of a proposed plan, on its own or in combination with other plans or projects, on one or more Natura 2000 sites [Special Protection Areas [SPA] for birds, Special Areas of Conservation [SAC] for habitats and species, Ramsar wetland sites].

In terms of Natura 2000 designations, an examination of the National Parks and Wildlife Service GIS database was undertaken. This exercise revealed that the site is neither within nor bounding an SAC or SPA. The site is located within 15km of 2 SACs and 1 SPA. There are 2 NHAs and 4 pNHA sites within 15km of the site. The SAC, SPA, NHA and pNHAs are listed in Tables 7 and 8; see also Figures 6, 7 and 8.

Table 7 SAC and SPA sites within 15km of Proposed Development

Site Code	Name	Distance (km)
Special Area of Conservation (SAC)		
002165	Lower River Shannon SAC	8.7km W, SW
002279	Askeaton Fen Complex SAC	13.2km NE
Special Protection Area (SPA)		
004161	Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	4.7km NW, W, SW, S

Table 8 NHA and pNHA sites within 15km of Proposed Development

Site Code	Name	Distance (km)
002399	Carrigkerry Bogs NHA	7.6km NW
002454	Lough Gay Bog NHA	13.4km S
001431	Glenastar Wood pNHA	5.4km NW
001434	Heathfield Wood pNHA	12.2km SE
001425	Ballymorrisheen Marsh pNHA	13.2km NE
001429	Cappagh Fen pNHA	14.3km NE

Having regard to the proximity of the nearest SAC, SPA, NHA and pNHA (as indicated above) and given the nature and extent of the proposed development and the availability of support infrastructure, it is not considered there would be potential for significant effects on the Natura 2000 network.

A Screening for Appropriate Assessment (MKO August 2021) concluded there was no impacts to Natura 2000 sites and a Natura Impact Statement (NIS) was not required.

3.2 Habitats and Flora

3.2.1 Habitats

There are no records of protected Annex I Habitats onsite that relate to the Lower River Shannon SAC.

3.2.2 Flora Protection Order & Threatened Plant Species

According to the NPWS and BSBI records (taken from the 10km² grid square R23) there is one vascular plant, the Fir Clubmoss *Huperzia selago*, which is protected under Annex V of the Habitats Directive.

The Liverwort, Ribbonwort *Pallavicinia lyellii* is listed as protected under the Flora Protection Order 2015 and recorded in 10km² grid square R23. It is also listed as 'Endangered'¹⁶

There are 135 other bryophyte species (moss, liverwort and hornwort), listed for 10km² grid square R23 as threatened (Red Data Book species) and all of 'Least Concern', see Appendix C for list.

3.2.3 Invasive Species

The number of non-native species recorded in Irish watercourses and on land has increased significantly in the 20th and 21st centuries. The presence of a truly invasive species is evidenced by a demonstrable adverse impact on native communities or habitats. Invasive species represent one of the greatest threats to biodiversity, second only to that caused by direct habitat destruction. They do this by competitively excluding or out-competing our less robust native species, by preying on native species or by altering the natural aquatic, riparian or terrestrial habitat in which they reside.

In addition to their biological effects, invasive species can adversely impact the recreational and amenity use of infested watercourses by restricting angling, boating, swimming and other water-based leisure pursuits. They can impact on industry by clogging engines, turbines and water intake pipes. These adverse effects have resulted in significant costs to the economy. A total of 16 Invasive species recorded from 10km² grid square R23 and shown in Table 9.

¹⁶ Lockhart, N., Hodgetts, N. & Holyoak, D. (2012) Ireland Red List No.8: Bryophytes. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Table 9 High Impact Invasive Species in 10km² Grid Square R23 or listed on Regulation S.I. 477

Species name	Designation
Butterfly-bush (Buddleja davidii)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
Cherry Laurel (Prunus laurocerasus)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species
Evergreen Oak (Quercus ilex)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
Himalayan Honeysuckle (Leycesteria formosa)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
Indian Balsam (Impatiens glandulifera)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Japanese Knotweed (Fallopia japonica)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Rhododendron ponticum	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Sycamore (Acer pseudoplatanus)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
Three-cornered Garlic (Allium triquetrum)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Aphanomyces astaci	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species
Common Garden Snail (Cornu aspersum)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
Jenkins' Spire Snail (Potamopyrgus antipodarum)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
American Mink (Mustela vison)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland)
Bank Vole (Myodes glareolus)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
European Rabbit (Oryctolagus cuniculus)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> Medium Impact Invasive Species
Fallow Deer (Dama dama)	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland) Protected Species: Wildlife Acts

3.2.4 Bird Species

A total of bird species are listed for 10km² grid square R23 of which 38 are listed as protected, see Appendix C for complete list.

3.2.5 Protected Mammals – Excluding Bats

Records from the National Biodiversity Data Centre reveal the presence of the 6 following protected mammals from within the 10km² grid square R23 of this proposed application site:

- Eurasian Badger (*Meles meles*)
- Eurasian Red Squirrel (*Sciurus vulgaris*)
- European Otter (*Lutra lutra*)
- Fallow Deer (*Dama dama*)
- Red Deer (*Cervus elaphus*)
- West European Hedgehog (*Erinaceus europaeus*)

3.2.6 Bats

A desktop review was carried out to identify the previous records of Bat species within the proposed development site and its environs. The study area occurs in 10km² Grid Square R23. The website the NBDC (www.nbdc.ie) was accessed on 13/05/2022 to establish any previous bat records and shown below in Table 10.

Table 10 Historical Bat Records in 10km² Grid Square R23

Species Name - Common	Species Name - Latin	Last Documented Record R23
Brown Long-eared Bat	<i>Plecotus auritus</i>	27/07/2002
Daubenton's Bat	<i>Myotis daubentonii</i>	12/08/2002
Leisler's Bat	<i>Nyctalus leisleri</i>	22/08/2014
Common Pipistrelle	<i>Pipistrellus pipistrellus sensu lato</i>	22/08/2014
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	22/08/2014

Species Background – Bats

Ireland had ten known bat species until February 2013, when a single live greater horseshoe bat (*Rhinolophus ferrumequinum*) was found roosting in Co. Wexford¹⁷. On 8th June 2020, a single audio recording was confirmed in the Glendaough area, Co. Wicklow. It was found on two more occasions in the same area in early July 2020 (Bat Conservation Ireland, July 2020).

The ten species (excluding the greater horseshoe) are briefly described overleaf. For a more comprehensive overview see McAney, 2006.¹⁸

The dependence of Irish bat species on insect prey has left them vulnerable to habitat destruction, land drainage, agricultural intensification and increase use of pesticides. Also, their reliance on buildings as roosting sites has made them particularly vulnerable to renovation works and the use of timber chemical treatment. Buildings are highly important as roosting sites for bats and all Irish bat species use buildings for all roost types. Most significant in terms of roosts in houses are maternity roosts, but cellars and even attics may serve as hibernation sites for bats. Roosts within buildings can far exceed the numbers encountered in trees, bridges, caves or cliffs and roosts of over 1,000 bats have been recorded in buildings.¹⁹

Family Vespertilionidae:

Common pipistrelle *Pipistrellus pipistrellus*

This species was only recently separated from its sibling, the soprano or brown pipistrelle *P. pygmaeus*²⁰, which is detailed below. The common pipistrelle's echolocation calls peak at 45 kHz. The species forages along linear landscape features such as hedgerows and treelines as well as within woodland.

Soprano pipistrelle *Pipistrellus pygmaeus*

The soprano pipistrelle's echolocation calls peak at 55 kHz, which distinguishes it readily from the common pipistrelle on detector. The pipistrelles are the smallest and most often seen of our bats, flying at head height and taking small prey such as midges and small moths. Summer roost sites are usually in buildings but tree holes and heavy ivy are also used. Roost numbers can exceed 1,500 animals in mid-summer.

¹⁷ National Biodiversity Data Centre <http://www.biodiversityireland.ie/new-bat-species-found-in-ireland/>

¹⁸ McAney, K. (2006) *A Conservation Plan for Irish Vesper Bats*. Irish Wildlife Manual No.20. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government.

¹⁹ NRA (2005) *Guidelines for the Treatment of Bats Prior to the Construction of National Road Schemes*. National Roads Authority, Dublin

²⁰ Barratt, E. M., Deauville, R., Burland, T. M., Bruford, M. W., Jones, G., Racey, P. A., & Wayne, R. K. (1997) *DNA Answers the Call of Pipistrelle Bat Species*. *Nature* 387: 138 - 139.

Nathusius' pipistrelle *Pipistrellus nathusii*

Nathusius' pipistrelle is a recent addition to the Irish fauna and has mainly been recorded from the north-east of the island in Counties Antrim and Down²¹ and also in Fermanagh, Longford and Cavan. It has also recently been recorded in Counties Cork and Kerry.²² However, the known resident population is enhanced in the autumn months by an influx of animals from Scandinavian countries. The status of the species has not yet been determined.

Leisler's bat *Nyctalus leisleri*

This species is Ireland's largest bat, with a wingspan of up to 320mm; it is also the third most common bat, preferring to roost in buildings, although it is sometimes found in trees and bat boxes. It is the earliest bat to emerge in the evening, flying fast and high with occasional steep dives to ground level, feeding on moths, caddis-flies and beetles. The echolocation calls are sometimes audible to the human ear being around 15 kHz at their lowest. The audible chatter from their roost on hot summer days is sometimes an aid to location. This species is uncommon in Europe and as Ireland holds the largest national population the species is considered as Near Threatened here.

Brown long-eared bat *Plecotus auritus*

This species of bat is a 'gleaner', hunting amongst the foliage of trees and shrubs, and hovering briefly to pick a moth or spider off a leaf, which it then takes to a sheltered perch to consume. They often land on the ground to capture their prey. Using its nose to emit its echolocation, the long-eared bat 'whispers' its calls so that the insects, upon which it preys, cannot hear its approach (and hence, it needs oversize ears to hear the returning echoes). As this is a whispering species, it is extremely difficult to monitor in the field as it is seldom heard on a bat detector. Furthermore, keeping within the foliage, as it does, it is easily overlooked. It prefers to roost in old buildings.

Natterer's bat *Myotis nattereri*

This species has a slow to medium flight, usually over trees but sometimes over water. It usually follows hedges and treelines to its feeding sites, consuming flies, moths, caddis-flies and spiders. Known roosts are usually in old stone buildings but they have been found in trees and bat boxes. The Natterer's bat is one of our least studied species and further work is required to establish its status in Ireland.

²¹ Richardson, P. (2000) *Distribution Atlas of Bats in Britain and Ireland 1980 - 1999*. The Bat Conservation Trust, London, England.

²² Kelleher, C. (2005) *International Bat Fieldcraft Workshop*, Killarney, Co. Kerry. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government.

Daubenton's bat *Myotis daubentonii*

This bat species feeds close to the surface of water, either over rivers, canals, ponds, lakes or reservoirs but it can also be found foraging in woodlands. Flying at 15 kilometres per hour, it gaffs insects with its over-sized feet as they emerge from the surface of the water - feeding on caddis flies, moths, mosquitoes, midges etc. It is often found roosting beneath bridges or in tunnels and also makes use of hollows in trees.

Whiskered bat *Myotis mystacinus*

This species, although widely distributed, has been rarely recorded in Ireland. It is often found in woodland, frequently near water. Flying high, near the canopy, it maintains a steady beat and sometimes glides as it hunts. It also gleans spiders from the foliage of trees. Whiskered bats prefer to roost in buildings, under slates, lead flashing or exposed beneath the ridge beam within attics. However, they also use cracks and holes in trees and sometimes bat boxes. The whiskered bat is one of our least studied species and further work is required to establish its status in Ireland.

Brandt's bat *Myotis brandtii*

This species is known from five specimens found in Counties Wicklow (Mullen, 2007), Cavan, and Clare in 2003, a specimen in Kerry in 2005²³ and another in Tipperary in 2006.²⁴ No maternity roosts have yet been found. It is very similar to the whiskered bat and cannot be separated by the use of detectors. Its habits are similar to its sibling.

Family Rhinolophidae:

Lesser horseshoe bat *Rhinolophus hipposideros*

This species is the only representative of the Rhinolophidae or horseshoe bat family in Ireland. It differs from our other species in both habits and looks, having a unique nose leaf with which it projects its echolocation calls. It is also quite small and, at rest, wraps its wings around its body. Lesser horseshoe bats feed close to the ground, gleaning their prey from branches and stones. It often carries its prey to a perch to consume, leaving the remains beneath as an indication of its presence.

The echolocation call of this species is of constant frequency and, on a heterodyne bat detector, sounds like a melodious warble. The species is confined to six counties along the Atlantic seaboard: Mayo, Galway, Clare, Limerick, Kerry and Cork. The current Irish national population is estimated at 12,500 animals. This species is listed on Annex II of the EC Habitats Directive and 41 Special Areas of Conservation have been designated in Ireland for its protection. Where it occurs, it is often found roosting within farm buildings.

²³ Kelleher, C. 2006a Nathusius pipistrelle *Pipistrellus nathusii* and Brandt's Bat *Myotis brandtii* - New Bat Species to Co. Kerry – Irish Naturalists' Journal 28: 258.

²⁴ Kelleher, C. 2006b Brandt's Bat *Myotis brandtii*, New Bat Species to Co. Tipperary. Irish Naturalists' Journal 28: 345.

Landscape Suitability for Bats

The National Biodiversity Data Centre (NBDC) maps landscape suitability bats based on Lundy *et al.* (2011). The maps are a visualisation of the results of the analyses based on a 'habitat suitability' index. The index ranges from 0 to 100 with 0 being least favourable and 100 most favourable for bats. The overall assessment of bat habitats for the current study area is given as 33.67, a Moderate score with the maximum average for all bats being between 36.44 and 58.55. Table 11 gives the suitability of the study area for the bat species found in the study area (based on NBDC) along with their Irish Red List Status (from Marnell *et al.*, 2019).²⁵

Table 11 Suitability of the study area for the bat species found in the Newcastle West area (based on the NBDC data) with Irish Red list status indicated

Common name	Scientific name	Suitability index	Irish red list status
All bats	-	33.67	Least Concern
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	47	Least Concern
Brown long-eared bat	<i>Plecotus auritus</i>	50	Least Concern
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	47	Least Concern
Lesser-horseshoe bat	<i>Rhinolophus hipposideros</i>	10	Least Concern
Leisler's bat	<i>Nyctalus leisleri</i>	46	Least Concern
Whiskered bat	<i>Myotis mystacinus</i>	21	Least Concern
Daubenton's bat	<i>Myotis daubentonii</i>	39	Least Concern
Nathusius' pipistrelle	<i>Pipistrellus nathusii</i>	9	Least Concern
Natterer's bat	<i>Myotis nattereri</i>	34	Least Concern

Bat Roosts

Bats were originally cave and tree dwelling animals but many now find buildings just as suitable for their needs. Bats are social animals and most species congregate in large colonies during summer. These colonies consist mostly of females of every reproductive class, with some juvenile males from the previous year. Male bats normally roost individually or in small groups meeting up with the females in the late autumn-early winter, when it is time to mate. In summer, bats seek warm dry buildings in which they can give birth and suckle their young. In winter, they seek out places with a constant low temperature and high humidity where they can become torpid and hibernate during adverse weather conditions. However, bats do not hibernate continuously during winter and will awake and hunt during mild nights when there are insects available and it is energetically advantageous to forage.

²⁵ Marnell, F., Looney, D. & Lawton, C. (2019) Ireland Red List No. 12: Terrestrial Mammals. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.

Maternity Roosts

Maternity roosts are the most significant roosts and they are predominantly all-female aggregations that are formed from late May onwards and remain as a relatively cohesive unit until mid to late August. Not all female bats give birth annually. These females that do bear young in a given year avail of a suitable building, tree and sometimes cave (or equivalent). The young are flightless for several weeks and hence are vulnerable to dangers such as tree felling and restoration, reinforcement or demolition of structures such as buildings and bridges.

Mating Roosts

Most bat species mate in autumn but pregnancy does not occur until the following spring. During this time males will take possession of a cavity in a building, tree, bridge, cave or mine and attract females to these sites to establish a harem. Male bats call both from a perch and in flight in much the same manner that male birds sing.

Hibernation Roosts

Bats have a high metabolic rate and in temperate countries, such as Ireland, flying insects are not available in sufficient numbers during winter to sustain bats. Therefore, bats hibernate during winter. In hibernation sites, bats are often completely inactive for several days and are extremely vulnerable to disturbance by human activities due to the time taken for them to become sufficiently active to allow escape. Hibernation may extend from November to the end of March, during which time bat activity will take place sporadically.

Night Roosts

These are roosts which are used as resting places for bats between foraging bouts. They also provide retreats for bats from predators or during inclement weather conditions. They also function as feeding perches and may be important for socialising. Likewise treelines and hedgerows have potential for nesting birds during spring/summer and also as commuting/foraging routes for bats.

3.3 Aquatic Environment

There are drainage ditches on the site that drain to the River Daar. The water quality of the general area is shown as Figure 8. The site is located within Hydrometric Area '24 –Shannon Estuary South'.

It is within WFD Catchment 25D , WFD Subcatchment 'Deel[Newcastlewest]_SC_040' and WFD River Sub-Basin 'DEEL (NEWCASTLEWEST)_090'

The 2013-2018 WFD River Status of 'DEEL (NEWCASTLEWEST)_090' is 'Moderate' and the 2013-2018 WFD River Risk Status of 'DEEL (NEWCASTLEWEST)_090' is 'At Risk'

The 2013-2018 WFD Groundwater Body Status of 'Newcastle West' is 'Good' and the 2013-2018 WFD Groundwater Body Risk Status of 'Newcastle West' is 'Review'

The most recent and relevant Q-Value rating EPA point d/s of site is along the River Deel at Station 'Grange Br (D46)' Q3-4 Moderate Status in 2020 (2km northeast of site).

3.4 Field Surveys

3.4.1 Flora

The site visit was conducted on May 10th 2022. A habitat map is shown as Figure 9 and Plates are attached as Appendix B.

. The site visit found the predominant habitat to be Improved agricultural grassland (GA1). Species recorded within this grassland area included yellow iris (*Iris pseudacorus*), hedge mustard (*Sisymbrium officinale*), meadow foxtail (*Alopecurus pratensis*), cocksfoot (*Dactylis glomerata*), perennial rye grass (*Lolium perenne*), crested dogs tail (*Cynosurus cristatus*) cuckoo flower (*Cardamine pratensis*), greater plantain (*Plantago major*), curled dock (*Rumex crispus*), broad leaved dock (*Rumex obtusifolius*), creeping buttercup (*Ranunculus repens*), meadow buttercup (*Ranunculus acris*), dandelion (*Taraxacum vulgaria*), common nettle (*Urtica dioica*), springy turf-moss (*Rhytidiadelphus squarrosus*) and soft rush (*Juncus effusus*). The site boundary bordering the adjacent Sycamore Crescent residential development located to the west and south of the site is delineated by a timber fence and the existing walls of that development. These features are classified as Buildings and artificial surfaces (BL3).

A combination of hedgerow (WL1) and treeline (WL2) dominated by hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), elder (*Sambucus nigra*), willow (*Salix spp.*), ash (*Fraxinus excelsior*), apple trees (*Malus domestica*), bramble (*Rubus fruticosus agg.*) and ivy (*Hedera helix*) bisects the site from north to south and is also present along the site's northern and southern boundaries.

A number of vegetated Drainage ditches [FW4] are present within the site, including along sections of the north-western boundary of the site, along the hedgerow that bisects the site from north to south and also at the south east of the site running from west to east.

Small areas to the north and north-west of the site, dominated by bramble, blackthorn and common nettle (*Urtica dioica*), were categorised as Scrub (WS1).

There are no watercourses within the proposed development site, however the Daar river is located approximately 50m to the east of the proposed development. The river is classified as an Eroding/upland river [FW1].

No Annex I listed habitats or supporting habitat for Annex II plant species were identified within or adjacent to the proposed development site.

No invasive species listed under Regulations 49 and 50 of the Third Schedule of the European

Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) were recorded within the development site boundary. The non-native invasive species, Himalayan balsam (*Impatiens glandulifera*), was identified outside of the

development site boundary along the bank of Daar River. This species is listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011.

Ecological evaluation follows a methodology that is set out in Chapter 3 of the 'Guidelines for Assessment of Ecological Impacts of National Roads Schemes' (2009)²⁶. The habitats within and adjacent to the works site were evaluated in accordance with the criteria developed by the NRA (2009), which classifies sites in terms of their ecological importance, i.e. 'international importance', 'national importance', 'county importance', 'local importance (higher value)' or 'local importance (lower value)'.

None of the habitats within the development site correspond to habitats listed on Annex I of the EU Habitats Directive. No supporting habitat for any Qualifying Interest species associated with any European sites were recorded within the proposed development site. The buildings and artificial surfaces, scrub, grassland habitats and drainage ditches were assigned Local Importance (Lower Value).

The hedgerows and treelines within the site boundary have been classified as Local Importance (Higher Value) as they are essential in maintaining connectivity and ecological corridors between features of higher ecological value in the surrounding environment. They provide 'low' suitability for bat roosting due to the lack of suitable cracks and cavities in the trees.

The Daar river located to the east of the development site boundary has been classified as Local Importance (Higher Value) as it is a semi-natural habitat presenting a high degree of naturalness and biodiversity which also supports a suitable habitat for Otter. It also helps maintain links and ecological corridors between features of higher ecological value. The river lies entirely outside of the development site boundary and will not be disturbed by the proposed works.

Table 12 Ecological Importance of habitats on site

Habitat Types	Ecological Importance	Rating
Treelines (WL2)/Hedgerows (WL1)	Some of the larger trees onsite have bat roost potential. May also harbour nesting birds. Also important for commuting and foraging bats, birds, other mammals and invertebrates. Affected trees should be assessed for bat roost potential prior to felling.	Local Importance (Higher Value)
Scrub (WS1)/ Grassy Verges (GS2)	This grassland and scrub is located at the base of some treelines and hedgerows. Important for pollinators, and other wildlife. A pre-	Local Importance (Higher Value)

²⁶ <https://www.tii.ie/technical-services/environment/planning/Guidelines-for-Assessment-of-Ecological-Impacts-of-National-Road-Schemes.pdf>

Habitat Types	Ecological Importance	Rating
	clearance search for badgers setts should be carried out in the winter when scrub has died back.	
Improved Grassland (GA1)	Habitat of low biodiversity	Local Importance (Lower Value)
Buildings and Artificial Surfaces (with Walls and Fencing) (BL3)	Habitats of no biodiversity	None assigned
Drainage Ditches (FW4)	Habitats of no biodiversity	None assigned
Eroding Rivers (FW1)	Important for wildlife and biodiversity.	Local Importance (Higher Value)

3.4.2 Fauna

No protected fauna were recorded within the proposed works site on the day of the site visit.

Birds

A total of 9 bird species were noted during the May 2022 survey which are Green-listed species²⁷ and not of conservation concern.

- Robin (*Erithacus rubecula*),
- Blackbird (*Turdus merula*),
- Magpie (*Pica pica*),
- Pied Wagtail (*Motacilla alba*),
- Woodpigeon (*Columba palumbus*)
- Winter Wren (*Troglodytes troglodytes*)
- Jackdaw (*Corvus monedula*),
- Hooded Crow (*Corvus cornix*)
- Bluetit (*Cyanistes caeruleus*)

Bats

There are no affected structures onsite for demolition that may contain bats. The trees onsite for removal include some specimens with high ivy cover so could be considered of 'Low' bat roost potential for bats.²⁸

A bat activity survey was undertaken the evening of 10th May 2022 from 20.55 to 23.00 (sunset was 21.17). There was a total of three species detected on the night which was undertaken using the appropriate guidelines.²⁹ A bat activity map is

²⁷ 5 Colhoun K. & Cummins, S. 2013 Birds of Conservation Concern in Ireland 2014-19. Irish Birds 9:523-544

²⁸ Bat Surveys for Professional Ecologists: Good Practice Guidelines (J., Collins (Bat Conservation Trust), 2016²⁸).

²⁹ 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

shown as Figure 10. The bat results from the survey are shown in Appendix D and summarised as follows:

- Common Pipistrelle – 6 Passes
- Leisler's Bat – 4 Passes
- Soprano Pipistrelle – 16 Passes

Badger and Otter

Mammal tracks were noted along field boundaries into thick scrub, possibly caused by foxes, rabbits (not protected) or badgers (protected).

Badger setts are best carried out in winter when scrub vegetation has died back. The scrub areas were therefore not fully assessed due to their extent and inaccessibility in May 2022, and therefore Badger setts could not be completely ruled out. A preconstruction / site clearance badger survey is recommended.

The Daar river, located >50m to the east of the development has potential to support otter.

A comprehensive search for otter (*Lutra lutra*) was undertaken of the Daar River otter in line with NRA guidelines. No evidence of otter including spraints, holts, prints, resting sites or slides were recorded along the river near the site. The development site itself does not provide potential resting or breeding habitat for this species.

Amphibians, Reptiles and Invertebrates

A common range of pollinating insects, such as bees, hoverflies, butterflies and moths frequent the site. Smooth Newt and Common Frog are unlikely to be present due to the lack of aquatic habitat. They may be present along the Daar River. Common Lizard was not observed on the site.

Invasive Species

No non-native invasive species that are regulated for control under the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477) were recorded within the study area. The non-native invasive species, Himalayan balsam (*Impatiens glandulifera*), was identified outside of the development site boundary along the bank of Daar River. This species is listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011.

4.0 IMPACT ASSESSMENT

4.1 Introduction

The information gathered as part of the desk study and field survey for this proposed application has been used to complete an Ecological Impact Assessment (EclA). This EclA has been undertaken following the latest guidelines set out by CIEEM (2018) and the EPA.

The identification of potential impacts and the assessment of their significance typically require the identification of the type and magnitude of the impacts. For example, will the impacts be short term or long term, direct, indirect or cumulative and will they occur during construction or operation. This section will establish whether ecological impacts of the proposed development at The Commons are likely to occur and whether or not they are significant. These potential impacts will be examined with respect to the ecological receptors identified in the previous section.

The emphasis in EclA is on “*significant*” effects, rather than all ecological effects (CIEEM, 2018). For the purpose of EclA, a “significant effect” is an effect that either supports or undermines biodiversity conservation objectives for important ecological features for biodiversity in general. Conservation objectives may be specific (e.g., for a designated site) or broad (e.g., national / local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local.

A significant effect is an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting the project. In broad terms, significant effects encompass impacts on structures and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution) (CIEEM, 2018).

4.2 Designated Areas

The Appropriate Assessment Screening Report (MKO, 2021) concluded that the proposed development will have no direct, indirect or cumulative impacts upon any site designated as a Special Area of Conservation, Special Protection Area or (proposed) National Heritage Area due to distance and/or lack of hydrological connections. However, a Natura Impact Statement (AEE, 2022) found a hydrological connection via the Daar River to the Deel River which becomes part of the Lower River Shannon SAC. In addition mitigation measures are needed as part of this development to protect the water quality of the Daar River.

With the implementation of the mitigation measures proposed, the Appropriate Assessment concludes the proposed development will not adversely affect (either directly or indirectly) the integrity of any European site, either alone or in-

combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion.

4.3 Construction Phase

4.3.1 Habitat Loss & Fragmentation

The main habitats affected are of low or no ecological importance which is Improved Grassland. No mitigation is required for the change of use of these habitat types.

Mitigation is required for the replacement and/or protection of any treelines/hedgerows which are of moderate conservation importance.

4.3.2 Invasive Species

Mitigation is required to prevent the introduction of invasive species onto the site during the construction phase of the proposed development.

4.3.3 Disturbance

Disturbance to local wildlife – The removal of vegetation during the bird nesting season could result in direct mortality of birds. In addition, during site preparation and construction, local populations of birds and mammals may be disturbed by the increase in noise, traffic and human activity. Bird nesting sites may also be lost. Overall, the loss of the open land and any treelines/hedgerows/scrub habitats may reduce the loss of nesting, roosting and foraging areas for some bird species.

It is possible that bats roost and forage within the site as the site has a Moderate bat suitability index for various bat species. There is a series of mature trees for removal to facilitate the development.

Trees and hedgerows may be used by nesting birds during the period March 1st to August 31st or by roosting bats if potential bat roost features are present.

Potential secondary/indirect impacts upon bats include the loss of foraging and commuting habitats and features. There is also the potential for disturbance of commuting and foraging bats through the impact of additional lighting that may be used during the construction and operational phase. The species potentially utilising this site most - common pipistrelle, soprano pipistrelle and to a lesser degree Leisler's bat – are less sensitive to light pollution than the Myotis species.

Without mitigation, these impacts are considered significant at the local scale.

4.3.4 Water Quality

Site preparation and construction will involve the excavation of soil and the pouring of concrete for foundations and other hard surfaces. Therefore, these works have the potential to generate run-off into this feature. If appropriate mitigation measures are not taken during the construction of the proposed development, then there is

the possibility that water quality of the general area is negatively impacted upon. Possible direct impacts include the pollution of the waters during construction with silt, oil, cement, hydraulic fluid etc. These substances would also have a toxic effect on the ecology of the water in general, directly affecting certain species and their food supplies. Pollution of the water with hydrocarbons, cement and concrete during the construction phase of this proposed development could also have a negative effect on the fish and aquatic invertebrate populations of downstream watercourses.

Mitigation measures will be implemented to ensure no surface run-off from the site.

4.4 Operational Phase

The majority of impacts will occur during the development phase of this development. However, certain ongoing impacts on local habitats / wildlife may occur during the operation of the development.

4.4.1 Disturbance to local wildlife

Once operational, the proposed development will facilitate many new buildings, all of which are associated with human activity. Overall, this will deter wildlife from the site; however the site is an existing live school site so this impact is negligible given current use.

4.4.2 Lighting

The proposed development may be associated with an increase in the level of baseline light in the area. This may affect bat species, in particular it will affect the foraging behaviour of those species that are light intolerant. If lighting is directed at a known roost emergence point e.g. at a bat potential tree, then this may affect bat species.

4.4.3 Pollution (Foul and Surface Water Discharge)

No mitigation required.

4.4.4 Landscaping

Inappropriate landscaping of the application site may inadvertently result in the introduction of non-native and invasive plant species.

5.0 MITIGATION MEASURES FOR ECOLOGY

The primary method of mitigation for any development should be avoidance of that impact. Consideration was therefore given to avoiding any direct or indirect impacts on the sensitive ecological receptors within the site.

In order to avoid protect the existing ecological features on site and surrounding area, the following mitigation measures are recommended below.

5.1 Flora

5.1.1 Habitat Loss

As stated in Section 3.4.1 the only habitats of moderate local importance from a biodiversity perspective as are the grassy verges, treelines and hedgerows around the site on the boundaries.

Native and local hedging stock should be used for landscaping purposes around the proposed development to replace any non-native trees/hedging removed. Any specimen trees which are mature (including non-native) should be retained where possible as these are ecologically important in the local context. Native species e.g. ash, hawthorn, blackthorn, hazel, alder (only *Alnus glutinosa*), birch (*Betula pubescens*), willow (mainly *Salix cinerea* and *S. aurita*), native holly (*Ilex aquifolium*), and oak (*Quercus petraea*) are potential species to use in a landscaping plan. Native tree species and pollinator friendly planting information is attached as Appendix E.

A 'Root Protection Areas' has been calculated as outlined in the Transport Infrastructure Ireland's (formerly National Road Authority (NRA) 'Guidelines for the Protection and Preservation of Trees, Hedgerows and Scrub Prior to, During and Post Construction of National Road Schemes'³⁰. Excavation works carried out within the RPA be undertaken with extreme care and should be carried out with due diligence, avoiding damage to the protective bark covering larger roots. This may involve excavation by mini-digger and/or hand as deemed appropriate. Exposed roots should be wrapped in a hessian sacking to avoid desiccation and roots less than 2.5cm in diameter can be pruned back to a side root. Trunk protection should also be put in place using hessian sacking and timber strips clad around the tree, in order to mitigate any potential damage that may occur.

The site specific tree report will detail Root Protection Areas of the trees on site to be retained. Some trees may be recommended for removal due to their physical condition (as opposed to being located within the footprint of works) and in this instance these should be retained as Biodiversity Value would take precedence in terms of their inherent value for birds and bats, and associated invertebrate species.

5.1.2 Non-Native Invasive Species

³⁰ <https://www.tii.ie/technical-services/environment/construction/Guidelines-for-the-Protection-and-Preservation-of-Trees-Hedgerows-and-Scrub.pdf>

No listed invasive species were noted on the site. There is the possibility of seeds and leaf fragments being introduced via construction material. In that regard quarries supplying material for the project should be able to give written confirmation to the client that material from their depot is free of non-native invasive species and noxious weeds.

The guidelines '*On the management of noxious weeds and non-native invasive plant species on National Roads*' (NRA 2010)³¹ should be followed.

5.1.3 Landscaping

The landscaping of the site offers the potential for biodiversity enhancements within the site. Future landscaping of the site should adhere to the following recommendations:

- Field boundaries containing mature treelines and hedgerows should be retained where possible and undisturbed
- Where natural verges along the treelines and hedgerows can be retained they should be managed appropriately for the benefit of wildlife. They should not be sprayed with herbicide and a low intensity mowing or strimming regime should be incorporated. This will benefit local pollinators.
- The retention of a 10m buffer zone from the retained site boundaries should be included providing ample opportunity for the creation of an area of local biodiversity value.
- Guidelines outlined in the All-Ireland National Pollinator Plan³² should be followed.
- Native trees and shrubs should be the focus for landscaping, followed by non-native, non-invasive species that provide early sources of nectar for pollinating insects, e.g., willow, single flowered ornamental cherries, apple blossom etc.
- A proportion of the new school ground habitats within the site should be managed through methods that mimic traditional grassland management (low level mowing regimes). This will benefit local pollinators. Locally sourced wildflower seed would also be beneficial.
- Where possible the importation of topsoil from outside the area should be avoided.
- Allow some areas to go 'wild' where bramble and scrub, etc. can develop.
- Garden plants that have the potential to become invasive must be avoided.

³¹ <https://www.tii.ie/technical-services/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf>

³² <https://pollinators.ie/>

- Water features, e.g., attenuation ponds, could be incorporated into the development as additional wildlife features.

5.2 Fauna

5.2.1 Birds

Any removal of trees/hedgerows for the proposed development should take note of the bird nesting season March 1st to August 31st each year (Section 40 of the Wildlife Act, 1976, as amended by Section 46 of the 2000 Act). Any removal of trees/hedgerows (if necessary) within this timeframe will require a licence from the Minister for Environment, Heritage and Local Government.

Supplementary planting of any trees/hedgerows removed should form part of the landscape plan and include semi mature, native Irish species to offset any negative impacts. A temporary loss of nesting sites should be mitigated by installing a series of ~10 bird boxes around the existing site of different types for various species. The appointed ecologist can suggest placement and type at later date.

5.2.2 Bats

5.2.2.1 Lighting for Bats

In order to preserve the roost potential of the trees to be retained on site and to minimise disturbance to bats utilising the site in general, the lighting and layout of the proposed works should be designed to minimise light-spill onto habitats both within and adjacent to it that are used by the local bat population foraging or commuting. This can be achieved by ensuring that the design of lighting accords with guidelines presented in the Bat Conservation Trust & Institute of Lighting Engineers 'Bats and Lighting in the UK - Bats and Built Environment Series', the Bat Conservation Trust 'Artificial Lighting and Wildlife Interim Guidance' and the Bat Conservation Trust 'Statement on the impact and design of artificial light on bats'. Therefore, where possible, the lighting scheme should include the following:

- The avoidance of direct lighting of existing and retained trees, hedgerows, scrub, or proposed areas of habitat creation / landscape planting.
- Unnecessary light spill controlled through a combination of directional lighting and hooded / shielded luminaires or strategic planting to provide screening vegetation.
- Where appropriate, luminaires on the site boundary could be fitted with light baffles to prevent light spill onto adjacent habitats.
- Lighting levels should be the minimum required for health and safety requirements, where possible.
- Vegetated areas around the perimeter should not be lit up nor lighting directed towards it. Lighting in these areas should not increase beyond existing lux levels or 1 lux, whichever is the lesser.

- Vertical light spill at light sources should be below 3m to avoid potential bat flight paths.
- No floodlighting should be used – this causes a large amount of light spillage into the sky. The spread of light should be kept below the horizontal.
- Hoods, louvres, shields or cowls should be fitted on the lights to reduce light spillage.
- Lights should be of low intensity. It is better to use several low intensity lights than one strong light spilling light across the entire area. Narrow spectrum lighting should be used with a low UV component. Glass also helps reduce the UV component emitted by lights.
- The source of light should be Light Emitting Diodes (LEDs) as this is a narrow beam that is highly directional and a highly energy efficient light source. The lighting should allow for a light level of 3 lux at ground level at the perimeter of the development area. This low lighting is thus easier to control both the direction but also the actual light level because it is so close to the target area.

5.2.2.2 Bat Potential Structures & Trees

A pre-felling bat survey of trees with potential bat roost features should be undertaken during September/October. If bats are roosting in affected trees then a derogation licence will be required from the NPWS.

For trees to be removed the following timing and felling technique should be implemented:

- Tree-felling should be undertaken in the period late August to late October/early November. During this period bats are capable of flight and this may avoid risks associated with tree-felling.
- Felling during the winter months should be avoided as this creates the additional risk that bats may be in hibernation and thus unable to escape from a tree that is being felled. Additionally, disturbance during winter may reduce the likelihood of survival as the bats' body temperature is too low and they may have to consume too much body fat to survive.
- Tree-felling should be undertaken using heavy plant and chainsaw. There is a wide range of machinery available with the weight and stability to safely fell a tree. Normally trees are pushed over, with a need to excavate and sever roots in some cases. In order to ensure the optimum warning for any roosting bats that may still be present, an affected tree should be pushed lightly two to three times, with a pause of approximately 30 seconds between each nudge to allow bats to become active. Any affected trees should then be pushed to the ground slowly and should remain in place for a period of at least 24 hours, and preferably 48 hours to allow bats to escape.

- Trees felled should NEVER be sawn up or mulched immediately in case protected wildlife is present.
- Trees used for future landscaping should comprise of semi-mature native Irish species.

5.2.2.3 Mitigation for Bat Roosts

A series of 5+ bat boxes should be erected on trees around the site to provide future roosting opportunities. The type recommended is the 2F Schwegler Bat Box.³³ The appointed ecologist can suggest placement and type at later date.

If any trees require a derogation licence (as per results from the pre-felling survey) then additional roosting mitigation may be required.

5.2.3 Badger

No obvious badger setts were uncovered during the site visit however levels of scrub were high. A preconstruction / Site Clearance survey is required, preferably during the winter season. If badger setts are uncovered a derogation licence from the NPWS will be required if they are affected, or within the zone of impact.

5.3 Water Quality Mitigation

5.3.1 Surface Water Management

Run-off into excavations/earthworks cannot be prevented entirely and is largely a function of prevailing weather conditions. Care will be taken to ensure that exposed soil surfaces are stable to minimise erosion. All exposed soil surfaces will be within the main excavation site which limits the potential for any offsite impacts. All run-off will be prevented from directly entering any water courses as no construction will be undertaken directly adjacent to open water.

It is envisaged that no significant dewatering will be required during the construction phase which would result in the localised lowering of the water table. There may be localised pumping of surface run-off from the excavations during and after heavy rainfall events to ensure that the excavations are kept safe and relatively dry.

The measures outlined in the following sections will be put in place during the construction phase to ensure protection of surface waterbodies.

Standard best practice environmental controls (i.e. soil and water management) to protect the surrounding environment will be implemented during construction and operation to minimise any potential risk of surface and/or groundwater pollution through, siltation, nutrient release and/or contamination. While primarily designed to address environmental risks associated with the development site only, these standard best practice environmental controls, will also serve to minimise potential

³³ Available here: <https://www.nhbs.com/search?q=bat+boxes&qtvview=158629>

construction phase run-off impacts into the wider environment even if this is not the primary aim of these protection measures.

During the construction phase as part of standard practice, appropriate mitigation measures to prevent water pollution to any watercourses near the site will be implemented during all of the construction phases and will include referral to:

1. Control of Water Pollution from construction Sites, Guidance for consultants and contractors (C532)
2. Environmental Good Practice on Site (3rd edition) (C692)
3. Inland Fisheries Ireland (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters.
4. Inland Fisheries Ireland (2020) Planning for Watercourses in the Urban Environment - A Guide to the Protection of Watercourses through the use of Buffer Zones, Sustainable Drainage Systems, Instream Rehabilitation, Climate / Flood Risk and Recreational Planning (Including one-off developments)

These measures include the release of suspended solids and contaminants (e.g. cement and oil) during construction and are listed below.

Reduction and Prevention of Suspended Solids

Inland Fisheries Ireland (2016) guidelines will be followed by the contractor. Release of suspended solids will be kept to a minimum. The key factors in erosion and sediment control are to intercept and manage on-site runoff. This limits the potential for soils to be eroded and enter the drainage network, in runoff.

Measures will be put in place to ensure that suspended solids in any runoff from the construction area, machinery access routes or any other land based source does not exceed 25mg/l. The construction manager will be responsible for overseeing the environmental protection measures listed. The main mitigation measures are:

1. Silt fencing will be installed around the perimeter of the site, and alongside the palisade fence with the drainage ditches beyond to ensure no site runoff, see Figure 4. The location of the silt fencing will be determined in the construction stage CEMP and will be subject to a detailed assessment of the area or phase to be developed. The purpose of the silt fencing is to prevent silt laden water leaving the site and entering neighbouring land with the potential to impact nearby watercourses. A typical silt fence detail is shown below;³⁴ See Also Appendix F.

³⁴ **Silt Fencing** (<https://acfenvironmental.com/>)



It will consist of a double layer of geotextile membrane fixed to wooden stakes approximately 600mm high. The membrane will be anchored into the ground to form a continuous barrier to silt laden water from the works site. Silt fences will be monitored via a silt inspection log (to be maintained by the construction manager) and periodically maintained during the construction period. Typical maintenance will consist of repairs to damaged sections of membrane and removal of a build-up of silt on the upslope side of the fence. Daily silt fence inspections are recommended as part of their operation ensuring that any necessary repairs can be expedited.

2. Drainage ditches will be installed to intercept surface water where there is a risk of significant water flow into excavations or on to adjoining lands. There will also be a requirement to periodically pump water from excavations. All collected and pumped water will have to be treated prior to discharge. The run-off will be directed through appropriately sized settlement ponds to remove suspended solids.
3. Emergency contact numbers for the Local Authority Environmental Section, Inland Fisheries Ireland, the Environmental Protection Agency and the National Parks and Wildlife Service will be displayed in a prominent position within the site compound. These agencies will be notified immediately in the event of a pollution incident.
4. Site personnel will be trained in the importance of preventing pollution and the mitigation measures described here to ensure same.
5. The construction manager will be responsible for the implementation of these measures. They will be inspected on at least a daily basis for the duration of the works, and a record of these inspections will be maintained.

Flooding

The site is not within a flood risk zone, as per CFRAM maps.

Control of cement run off

The washing out of concrete delivery vehicles is a potential source of pollution and shall be carried out in designated wash out areas only. Wash-out areas will be provided with an impermeable liner to contain all cement laden water and then taken off site for appropriate disposal. Raw or uncured waste concrete will be removed from site and disposed of in accordance with the relevant waste management legislation. Signage shall be erected to clearly identify the wash-out areas. Sufficient wash-out areas shall be provided to cater for all vehicles at peak delivery times. On-site batching of concrete is not envisaged, but ready to use mortar silos are often used for residential developments. These systems involve the delivery and storage of dry cement and aggregates in silos, water is added at the point of delivery to make mortar or plaster. The following controls shall be put in place for the on-site batching of mortar and render:

- The plant shall be maintained in good condition.
- Delivery of cement shall be means of a sealed system to prevent escape of cement.
- Emergency procedures shall be in place to deal with accidental spillages of cement or mortar.

Accidental Spills and Leaks

No bulk chemicals will be stored within the active construction areas. Temporary oil and fuel storage tanks may be kept in the material storage area in suitable containers and will be stored on appropriately bunded spill pallets as required. Any fuel and oil stored onsite shall be stored on bunded spill pallets approved under BS EN 1992-3:2006). All bunds will be impermeable and capable of retaining a volume of equal to or greater than 1.1 times (>110%) capacity of the containers stored on them. In the event of a spillage, excess oil or fuel will be collected in the bund.

Refuelling of vehicles and the addition of hydraulic oils or lubricants to vehicles will be undertaken offsite where possible. Where this is not possible, filling and maintenance will take place in a designated material storage compound. Spill protection equipment such as oil booms, oil soakage pads, socks and sand will be available in clearly marked bins/silos and in construction vehicles to be used in the event of an accidental release during refuelling. Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the site and disposed of in accordance with all relevant waste management legislation. Training will be given to site workers in how to manage a spill event.

Prior to any work commencing on site, all construction equipment will be checked to ensure that it is mechanically sound, to avoid leaks of oil, hydraulic fluids and grease.

Measures will be implemented to minimise waste and ensure correct handling storage and disposal of waste.

Emergency response procedures will be put in place.

Monitoring

Daily checks will be carried out and recorded in a Surface Water Management Log to ensure pollution control measures are being adhered to. A daily log of inspections will be maintained, and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not reoccur.

Contingency Plan for Mitigation Failure

1. The mitigation measures will be implemented prior to the relevant works being carried out.
2. During the construction stage the following procedures will be undertaken in response to any pollution incident at the site:
 - The source and/or activities relating to the incident will be stopped immediately
 - Adequate steps will be taken to filter and/or slow down the rate of discharge/slippage
 - The relevant authorities, such as EPA, IFI etc., will be contacted immediately

As noted in Section 3.3 (see also Figure 8) the DEEL (NEWCASTLEWEST)_090 water quality in the area is considered to be 'At Risk'. In that regard it is paramount this development does not degrade the water quality. The following mitigation measures will ensure no impacts to water quality due to the proposed development.

Construction Phase

- Site preparation and construction must be confined to the development site only and should adhere to all standard best practice measures and the measures outlined in this EclA. Work areas should be kept to the minimum area required to carry out the proposed works and the area should be clearly marked out in advance of the proposed works.
- All construction waste must be removed from site by a registered contractor to a registered site. Evidence of the movement and safe disposal of the construction waste must be retained and presented to Local Authority upon request. The applicants and construction contractors will be responsible for the safe removal of any construction waste generated on site. Removal of the construction waste will occur as soon as possible after construction works.

- Efficient construction practices and sequences should be employed on site, and this will minimise soil erosion and potential pollution of local watercourses with soil and sediment. Unnecessary clearance of vegetation should be avoided and only areas necessary for building works should be cleared. Supplemental planting and careful management of these areas will increase the biodiversity value of the site in the future. The retention of these areas will also help retain storm water run-off from the site during construction and operation. Works within the site should be avoided during periods of heavy rainfall.
- In-stream works (if any) should confirm to the '*Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters*' (IFI, 2016).³⁵
- There should be no discharges of contaminated waters to ground or surface waters from these developments, either during the construction or operation of the development. The control and management of hydrocarbons on site will be vital to prevent deteriorations in surface and groundwater quality locally. The following measures must be employed on site:
 - On-site refuelling must be carried out at designated refuelling stations within the site. Only designated trained and competent operatives should be authorised to refuel plant on site. Drip trays must be used when refuelling all machinery. Absorbent material and pads should be available in the event of any accidental spillages.
 - Alternatively, mobile double skinned fuel bowzers may be used. Fuel bowzers should be parked on a level area in the site when not in use. They should be bunded at 110%.
 - There must be minimal maintenance of construction vehicles or plant on site.
 - On-site diesel tanks should be double skinned to 110% of their capacity.
 - Containment stores should be used for refuelling of small plant such as consaws etc.
 - Fuel volumes stored on site should be minimised. Any fuel storage areas should be bunded appropriately for the fuel storage volume for the time period of the construction.
 - Machines used should be regularly inspected for leaks and fitness for purpose.
 - Any hazardous materials should be stored in secure bunded areas.

³⁵ <https://www.fisheriesireland.ie/documents/624-guidelines-on-protection-of-fisheries-during-construction-works-in-and-adjacent-to-waters/file.html>

- An emergency plan for the construction phase to deal with accidental spillages should be contained within an Environmental Management Plan.
 - Waste oils and hydraulic fluids should be collected in leak-proof containers and removed from site for disposal and recycling
- Best practice concrete / aggregate management measures should be employed on site. These should include:
 - Best practice in bulk-liquid concrete management must be employed on site addressing pouring and handling, secure shuttering, adequate curing times etc.
 - Stockpile areas for sands and gravel should be kept to a minimum size, well away from the drains and watercourses (minimum 50m).
 - Where concrete shuttering is used, measures should be put in place to prevent against shutter failure and control storage, handling and disposal of shutter oils.
 - Wash down water from concrete trucks will be appropriately controlled on-site. Such controls may include collection to allow sediment to settle out and reach neutral pH before clarified water is released to the local watercourse or allowed to percolate into the ground.
 - Activities which result in the creation of cement dust should be controlled by dampening down the areas.
 - Raw and uncured waste concrete should be disposed of by removal from the site or by burial on the site in a location and manner which will not impact upon local watercourses.
 - Stockpile areas for sands and gravel should be kept to a minimum size and away from watercourses.
- During construction, surface water on the site must be controlled and management to avoid any impacts upon local ground or surface water receptors. Construction water should not be discharged directly into any watercourse. Good construction practices such as wheel washers and dust suppression measures must be undertaken. There must be no discharges of silt laden surface water into the public sewer.
- Guidelines within The Construction Industry Research and Information Association (CIRIA) provides guidance on the control and management of water pollution from construction sites (*'Control of Water Pollution from Construction Sites, guidance for consultants and contractors', CIRIA, 2001*). Guidelines within this document must be followed.

- The techniques of SUDs (Sustainable urban Drainage Systems) should be applied to all hydrological engineering aspects of this proposed development.

5.3.2 Surface Water Drainage

A new surface water sewer network shall be provided for the proposed development which will be entirely separate from the foul water sewer network. Surface water run-off from roof areas and hardstanding areas are designed to be collected by a gravity pipe network. Surface water will be collected and discharged via a mixture of traditional and Sustainable urban Drainage System (SuDS).

Taking the above into consideration, no indirect habitat loss or deterioration of either SAC or SPA in relation to contaminated surface-water run-off arising from the construction/operational phases of the proposed development at the study site is deemed likely.

5.3.3 Waste-Water / Foul Effluent Drainage

Indirect habitat loss or deterioration of Natura 2000 sites (including water quality) within the surrounding area can occur from the effects of run-off or discharge into the aquatic environment through impacts such as increased siltation, nutrient release and/or contamination. This requires connectivity between the study site and the Natura 2000 sites in question through watercourses and/or drainage. This potentially applies to the Upper Shannon Estuary where construction/operational stage waste-water/foul effluent will discharge via the public foul sewer network and associated WWTP when connected to the network.

As stated in Section 1.3 (Project Description) during the initial construction works, and before the residential site is connected to the public effluent sewer network, construction phase waste-water/foul effluent will be managed at a temporary site compound (e.g. site portaloos and welfare units) with all waste removed from site by licenced waste disposal. Therefore, no potential hydrological link from waste-water/effluent is relevant to any of the designated conservation sites under consideration.

In addition the following will be in place:

- The attenuation tank system will have BBA Agreement Certification and will be a site specific design.
- A maintenance plan and maintenance schedule shall be implemented.
- Retained pollutants in the Class 1 By-Pass Interceptor will be emptied from the separator once the level of oil is reached or the oil level alarm is activated. This waste will be removed from the separator under the terms of The Waste Management Code of Practice.

5.3.4 Treated Sewage Discharge

Foul water from the proposed development will connect to the existing foul water network servicing the adjacent Sycamore Crescent to the west of the site. A pre-connection enquiry was lodged with Irish Water in relation to the proposed development. Irish Water confirmed that there is capacity to accept the proposed connection to the network. The letter of confirmation from Irish Water is included in Appendix 1 of the Screening Report (MKO, 2021).

On that basis no impacts from the operational phase of the proposed development are envisaged.

5.4 Introduction/Spread of Invasive Species

No invasive species listed under Regulations 49 and 50 of the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011) were recorded within the development site boundary during the site visit in May 2022.

The non-native invasive species, Himalayan balsam (*Impatiens glandulifera*), was identified outside of the development site boundary along the bank of Daar River. This species is listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011.

Regarding the introduction of highly invasive plant species, the intended construction methodology of the client shall contain measures for avoiding the introduction and spread of non-native invasive species and will follow best practice guidance documents. The control measures shall be in accordance with the "The Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads" (NRA, 2010).³⁶ The measures outlined in the '*Horticulture Code of Good Practice*'³⁷ and the '*IFI Biosecurity Protocol for Field Survey Work*'³⁸ should be adhered to for example high-pressure steam cleaning, with water > 40°C for machinery and sprayed with Virkon antiseptic.

Quarries supplying material for the project should be able to give confirmation to the client that material from their depot is free of non-native invasive species and noxious weeds.

Good working practice concerning other environmental factors affecting ecology will be maintained during the construction phase for example construction noise and vibration impacts will be kept to a minimum.

³⁶ <https://www.tii.ie/technical-services/environment/construction/Management-of-Noxious-Weeds-and-Non-Native-Invasive-Plant-Species-on-National-Road-Schemes.pdf>

³⁷ Kelly, J. 2012. Horticulture code of good practice to prevent the introduction and spread of invasive non-native species. V2.0. Prepared as part of Invasive Species Ireland.

³⁸ IFI (2010) *IFI Biosecurity Protocol for Field Survey Work*. Inland Fisheries Ireland.

5.5 Impact Summary

Overall, the impacts of the proposed development are summarised in Table 13, whilst Table 14 attempts to quantify these impacts in terms of magnitude, extent and likelihood in the absence and presence of mitigation.

Table 13 Predicted Impacts

Impact Description	Duration	Reversible?	Positive / Negative	Predicted Impact with Mitigation
Habitat Loss and Fragmentation	Permanent	No	Negative	Negligible Impact
Pollution	Temporarily during construction and ongoing during operation	Will recover in time	Negative	With mitigation – No Impacts
Disturbance to Wildlife	Temporarily during construction and ongoing during operation	No	Negative – Significant Local Impact on Bats and Birds. Also potentially badgers if found during pre-clearance.	With mitigation – Temporary Impacts during construction phase and operational phases. Slight negative Impact
Landscaping	Permanent	No	Negative / Positive	With mitigation – Slight Positive Impacts
Impacts on Designated Sites – SACs and SPA	N/A	N/A	N/A	With mitigation – No Impacts
Impacts on Designated Sites – pNHAs	N/A	N/A	N/A	No Impacts – No Mitigation required.

Table 14 Quantification of Impacts

Impact Description	Magnitude and Extent	Likelihood	Quantification with Mitigation
Habitat Loss and Fragmentation	Existing Improved Grassland (GA1), Buildings & Artificial Surfaces (BL3)	Certain	Low biodiversity habitat transformed – negligible Impact
	Loss of Trees (WL2), hedgerow (WL1), scrub (WS1) and grassy verges (GS2)	Possible	A selection of trees and grassy verges to be removed however Enhanced with more planting – Slight Negative Impact
Pollution	None	Certain	With mitigation – No Impacts
Disturbance to Wildlife	Loss of some bird nesting sites and mammal commuting corridors.	Possible	With mitigation – Temporary Impacts during construction phase. Slight Negative Impact
	Possible Loss of bat habitats if structures for demolition contain bats.	Possible	With emergence surveys mitigation can be designed to minimise impacts. With mitigation – Slight Negative Impact.
	Potential loss of badgers setts, if present during pre-clearance (conduct survey in Winter)	Possible	With pre-construction/site clearance, mitigation can be designed to minimise impacts. With mitigation –Slight Negative Impact.
Landscaping	Introduction of Invasive / Non Native Species	Possible	With mitigation – No Impacts
	Use of Plants that are Beneficial for Wildlife	Possible	Slight Positive Impacts
Impacts on Designated Sites	None	N/A	None affected – No Impacts

6.0 CUMULATIVE IMPACTS

Cumulative impacts or effects are changes in the environment that result from numerous human-induced, small-scale alterations. Cumulative impacts can be thought of as occurring through two main pathways: first; through persistent additions or losses of the same materials or resource, and second, through the compounding effects as a result of the coming together of two or more effects³⁹.

When assessing cumulative impacts it is necessary to consider the effect of other plans and projects that, together with the current project, could have a cumulative impact. The proposed development, with the mitigation measures listed, will not have any significant adverse effect on the local biodiversity of the area and therefore would not be expected to contribute significantly to in-combination effects with other plans or projects in the area.

This proposed development will result in no significant change of land-use as the site is mainly improved agricultural grassland (GA1). Sections of treelines and hedgerows, of local ecological importance, will be affected. There are a number of other proposed housing developments within the Newcastle West area. These developments combined will reduce the open spaces and habitat availability of the locality, thereby cumulatively impacting upon local bird and mammal populations.

Other plans and projects examined which are specific to the area/county are:

- National Biodiversity Action Plan 2017 – 2021 (Department of Culture, Heritage and the Gaeltacht, 2017)
- Limerick County Development Plan 2010-2016 (Limerick County Council, 2010)
- Limerick City Development Plan 2010-2016 (Limerick City Council, 2010)
- Draft Limerick County Development Plan 2022-2028 (Limerick City and County Council, June 2021)
- Natura Impact Report, January 2018, As part of the preparation of the Proposed Variation No. 6, Limerick County Development Plan 2010-2016 (as extended)
- Newcastle West Local Area Plan 2014 - 2020

Overall no specific pathway has been identified by which any of the plans and projects identified would have a significant negative in-combination effect on the proposed development and the local biodiversity value of the area.

³⁹ Betty Bowers Marriot (1997) Practical guide to environmental impact assessment, New York; London : McGraw-Hill,

7.0 MONITORING

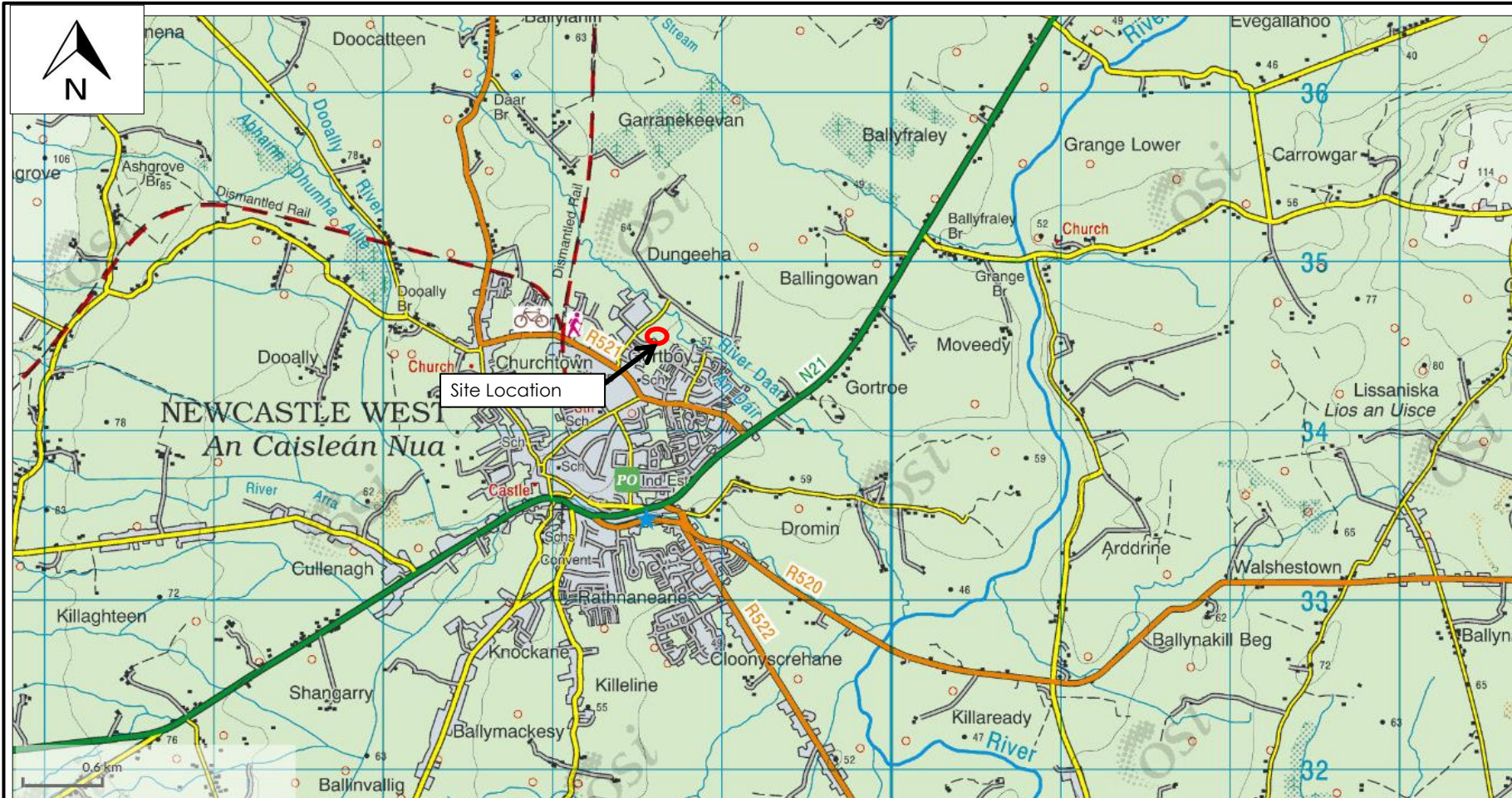
Monitoring is generally required where there may be significant residual impacts despite the implementation of the mitigation measures. The following monitoring measures are recommended:

- Any planted trees, bird and bat boxes should be monitored to ensure compliance once the development is operational.
- Local residents could participate in Citizen Science schemes such as bee or butterfly monitoring when the new areas of biodiversity value are created.
- Biodiversity information boards could be erected in the Biodiversity Areas of the site.

8.0 CONCLUDING STATEMENT

With the implementation of best design practice and mitigation measures listed in Section 5.0, any residual impacts on the habitats and protected species that occur due to the proposed development is considered to be neutral in the long-term and the predicted residual impact on flora and fauna will be insignificant. The exception is with bat species that may use affected trees whereby pre-felling bat surveys should be completed to ensure their absence. Likewise due to the cover of scrub in May 2022 along certain hedgerows a preconstruction / Site clearance survey should be undertaken to ensure no badger setts are present.

FIGURES



Map sourced from National Biodiversity Data Centre Website – www.nbdc.ie



Client Limerick City & County Council		Drawing Site location map				
Job EcIA Report						
Drawing Number Figure 1	Status Final	Sht. Size A4	Scale As Shown	Date May 22	Drawn AW	

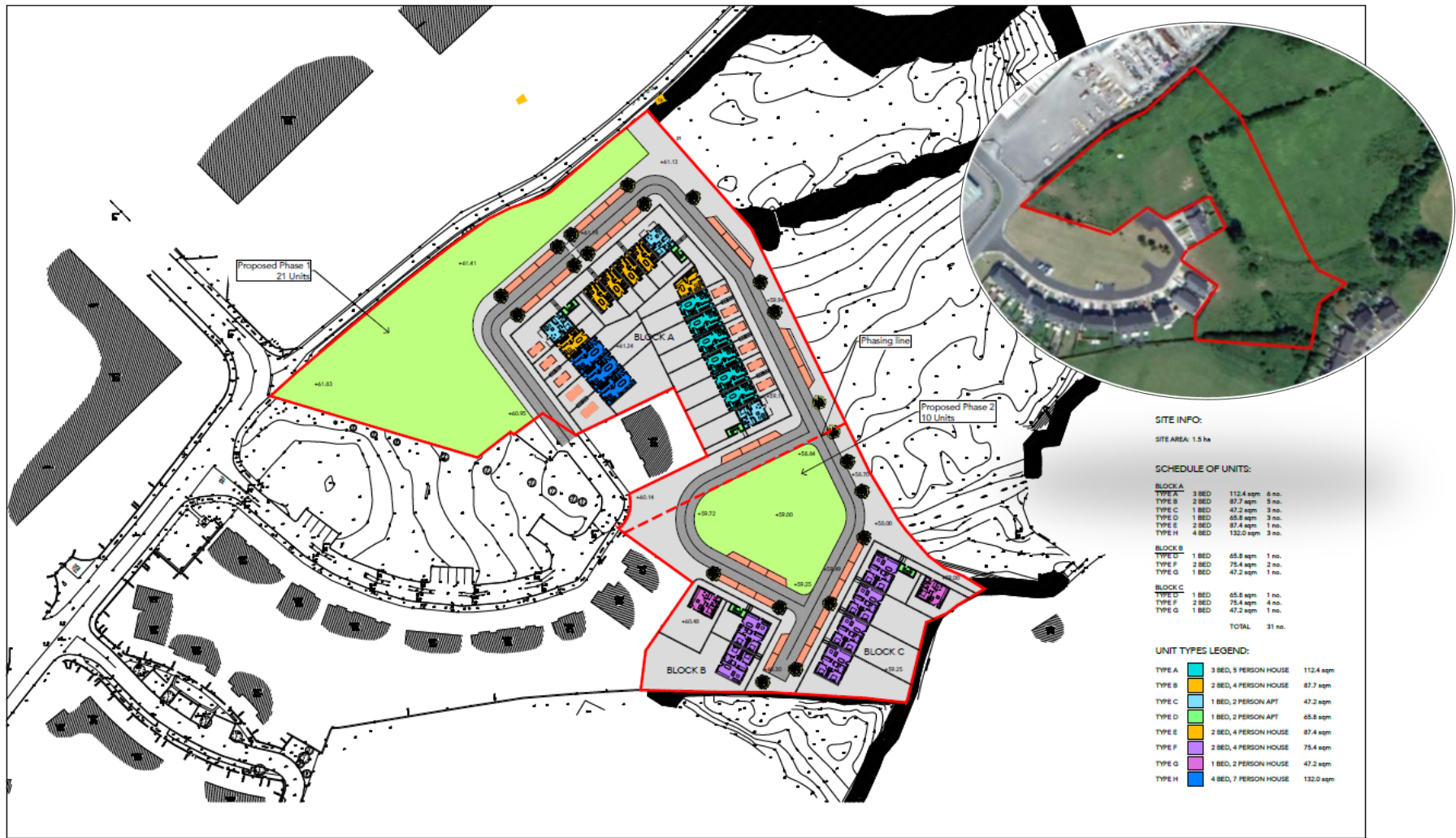


River Daar

100 m

- Approx. Site Boundary
- River Daar
- Drainage Ditch

Client Limerick City & County Council		Drawing Aerial Map with Drainage Information			
Job EcIA Report					
Drawing Number Figure 2	Status Final	Sht. Size A4	As shown As Shown	Date May 22	AW



SITE INFO:

SITE AREA: 1.5 ha

SCHEDULE OF UNITS:

BLOCK A			
TYPE A	3 BED	112.4 sqm	4 no.
TYPE B	2 BED	87.7 sqm	5 no.
TYPE C	1 BED	47.2 sqm	3 no.
TYPE D	1 BED	65.8 sqm	3 no.
TYPE E	2 BED	87.4 sqm	1 no.
TYPE H	4 BED	132.0 sqm	3 no.
BLOCK B			
TYPE C	1 BED	47.2 sqm	1 no.
TYPE F	2 BED	75.4 sqm	2 no.
TYPE G	1 BED	47.2 sqm	1 no.
BLOCK C			
TYPE C	1 BED	47.2 sqm	1 no.
TYPE F	2 BED	75.4 sqm	4 no.
TYPE G	1 BED	47.2 sqm	1 no.
TOTAL			31 no.

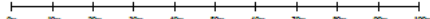
UNIT TYPES LEGEND:

TYPE A	3 BED, 3 PERSON HOUSE	112.4 sqm
TYPE B	2 BED, 4 PERSON HOUSE	87.7 sqm
TYPE C	1 BED, 2 PERSON APT	47.2 sqm
TYPE D	1 BED, 2 PERSON APT	65.8 sqm
TYPE E	2 BED, 4 PERSON HOUSE	87.4 sqm
TYPE F	2 BED, 4 PERSON HOUSE	75.4 sqm
TYPE G	1 BED, 2 PERSON HOUSE	47.2 sqm
TYPE H	4 BED, 7 PERSON HOUSE	132.0 sqm

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DO NOT SCALE FROM THIS DRAWING.
Use Figure Dimensions. Contractor to check all dimensions on site prior to construction of works. Any discrepancies are to be referred to the ARCHITECT.

SCALE @ 1:500 on A1



MATERIALS LEGEND:

		GREENPARK/LANDSCAPED AREA

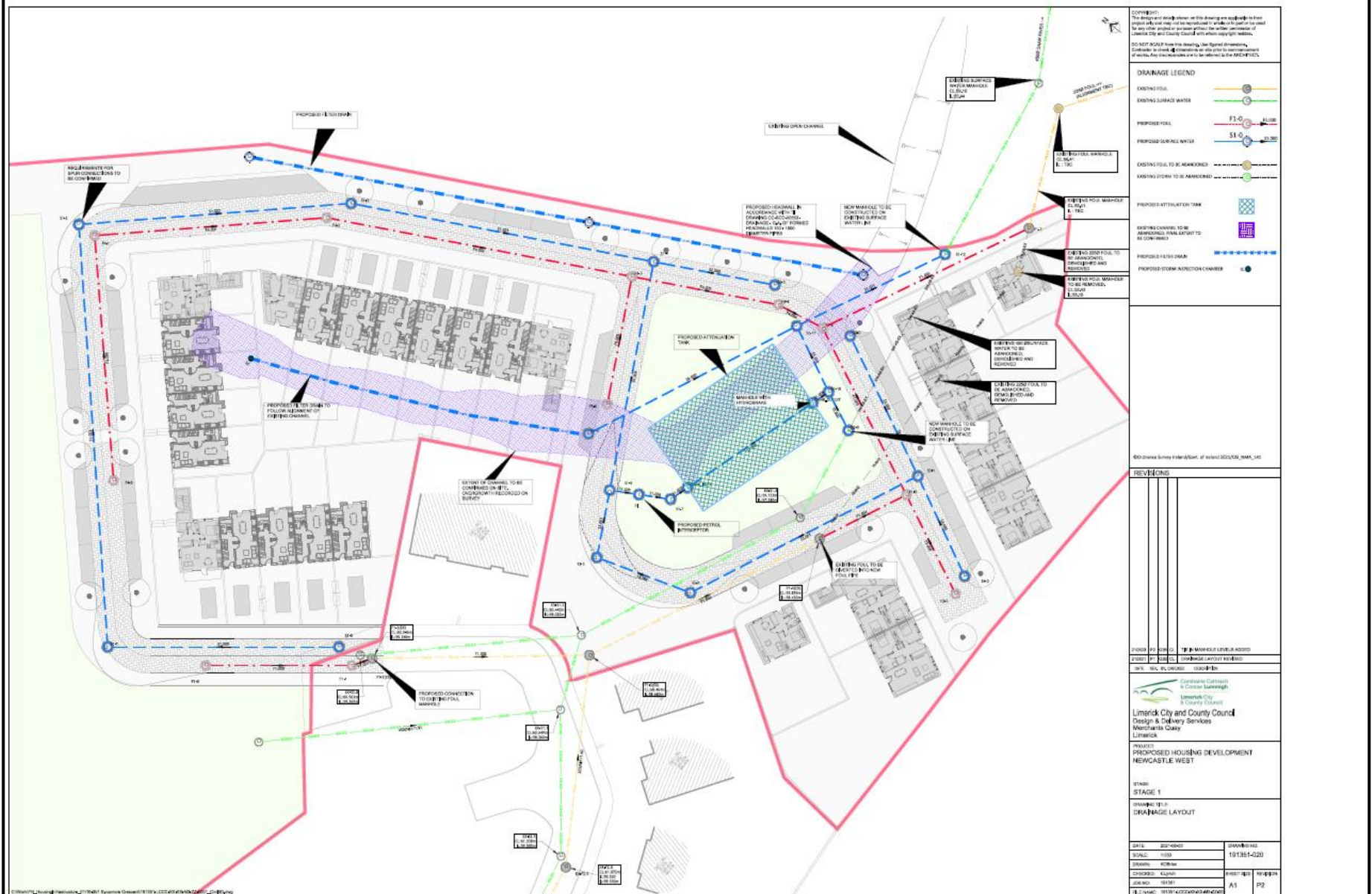
REVISIONS

DATE	REV	BY	CHK	DESCRIPTION

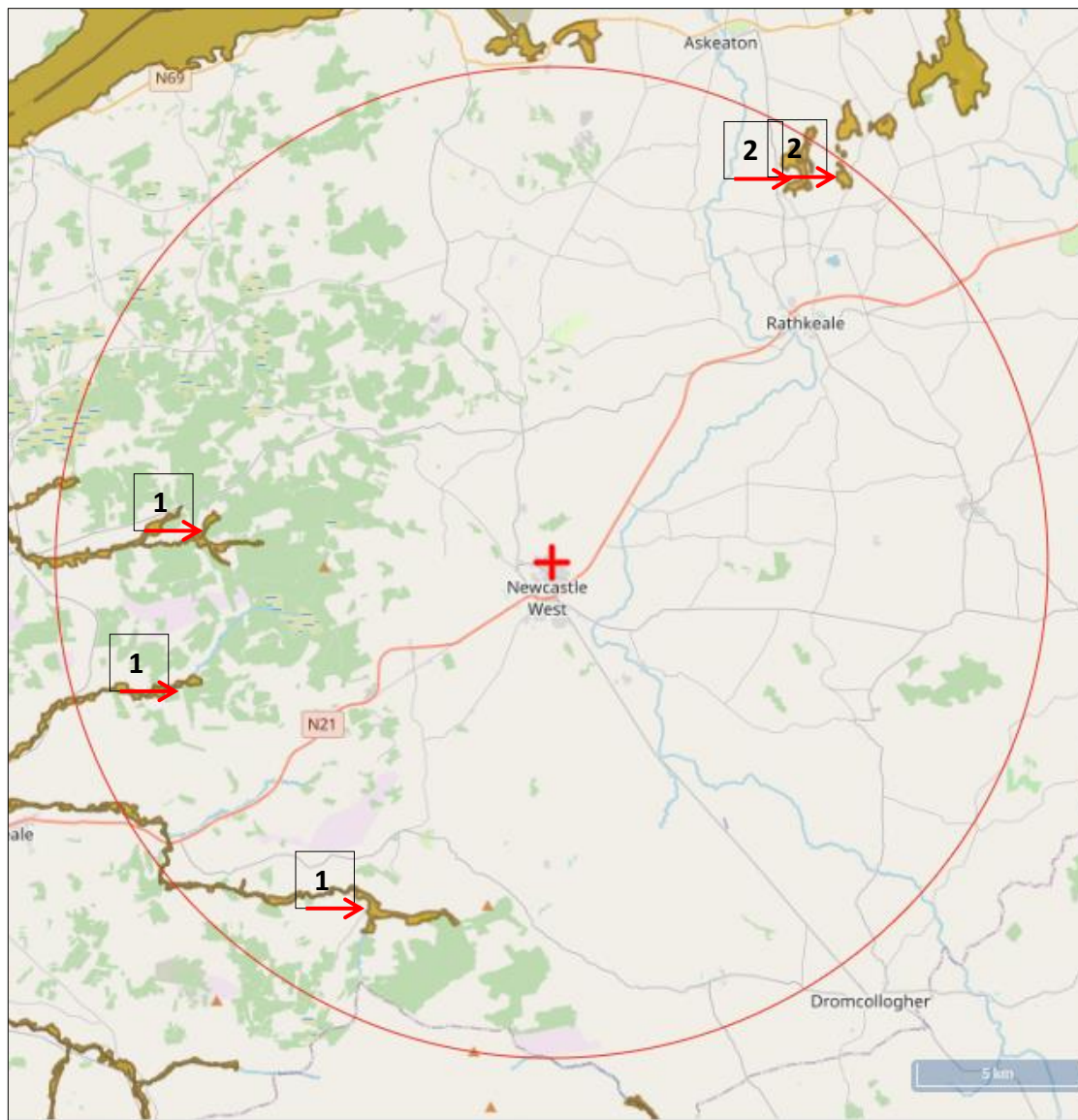
Limerick City & County Council	
Design & Delivery Services	
Newcastle Mabel, County Limerick	
V1000	
CAMP STAGE 3	
DATE:	02 NOV 2021
SCALE:	1:500 (A1)
DESIGNER:	ME
CHECKED:	ME
DATE:	19119-002

PROJECT:	PROPOSED HOUSING DEVELOPMENT
LOCATION:	NEWCASTLE MABEL, COUNTY LIMERICK
STAGE:	CAMP STAGE 3
DRAWING TITLE:	PROPOSED SITE LAYOUT - GROUND FLOOR
DATE:	19119-002
SCALE:	A1
REVISION:	-

Client Limerick City & County Council		Drawing Proposed Site Layout	
Job EcIA Report			
Drawing Number Figure 3	Status Final	Sht. Size A4	Scale As Shown
Date May 22	Drawn AW		



Client		Drawing	
Limerick City & County Council		Proposed Drainage layout	
Job		ECIA Report	
Drawing Number	Status	Sht. Size	NTS
Figure 4	Final	A4	May 22



No.	Site Code	Name	Distance
1	002165	Lower River Shannon SAC	8.7km W, SW
2	002279	Askeaton Fen Complex SAC	13.2km NE



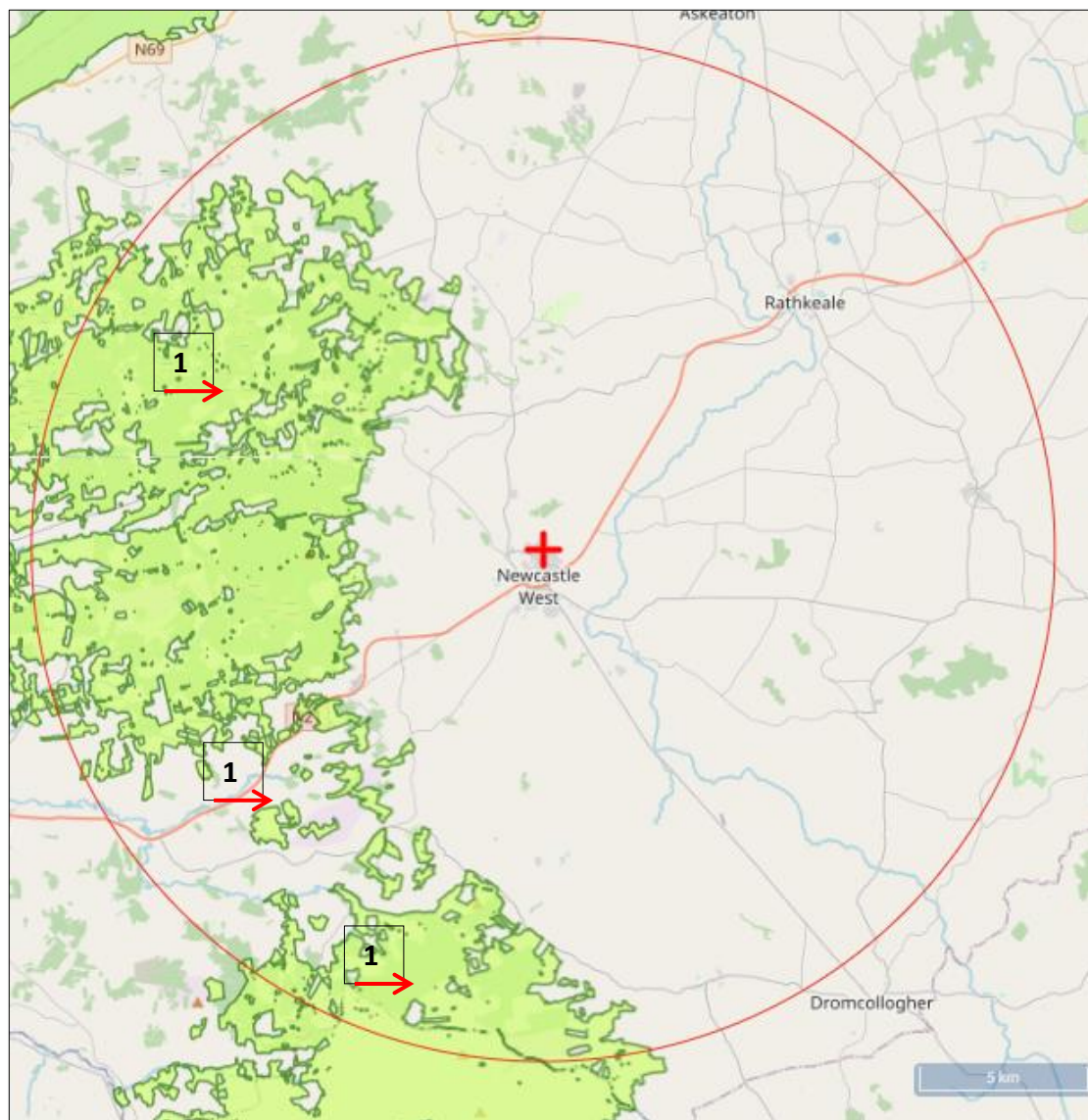
Special Area of Conservation



Site Location



Client Limerick City & County Council		Drawing Special Areas of Conservation (SACs) within 15km of Site			
Job EcIA Report					
Drawing Number Figure 5	Status Final	Sht. Size A4	Scale As Shown	Date May 22	Drawn AW



Special Protection Area

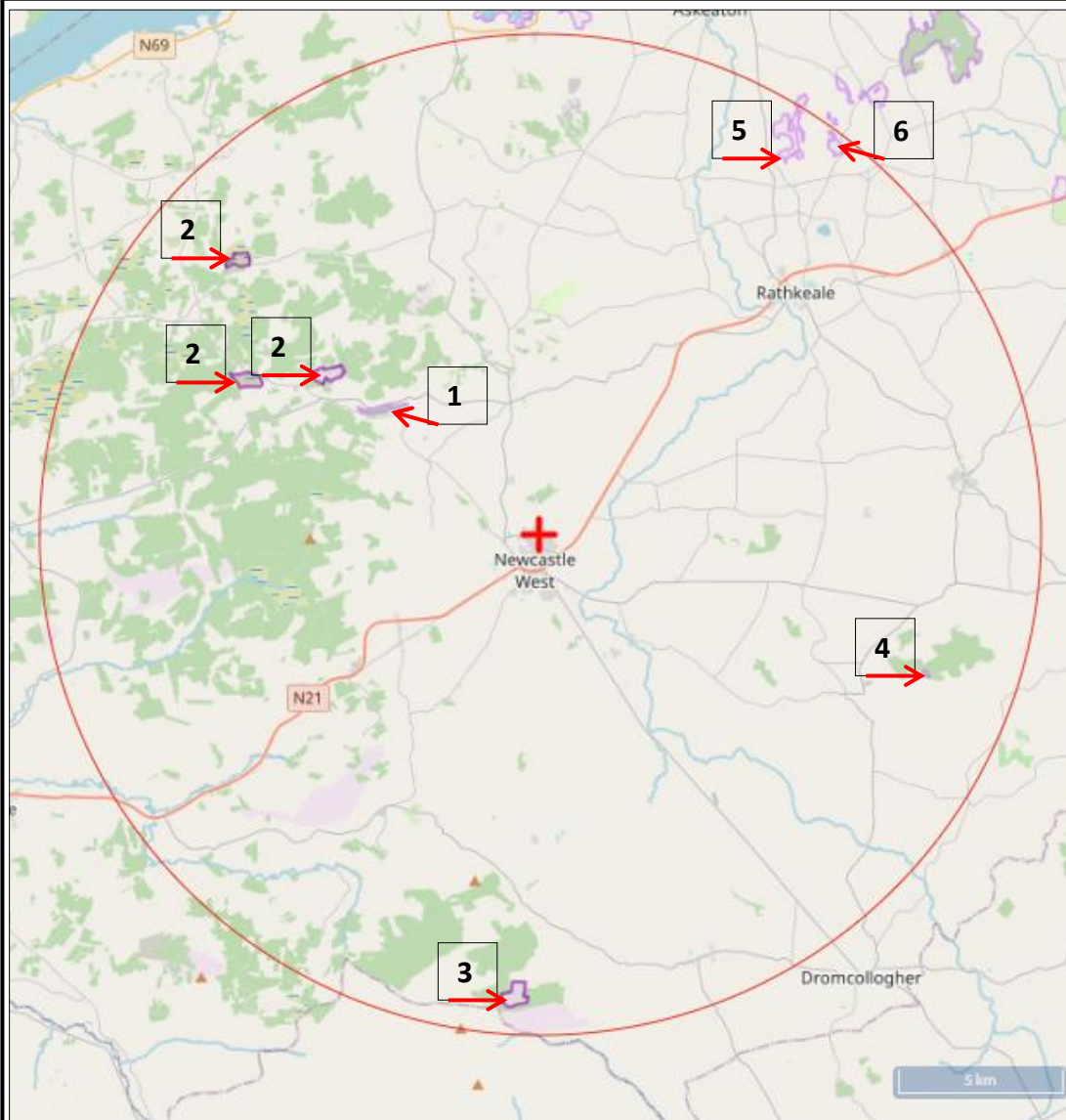


Site Location



No.	Site Code	Name	Distance
1	004161	Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA	4.7km NW, W, SW, S

Client Limerick City & County Council		Drawing			
Job EcIA Report		Special Protection Areas (SPAs) within 15km of Site			
Drawing Number Figure 6	Status Final	Sht. Size A4	Scale As Shown	Date May 22	Drawn AW



National Heritage Area (NHA)



Proposed National Heritage Area (pNHA)



Site Location

No.	Site Code	Name	Distance
1	001431	Glenastar Wood pNHA	5.4km NW
2	002399	Carrigkerry Bogs NHA	7.6km NW
3	002454	Lough Gay Bog NHA	13.4km S
4	001434	Heathfield Wood pNHA	12.2km SE
5	001425	Ballymorrisheen Marsh pNHA	13.2km NE
6	001429	Cappagh Fen pNHA	14.3km NE



Client Limerick City & County Council		Drawing National Heritage Areas (NHAs/pNHAs) within 15km of Site				
Job EcIA Report						
	Drawing Number Figure 7	Status Final	Sht. Size A4	Scale As Shown	Date May 22	Drawn AW



Site Location

Hydrometric Area '24 –Shannon Estuary South
WFD Catchment '25D', WFD Subcatchment 'Deel[Newcastlewest]_SC_040'
WFD River Sub-Basin 'DEEL (NEWCASTLEWEST)_090'

2013-2018 WFD River Status of 'DEEL (NEWCASTLEWEST)_090' is 'Moderate'

2013-2018 WFD River Risk Status of 'DEEL (NEWCASTLEWEST)_090' is 'At Risk'

2013-2018 WFD Groundwater Body Status of 'Newcastle West' is 'Good'

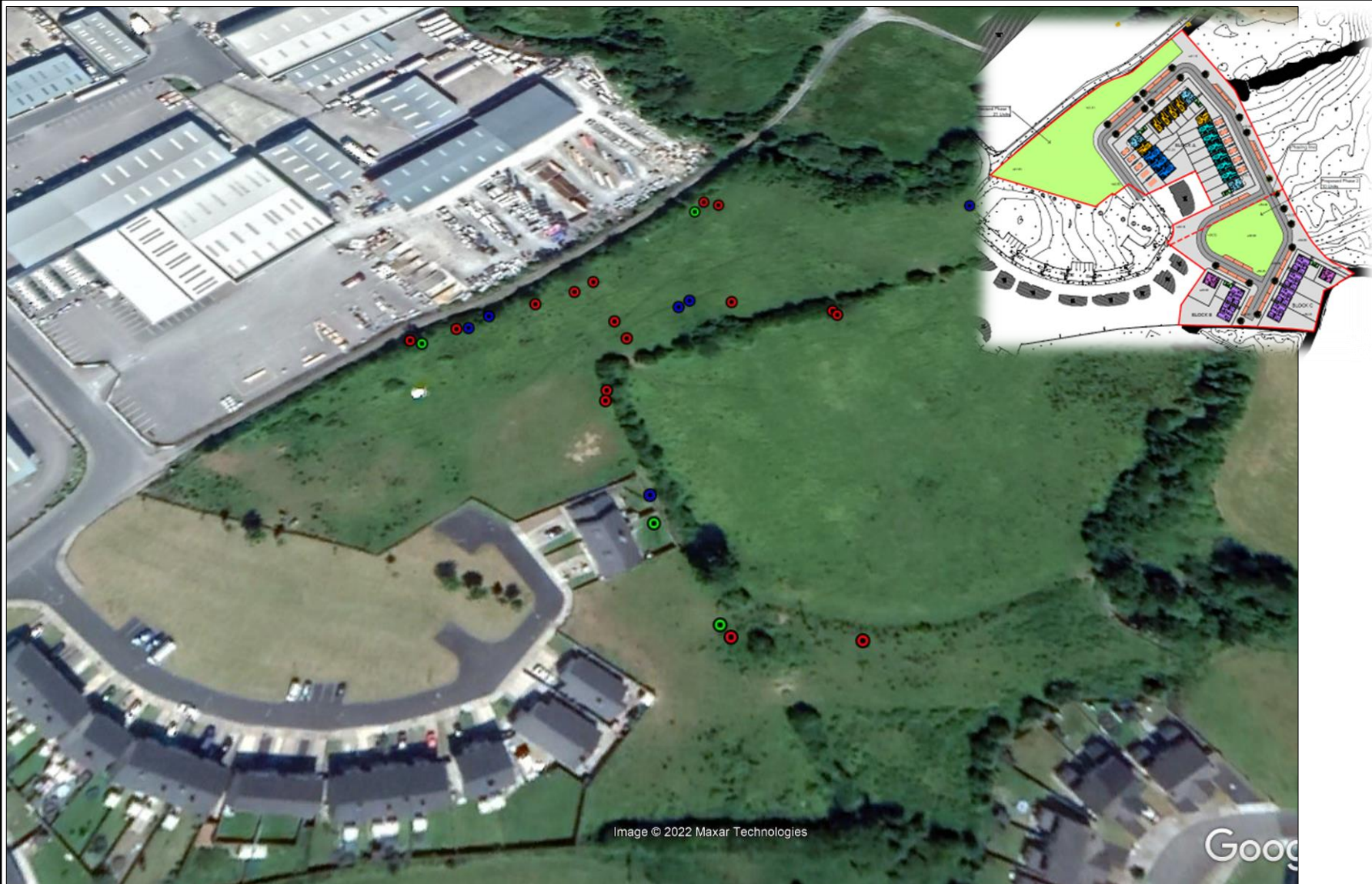
2013-2018 WFD Groundwater Body Risk Status of 'Newcastle West' is 'Review'

EPA point d/s of site on River Deel at Station 'Grange Br (D46)' Q3-4 Moderate Status in 2020 (2km northeast of site)



Map sourced from EPA Maps <https://gis.epa.ie/EPAMaps/>

Client Limerick City & County Council			Drawing Catchment Drainage Information			
Job EcIA Report						
Drawing Number Figure 8	Status Final	Sht. Size A4	Scale As Shown	Date May 22	Drawn AW	



Common Pipistrelle Bat



Leisler's Bat



Soprano Pipistrelle Bat

Client Limerick City & County Council		Drawing Bat Activity Map			
Job EcIA Report					
Drawing Number Figure10	Status Final	Sht. Size A4	Shown As Shown	Date May 22	AW

APPENDICES

APPENDIX A



Registered Practices Certificate

April 2022 – March 2023

Pioneer Environment Group Ltd

has been admitted as a Registered Practice

of the

Chartered Institute of Ecology
and Environmental Management

on the 17th day of March 2022

A handwritten signature in black ink, which appears to read 'R Handley', is positioned above the printed name of the signatory.

Richard Handley CEng MCIEEM
President

17th March 2022

This certificate remains the property of CIEEM. Membership is subject to annual renewal and may be authenticated by contacting CIEEM at the registered address. Company no. RC000861. Registered Charity Number (England and Wales): 1189915. Registered address: Grosvenor Court, Ampfield Hill, Ampfield, Romsey, SO51 9BD United Kingdom.

APPENDIX B



Plate 1 Main habitats affected on site is Improved Agricultural Grassland (GA1) and grassy verges (GS2).



Plate 2 Adjacent housing to site with fencing in between (BL3) and improved grassland (GA1)



Plate 3 Daar River (FW1) approx. 50m from site.



Plate 4 Himalayan Balsam (invasive) along the Daar River.



Plate 5 Treelines/Hedgerows (WL2/WL1) and Walls (BL3) bisect the site.



Plate 6 Areas of scrub with potential for badger setts in the larger inaccessible areas of scrub.



Plate 7 Tree with Bat roost potential due to heavy ivy growth (left) and areas of scrub (WS1) and treeline (right).



Plate 8 Areas of scrub (WS1) need to be checked for badger setts in winter when it is more accessible, or during site clearance.



Plate 9 Areas of grassy verges (GS2) at the base of hedgerows and treelines.

APPENDIX C

Species group	Species name	Date of last record	Designation
amphibian	Common Frog (<i>Rana temporaria</i>)	30/03/2020	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex V Protected Species: Wildlife Acts
amphibian	Smooth Newt (<i>Lissotriton vulgaris</i>)	24/06/2020	Protected Species: Wildlife Acts
bird	Barn Owl (<i>Tyto alba</i>)	20/06/2014	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Barn Swallow (<i>Hirundo rustica</i>)	08/06/2020	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Black-headed Gull (<i>Larus ridibundus</i>)	04/02/2016	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Common Grasshopper Warbler (<i>Locustella naevia</i>)	31/12/2011	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Kestrel (<i>Falco tinnunculus</i>)	30/03/2020	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Kingfisher (<i>Alcedo atthis</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Linnet (<i>Carduelis cannabina</i>)	02/04/2020	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Pheasant (<i>Phasianus colchicus</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
bird	Common Sandpiper (<i>Actitis hypoleucos</i>)	31/07/1972	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Snipe (<i>Gallinago gallinago</i>)	02/04/2020	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section III Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Starling (<i>Sturnus vulgaris</i>)	04/01/2021	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Swift (<i>Apus apus</i>)	20/04/2020	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Common Wood Pigeon (<i>Columba palumbus</i>)	02/04/2020	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
bird	Corn Crake (<i>Crex crex</i>)	31/07/1972	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Eurasian Curlew (<i>Numenius arquata</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section II Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Eurasian Woodcock (<i>Scolopax rusticola</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex

Species group	Species name	Date of last record	Designation
			III, Section III Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Hen Harrier (<i>Circus cyaneus</i>)	24/06/2020	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Herring Gull (<i>Larus argentatus</i>)	29/02/1984	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	House Martin (<i>Delichon urbicum</i>)	29/05/2020	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	House Sparrow (<i>Passer domesticus</i>)	04/01/2021	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Jack Snipe (<i>Lymnocyptes minimus</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section III Bird Species
bird	Lesser Black-backed Gull (<i>Larus fuscus</i>)	04/04/2020	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Little Egret (<i>Egretta garzetta</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species
bird	Mallard (<i>Anas platyrhynchos</i>)	04/04/2020	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section I Bird Species
bird	Merlin (<i>Falco columbarius</i>)	30/03/2020	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Mute Swan (<i>Cygnus olor</i>)	29/02/1984	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Northern Lapwing (<i>Vanellus vanellus</i>)	29/02/1984	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section II Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Northern Wheatear (<i>Oenanthe oenanthe</i>)	29/08/2017	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Red Grouse (<i>Lagopus lagopus</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species Protected Species: EU Birds Directive >> Annex III, Section I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
bird	Rock Pigeon (<i>Columba livia</i>)	22/03/2020	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex II, Section I Bird Species
bird	Sand Martin (<i>Riparia riparia</i>)	04/04/2020	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Short-eared Owl (<i>Asio flammeus</i>)	31/12/2011	Protected Species: Wildlife Acts Protected Species: EU Birds Directive Protected Species: EU Birds Directive >> Annex I Bird Species Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List

Species group	Species name	Date of last record	Designation
bird	Sky Lark (<i>Alauda arvensis</i>)	24/06/2020	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Spotted Flycatcher (<i>Muscicapa striata</i>)	29/06/2020	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Stock Pigeon (<i>Columba oenas</i>)	31/07/1972	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Water Rail (<i>Rallus aquaticus</i>)	31/07/1972	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Whinchat (<i>Saxicola rubetra</i>)	31/07/1991	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Amber List
bird	Yellowhammer (<i>Emberiza citrinella</i>)	31/07/1991	Protected Species: Wildlife Acts Threatened Species: Birds of Conservation Concern Threatened Species: Birds of Conservation Concern >> Birds of Conservation Concern - Red List
clubmoss	Fir Clubmoss (<i>Huperzia selago</i>)	08/06/2020	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex V
crustacean	Freshwater White-clawed Crayfish (<i>Austropotamobius pallipes</i>)	03/08/2017	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex II Protected Species: EU Habitats Directive >> Annex V Protected Species: Wildlife Acts
liverwort	Ribbonwort (<i>Pallavicinia lyellii</i>)	31/12/1979	Protected Species: Flora Protection Order Protected Species: Flora Protection Order >> Flora Protection Order 2015 Schedule C (Liverworts) Threatened Species: Endangered
reptile	Common Lizard (<i>Zootoca vivipara</i>)	26/07/2013	Protected Species: Wildlife Acts
terrestrial mammal	Brown Long-eared Bat (<i>Plecotus auritus</i>)	27/07/2002	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
terrestrial mammal	Daubenton's Bat (<i>Myotis daubentonii</i>)	12/08/2002	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
terrestrial mammal	Eurasian Badger (<i>Meles meles</i>)	31/12/2016	Protected Species: Wildlife Acts
terrestrial mammal	Eurasian Red Squirrel (<i>Sciurus vulgaris</i>)	17/05/2017	Protected Species: Wildlife Acts
terrestrial mammal	European Otter (<i>Lutra lutra</i>)	03/09/2017	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex II Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
terrestrial mammal	Fallow Deer (<i>Dama dama</i>)	31/12/2008	Invasive Species: Invasive Species Invasive Species: Invasive Species >> High Impact Invasive Species Invasive Species: Invasive Species >> Regulation S.I. 477 (Ireland) Protected Species: Wildlife Acts
terrestrial mammal	Lesser Noctule (<i>Nyctalus leisleri</i>)	22/08/2014	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
terrestrial mammal	Pipistrelle (<i>Pipistrellus pipistrellus sensu lato</i>)	22/08/2014	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
terrestrial mammal	Red Deer (<i>Cervus elaphus</i>)	01/01/2010	Protected Species: Wildlife Acts
terrestrial mammal	Soprano Pipistrelle (<i>Pipistrellus pygmaeus</i>)	22/08/2014	Protected Species: EU Habitats Directive Protected Species: EU Habitats Directive >> Annex IV Protected Species: Wildlife Acts
terrestrial mammal	West European Hedgehog (<i>Erinaceus europaeus</i>)	30/08/2020	Protected Species: Wildlife Acts

Species group	Species name	Date of last record	Designation
hornwort	Dotted Hornwort (<i>Anthoceros punctatus</i>)	23/08/1979	Threatened Species: Least concern
insect - beetle (Coleoptera)	Hydroporus longicornis	13/09/2004	Threatened Species: Endangered
insect - butterfly	Large Heath (<i>Coenonympha tullia</i>)	24/06/2020	Threatened Species: Vulnerable
insect - butterfly	Small Heath (<i>Coenonympha pamphilus</i>)	25/06/2019	Threatened Species: Near threatened
insect - dragonfly (Odonata)	Scarce Blue-tailed Damselfly (<i>Ischnura pumilio</i>)	21/07/2020	Threatened Species: Vulnerable
insect - hymenopteran	Gipsy Cuckoo Bee (<i>Bombus (Psithyrus) bohemicus</i>)	07/05/2020	Threatened Species: Near threatened
insect - hymenopteran	Large Red Tailed Bumble Bee (<i>Bombus (Melanobombus) lapidarius</i>)	30/05/2020	Threatened Species: Near threatened
insect - hymenopteran	Moss Carder-bee (<i>Bombus (Thoracomus) muscorum</i>)	26/06/2020	Threatened Species: Near threatened
liverwort	Bifid Crestwort (<i>Lophocolea bidentata</i>)	17/06/2005	Threatened Species: Least concern
liverwort	Blueish Veilwort (<i>Metzgeria violacea</i>)	10/08/1994	Threatened Species: Least concern
liverwort	Bog Germanderwort (<i>Riccardia latifrons</i>)	23/08/1979	Threatened Species: Least concern
liverwort	British Featherwort (<i>Plagiochila britannica</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Chiloscyphus polyanthos	23/08/1979	Threatened Species: Least concern
liverwort	Common Pouchwort (<i>Calypogeia fissa</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Common Threadwort (<i>Cephaloziella divaricata</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Crenulated Flapwort (<i>Jungermannia gracillima</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Crescent-cup Liverwort (<i>Lunularia cruciata</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Dark-green Flapwort (<i>Jungermannia atrovirens</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Delicate Germanderwort (<i>Riccardia multifida</i>)	10/08/1994	Threatened Species: Least concern
liverwort	Dilated Scalewort (<i>Frullania dilatata</i>)	10/08/1994	Threatened Species: Least concern
liverwort	Endive Pellia (<i>Pellia endiviifolia</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Even Scalewort (<i>Radula complanata</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Fingered Cowlwort (<i>Colura calyptrifolia</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Forcipated Pincerwort (<i>Cephalozia connivens</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Forked Veilwort (<i>Metzgeria furcata</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Greasewort (<i>Aneura pinguis</i>)	10/08/1994	Threatened Species: Least concern
liverwort	Greater Featherwort (<i>Plagiochila asplenoides</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Grove Earwort (<i>Scapania nemorea</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Hampe's Threadwort (<i>Cephaloziella hampeana</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Handsome Woollywort (<i>Trichocolea tomentella</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Heath Earwort (<i>Scapania irrigua</i>)	17/06/2005	Threatened Species: Least concern
liverwort	Jagged Notchwort (<i>Lophozia incisa</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Ladder Flapwort (<i>Nardia scalaris</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Lesser Featherwort (<i>Plagiochila porelloides</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Lindenberg's Scalewort (<i>Radula lindenbergiana</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Long-leaved Pouncewort (<i>Aphanolejeunea microscopica</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Mueller's Pouchwort (<i>Calypogeia muelleriana</i>)	10/08/1994	Threatened Species: Least concern
liverwort	Nees' Pellia (<i>Pellia neesiana</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Norwegian Earwort (<i>Scapania scandica</i>)	17/06/2005	Threatened Species: Least concern
liverwort	Notched Pouchwort (<i>Calypogeia arguta</i>)	23/08/1979	Threatened Species: Least concern

Species group	Species name	Date of last record	Designation
liverwort	Overleaf Pellia (<i>Pellia epiphylla</i>)	17/06/2005	Threatened Species: Least concern
liverwort	Palmate Germanderwort (<i>Riccardia palmata</i>)	10/08/1994	Threatened Species: Least concern
liverwort	Pearl Pouncewort (<i>Lejeunea patens</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Prickly Featherwort (<i>Plagiochila spinulosa</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Rock Veilwort (<i>Metzgeria conjugata</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Sea Scalewort (<i>Frullania teneriffae</i>)	16/06/2005	Threatened Species: Least concern
liverwort	Straggling Pouchwort (<i>Saccogyna viticulosa</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Tamarisk Scalewort (<i>Frullania tamarisci</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Toothed Pouncewort (<i>Drepanolejeunea hamatifolia</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Top Notchwort (<i>Leiocolea turbinata</i>)	10/08/1994	Threatened Species: Least concern
liverwort	Transparent Flapwort (<i>Jungermannia hyalina</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Tumid Notchwort (<i>Lophozia ventricosa</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Two-horned Pincerwort (<i>Cephalozia bicuspidata</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Water Earwort (<i>Scapania undulata</i>)	23/08/1979	Threatened Species: Least concern
liverwort	Western Pouncewort (<i>Lejeunea lamacerina</i>)	23/08/1979	Threatened Species: Least concern
liverwort	White Earwort (<i>Diplophyllum albicans</i>)	23/08/1979	Threatened Species: Least concern
mollusc	Common Whorl Snail (<i>Vertigo</i> (<i>Vertigo</i>) <i>pygmaea</i>)	21/09/1977	Threatened Species: Near threatened
mollusc	English Chrysalis Snail (<i>Leiostryla</i> (<i>Leiostryla</i>) <i>anglica</i>)	21/09/1977	Threatened Species: Vulnerable
mollusc	Heath Snail (<i>Helicella itala</i>)	21/09/1977	Threatened Species: Vulnerable
mollusc	Lesser Bulin (<i>Merdigera obscura</i>)	21/09/1977	Threatened Species: Endangered
mollusc	Swan Mussel (<i>Anodonta</i> (<i>Anodonta</i>) <i>cygnea</i>)	21/04/1983	Threatened Species: Vulnerable
moss	Aloe Haircap (<i>Pogonatum aloides</i>)	23/08/1979	Threatened Species: Least concern
moss	Alpine Thread-moss (<i>Bryum alpinum</i>)	23/08/1979	Threatened Species: Least concern
moss	Anomalous Bristle-moss (<i>Orthotrichum anomalum</i>)	23/08/1979	Threatened Species: Least concern
moss	Big Shaggy-moss (<i>Rhytidiadelphus triquetrus</i>)	10/08/1994	Threatened Species: Least concern
moss	Bird's-claw Beard-moss (<i>Barbula unguiculata</i>)	23/08/1979	Threatened Species: Least concern
moss	Bog Groove-moss (<i>Aulacomnium palustre</i>)	26/08/1992	Threatened Species: Least concern
moss	Bristly Haircap (<i>Polytrichum piliferum</i>)	23/08/1979	Threatened Species: Least concern
moss	Brittle Swan-neck Moss (<i>Campylopus fragilis</i>)	23/08/1979	Threatened Species: Least concern
moss	Broom Fork-moss (<i>Dicranum scoparium</i>)	23/08/1979	Threatened Species: Least concern
moss	Bruch's Pincushion (<i>Ulota bruchii</i>)	23/08/1979	Threatened Species: Least concern
moss	Capillary Thread-moss (<i>Bryum capillare</i>)	23/08/1979	Threatened Species: Least concern
moss	Clay Earth-moss (<i>Archidium alternifolium</i>)	23/08/1979	Threatened Species: Least concern
moss	Common Feather-moss (<i>Eurhynchium praelongum</i>)	17/06/2005	Threatened Species: Least concern
moss	Common Pottia (<i>Tortula truncata</i>)	23/08/1979	Threatened Species: Least concern
moss	Common Striated Feather-moss (<i>Eurhynchium striatum</i>)	10/08/1994	Threatened Species: Least concern
moss	Common Tamarisk-moss (<i>Thuidium tamariscinum</i>)	10/08/1994	Threatened Species: Least concern
moss	Cow-horn Bog-moss (<i>Sphagnum denticulatum</i>)	23/08/1979	Threatened Species: Least concern
moss	Crisped Pincushion (<i>Ulota crispa</i>)	10/08/1994	Threatened Species: Least concern
moss	Ctenidium molluscum var. molluscum	23/08/1979	Threatened Species: Least concern
moss	Cylindric Ditrichum (<i>Ditrichum cylindricum</i>)	23/08/1979	Threatened Species: Least concern
moss	Delicate Earth-moss (<i>Pseudephemerum nitidum</i>)	23/08/1979	Threatened Species: Least concern

Species group	Species name	Date of last record	Designation
moss	Dotted Thyme-moss (<i>Rhizomnium punctatum</i>)	10/08/1994	Threatened Species: Least concern
moss	Drab Brook-moss (<i>Hygrohypnum luridum</i>)	10/08/1994	Threatened Species: Least concern
moss	Dwarf Neckera (<i>Neckera pumila</i>)	23/08/1979	Threatened Species: Least concern
moss	Dwarf Swan-neck Moss (<i>Campylopus pyriformis</i>)	23/08/1979	Threatened Species: Least concern
moss	Elegant Bristle-moss (<i>Orthotrichum pulchellum</i>)	10/08/1994	Threatened Species: Least concern
moss	Elegant Silk-moss (<i>Pseudotaxiphyllum elegans</i>)	23/08/1979	Threatened Species: Least concern
moss	Fallacious Beard-moss (<i>Didymodon fallax</i>)	10/08/1994	Threatened Species: Least concern
moss	Feathery Bog-moss (<i>Sphagnum cuspidatum</i>)	23/08/1979	Threatened Species: Least concern
moss	Fern-leaved Hook-moss (<i>Cratoneuron filicinum</i>)	23/08/1979	Threatened Species: Least concern
moss	Flagellate Feather-moss (<i>Hyocomium armoricum</i>)	23/08/1979	Threatened Species: Least concern
moss	Flat Neckera (<i>Neckera complanata</i>)	23/08/1979	Threatened Species: Least concern
moss	Fountain Apple-moss (<i>Philonotis fontana</i>)	23/08/1979	Threatened Species: Least concern
moss	Fountain Feather-moss (<i>Amblystegium tenax</i>)	10/08/1994	Threatened Species: Near threatened Threatened Species: Least concern
moss	Fox-tail Feather-moss (<i>Thamnobryum alopecurum</i>)	10/08/1994	Threatened Species: Least concern
moss	Frizzled Pincushion (<i>Ulota phyllantha</i>)	10/08/1994	Threatened Species: Least concern
moss	Glittering Wood-moss (<i>Hylocomium splendens</i>)	26/08/1992	Threatened Species: Least concern
moss	Golden-head Moss (<i>Breutelia chrysocoma</i>)	23/08/1979	Threatened Species: Least concern
moss	Hart's-tongue Thyme-moss (<i>Plagiomnium undulatum</i>)	10/08/1994	Threatened Species: Least concern
moss	Heath Plait-moss (<i>Hypnum jutlandicum</i>)	23/08/1979	Threatened Species: Least concern
moss	Heath Star Moss (<i>Campylopus introflexus</i>)	10/08/1994	Threatened Species: Least concern
moss	Heterocladium heteropterum var. heteropterum	23/08/1979	Threatened Species: Least concern
moss	Hooded Bristle-moss (<i>Orthotrichum cupulatum</i>)	23/08/1979	Threatened Species: Least concern
moss	Irish Daltonia (<i>Daltonia splachnoides</i>)	31/12/1994	Threatened Species: Least concern
moss	Isothecium myosuroides var. myosuroides	10/08/1994	Threatened Species: Least concern
moss	Juicy Silk-moss (<i>Plagiothecium succulentum</i>)	23/08/1979	Threatened Species: Least concern
moss	Juniper Haircap (<i>Polytrichum juniperinum</i>)	23/08/1979	Threatened Species: Least concern
moss	Larger Mouse-tail Moss (<i>Isothecium alopecuroides</i>)	23/08/1979	Threatened Species: Least concern
moss	Lateral Cryphaea (<i>Cryphaea heteromalla</i>)	23/08/1979	Threatened Species: Least concern
moss	Little Shaggy-moss (<i>Rhytidiadelphus loreus</i>)	23/08/1979	Threatened Species: Least concern
moss	Long-shanked Pincushion (<i>Ptychomitrium polyphyllum</i>)	23/08/1979	Threatened Species: Least concern
moss	Maidenhair Pocket-moss (<i>Fissidens adianthoides</i>)	23/08/1979	Threatened Species: Least concern
moss	Neat Feather-moss (<i>Scleropodium purum</i>)	10/08/1994	Threatened Species: Least concern
moss	Nodding Thread-moss (<i>Pohlia nutans</i>)	23/08/1979	Threatened Species: Least concern
moss	Pale Thread-moss (<i>Bryum pallens</i>)	23/08/1979	Threatened Species: Least concern
moss	Pale-fruited Thread-moss (<i>Pohlia annotina</i>)	23/08/1979	Threatened Species: Least concern
moss	Papillose Bog-moss (<i>Sphagnum papillosum</i>)	23/08/1979	Threatened Species: Least concern
moss	Pink-fruited Thread-moss (<i>Pohlia melanodon</i>)	10/08/1994	Threatened Species: Least concern
moss	Plagiothecium denticulatum var. denticulatum	23/08/1979	Threatened Species: Least concern
moss	Pointed Spear-moss (<i>Calliergonella cuspidata</i>)	10/08/1994	Threatened Species: Least concern
moss	Pretty Nodding-moss (<i>Pohlia lescuriana</i>)	31/12/1979	Threatened Species: Data deficient
moss	Redshank (<i>Ceratodon purpureus</i>)	23/08/1979	Threatened Species: Least concern

Species group	Species name	Date of last record	Designation
moss	Red-stemmed Feather-moss (<i>Pleurozium schreberi</i>)	23/08/1979	Threatened Species: Least concern
moss	Rigid Beard-moss (<i>Didymodon rigidulus</i>)	23/08/1979	Threatened Species: Least concern
moss	Rough-stalked Feather-moss (<i>Brachythecium rutabulum</i>)	23/08/1979	Threatened Species: Least concern
moss	Rufous Forklet-moss (<i>Dicranella rufescens</i>)	23/08/1979	Threatened Species: Least concern
moss	Rusty Feather-moss (<i>Sciuro-hypnum plumosum</i>)	23/08/1979	Threatened Species: Least concern
moss	Rusty Swan-neck Moss (<i>Campylopus flexuosus</i>)	23/08/1979	Threatened Species: Least concern
moss	Sauter's Thread-moss (<i>Bryum sauteri</i>)	23/08/1979	Threatened Species: Least concern
moss	Shining Hookeria (<i>Hookeria lucens</i>)	10/08/1994	Threatened Species: Least concern
moss	Silky Forklet-moss (<i>Dicranella heteromalla</i>)	10/08/1994	Threatened Species: Least concern
moss	Silky Wall Feather-moss (<i>Homalothecium sericeum</i>)	23/08/1979	Threatened Species: Least concern
moss	Silver-moss (<i>Bryum argenteum</i>)	23/08/1979	Threatened Species: Least concern
moss	Slender Bristle-moss (<i>Orthotrichum tenellum</i>)	23/08/1979	Threatened Species: Least concern
moss	Spiral Extinguisher-moss (<i>Encalypta streptocarpa</i>)	26/08/1992	Threatened Species: Least concern
moss	Springy Turf-moss (<i>Rhytidiadelphus squarrosus</i>)	10/08/1994	Threatened Species: Least concern
moss	Swan's-neck Thyme-moss (<i>Mnium hornum</i>)	23/08/1979	Threatened Species: Least concern
moss	Thin Cord-moss (<i>Entosthodon attenuatus</i>)	23/08/1979	Threatened Species: Least concern
moss	Variable Forklet-moss (<i>Dicranella varia</i>)	10/08/1994	Threatened Species: Least concern
moss	Wall Screw-moss (<i>Tortula muralis</i>)	23/08/1979	Threatened Species: Least concern
moss	Waved Silk-moss (<i>Plagiothecium undulatum</i>)	23/08/1979	Threatened Species: Least concern
moss	Welsh Pocket-moss (<i>Fissidens celticus</i>)	23/08/1979	Threatened Species: Least concern
moss	Wood Bristle-moss (<i>Orthotrichum affine</i>)	10/08/1994	Threatened Species: Least concern
moss	Yellow Fringe-moss (<i>Racomitrium aciculare</i>)	23/08/1979	Threatened Species: Least concern
moss	Yellow Thread-moss (<i>Pohlia lutescens</i>)	31/12/1979	Threatened Species: Least concern

APPENDIX D

10/05/2022	Species	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temperature [°C]	Latitude [WGS84]	Longitude [WGS84]
21:17:00	Soprano Pipistrelle	12	57	69.9	56.5	6	90	13	52.45879	-9.05169
21:27:10	Leisler's Bat	1	24.1	24.4	23.5	19	0	13	52.45878	-9.05165
21:30:09	Common Pipistrelle	7	43	52.7	38.7	2	90	13	52.45892	-9.05061
21:30:29	Common Pipistrelle	1	46.7	61.9	45.4	4.6	0	13	52.45883	-9.05148
21:35:22	Soprano Pipistrelle	7	55.4	61.5	54	7	186	13	52.45895	-9.05107
21:38:08	Soprano Pipistrelle	25	55.7	65.2	54.9	7	84	13	52.45891	-9.05123
21:38:24	Soprano Pipistrelle	5	60.6	73.7	59.9	4.3	389	13	52.45883	-9.05152
21:43:59	Leisler's Bat	2	23.8	23.9	23.2	10.2	36	13	52.45801	-9.0505
21:47:42	Soprano Pipistrelle	4	61.9	74.8	60.8	3.8	110	13	52.45889	-9.05005
21:47:42	Common Pipistrelle	4	51.3	62.8	48.7	5	97	13	52.45887	-9.0514
21:49:25	Leisler's Bat	3	23.8	24	23.3	11.4	419	13	52.45925	-9.0506
21:49:42	Soprano Pipistrelle	1	54.9	55.2	54.6	13.1	0	13	52.4588	-9.05085
21:50:03	Soprano Pipistrelle	14	57.2	77.6	56.2	3	125	13	52.45799	-9.05046
21:51:05	Common Pipistrelle	7	46.5	60	42	2	132	13	52.4589	-9.05066
21:51:34	Soprano Pipistrelle	23	55.5	66.8	54.9	3	80	13	52.45885	-9.05091
21:52:04	Soprano Pipistrelle	6	53.9	60.7	53.2	5	201	13	52.45863	-9.05092
21:52:08	Soprano Pipistrelle	14	58.1	71.3	56.7	4	85	13	52.4586	-9.05092
21:52:59	Common Pipistrelle	8	49.6	72.1	42.4	3	107	13	52.45833	-9.05074
21:58:31	Soprano Pipistrelle	40	55.7	60.1	54.9	5	90	13	52.45899	-9.051
22:03:01	Common Pipistrelle	7	41.8	56.9	37.8	2	199	13	52.45927	-9.04942
22:09:37	Soprano Pipistrelle	18	56.4	61.6	55.6	5	90	13	52.45928	-9.05056
22:17:41	Soprano Pipistrelle	18	57.2	67	56.6	3	85	13	52.45927	-9.05049
22:27:27	Soprano Pipistrelle	1	57.3	59.5	56.4	3.3	0	13	52.45887	-9.05003
22:33:14	Leisler's Bat	1	23.5	24.1	23.2	11.1	0	13	52.45826	-9.05072
22:50:19	Soprano Pipistrelle	10	55.5	68.9	54.8	5	80	13	52.45892	-9.05044
22:54:46	Soprano Pipistrelle	18	57.1	66.7	56.5	3	80	13	52.45798	-9.05004

APPENDIX E

Choosing the right species of native tree and shrub

As mentioned, choosing the right species of tree and shrub is very important in urban areas where there are restrictions on space. Where possible, always use native species. Below is a list of the trees and shrubs native to Ireland, and advice on the locations to which they are suited.

Common name	Latin name	Height (max)	Suitable for public open spaces	Suitable for streets and confined spaces	Suitable for tubs, containers, raised beds etc.	Guide to planting: see key below
Alder	<i>Alnus glutinosa</i>	22m	Yes	No	Yes	ADPS
Alder buckthorn	<i>Frangula alnus</i>	6m	Yes	No	Yes	D
Arbutus (strawberry tree)	<i>Arbutus unedo</i>		Yes	No	Yes	
Ash	<i>Fraxinus excelsior</i>	28m	Yes	Yes	No	ADIPS
Aspen	<i>Populus tremula</i>	24m	Yes	No	No	DPSV
Bird cherry	<i>Prunus padus</i>	14m	Yes	Yes	Yes	P
Bramble	<i>Rubus fruticosus</i>					C/H
Broom	<i>Cytisus scoparius</i>	2m				
Burnet rose	<i>Rosa pimpinellifolia</i>					C/H
Common (or European) gorse	<i>Ulex europeus</i>	2.5m				HV
Crab apple	<i>Malus sylvestris</i>	6m	Yes	No	No	AHIP
Dog rose	<i>Rosa canina</i>					C/H
Downy birch	<i>Betula pubescens</i>	18m	Yes	Yes	Yes	ADIP
Elder	<i>Sambucus nigra</i>	6m				V
Guelder rose	<i>Viburnum opulus</i>	4.5m				DH

Hawthorn	<i>Crataegus monogyna</i>	9m				AHIPS
Hazel	<i>Corylus avellana</i>	6m				AHS
Holly	<i>Ilex aquifolium</i>	15m	Yes	No	Yes	AHPS
Honeysuckle	<i>Lonicera periclymenum</i>					C
Ivy	<i>Hedera helix</i>					C
Juniper	<i>Juniperus communis</i>	6m	Yes	No	No	
Pedunculate oak	<i>Quercus robur</i>	30m	Yes	No	No	AI
Privet	<i>Ligustrum vulgare</i>	3m				No
Purging buckthorn	<i>Rhamnus cathartica</i>	4.5m				AHPV
Rowan or mountain ash	<i>Sorbus aucuparia</i>	9m	Yes	Yes	Yes	ADHIP
Scots pine	<i>Pinus sylvestris</i>	24m	Yes	No	No	AI
Sessile oak	<i>Quercus petraea</i>	30m	Yes	No	No	AI
Silver birch	<i>Betula pendula</i>	18m	Yes	Yes	Yes	ADIP
Sloe, blackthorn	<i>Prunus spinosa</i>	3m				AHPV
Spindle	<i>Euonymus europaeus</i>	7.5m				H
Western (or mountain) gorse	<i>Ulex gallii</i>					
Whitebeam spp.	<i>Sorbus aria/S. anglica/S. devoniensis/S. hibernica/S. latifolia/S. rupicola</i>	12m	Yes	Yes	Yes	IPS
Wild cherry	<i>Prunus avium</i>	15m	Yes	Yes	Yes	AHI

Willow spp.	<i>Salix spp.</i>	6m				V
Wych elm	<i>Ulmus glabr</i>	30m	Yes		No	PS
Yew	<i>Taxus baccata</i>	14m	Yes	No	Yes	AIPS

A – Grows in a wide variety of soils

C – Climber

H – Suitable for hedging

I – Suitable as an individual tree

D – Tolerates or prefers damp conditions

P – Tolerates smoke or pollution

S – Tolerates shade

V – Invasive

Pollinator friendly garden plants

Aim to have 3-5 different types of these plants flowering in your garden each season. These suggestions are **not** exhaustive; many other flowers are also good for pollinators. For more planting suggestions visit

www.rhs.org.uk/perfectforpollinators.

		SPRING	SUMMER	AUTUMN
		March-May	June-Aug	Sept-Oct
	Wildflowers in long grass These are examples of plants that will grow naturally in long grass; you do not need to buy seed or plants!	Dandelion Dead-nettle Vetch	Bird's foot trefoil Brassicas Clovers Geranium Knapweed Oxeye daisy Self-heal Speedwell Thistle Vetch Yarrow	Autumn Hawkbit Clovers Hawksbeard Vetch
	Ornamental plants and herbs	Comfrey Hellebores Lungwort Spring/winter Heather	Borage Calamint Catmint Columbine Delphinium Globe thistle Lavender Oregano Penstemon Poppy Scabious Stachys Sneezeweed Thyme Viper's bugloss	Aster Button Snakewort Coneflower Eupatorium Heathers Single Sunflowers ^(Annual) Stonecrop
	Flowering trees/shrubs	Barberry (Berberis) Broom Crab apple Forsythia Hawthorn Mahonia Rowan Viburnum Wild cherry Willow	Bramble Cotoneaster Deutzia Firethorn Laburnum Rock Rose Viburnum	Hebe Ivy Russian Sage (sub-shrub)
	Fruit and Veg Many of the fruits and vegetables you grow in your garden need pollinators to produce seeds and fruit!	Apples Blueberries Cherry plum Currants	Blackberries Courgettes Field/runner beans Pumpkins Raspberries Strawberries Tomatoes	

Info Box:
 Letting a small portion of Brassica plants (e.g. Cabbage, Kale, Brussel sprouts) flower can help provide food for pollinators in your garden

Which plants should I choose?

Bat-friendly gardeners should aim to plant a mixture of flowering plants, vegetables, trees and shrubs to encourage a diversity of insects, which in turn may attract different bat species. Flowers that bloom throughout the year, including both annuals and herbaceous perennials, are a good idea: night-flowering blossoms attract night-flying insects. Trees and shrubs provide food for insects and roosting opportunities for bats.

Approximate flowering periods are listed below, although they may vary according to area and weather conditions!

Flowers for borders

*Aubretia (spring to early summer)
*Candytuft (summer to autumn)
*Cherry pie (summer to autumn)
Corncockle
Cornflower
Corn marigold
Corn poppy
*Echinacea
English Bluebell (spring)
*Evening primrose (summer to autumn)
Field poppies (summer)
*Honesty (spring)
*Ice plant 'Pink lady' (early autumn)
Knapweed (summer to autumn)
Mallow (summer to autumn)
*Mexican aster (summer to autumn)
*Michaelmas daisy (summer to autumn)
*Night-scented stock (summer)

Ox-eye daisy (summer)
*Phacelia (summer to autumn)
*Poached egg plant (summer)
Primrose (spring)
Red campion (spring)
*Red valerian (summer to autumn)
Scabious (summer)
St John's wort (spring)
*Sweet William (summer)
*Tobacco plant
*Verbena (summer to autumn)
*Wallflowers (spring to early summer)
Wood forget-me-not (spring)
Yarrow (early summer)



Plants marked * are hybrids or exotics that may be useful in the garden



Herbs (both leaves & flowers are fragrant)

Angelica
Bergamot (summer to early autumn)
Borage (spring to early autumn)
Coriander (summer)
English marigolds
Fennel (summer to early autumn)
Feverfew (summer to autumn)

Hyssop (summer to early autumn)
Lavenders
Lemon balm
Marjoram (summer)
Rosemary (spring)
Sweet Cicely (spring to early summer)
Thyme (summer)

Things to remember

- Pesticide-free gardens tend to be better for wildlife and bats.
- Wherever possible, try to choose native plants and trees.
- Never dig up plants from the wild. Buy native plants from reputable suppliers who breed their own stock.
- Use peat-free compost or peat-substitutes such as coir. Peat extraction is unsustainable and seriously damages our unique bog habitats. Gardeners can help by reducing the demand for this product.
- Creating a range of habitats such as a pond, vegetable garden and hedgerow makes your garden more attractive to insects and in turn bats.
- Add a seat, put your feet up and watch your garden come to life!
- Hedge and tree lines are important to help bats navigate.
- Use lighting sensitively in your garden and do not point it at a bat box or roost.

Trees, shrubs & climbers

Bramble (climber)
 *Buddleia (shrub)
 Common alder
 (suitable for coppicing)
 Dog rose (climber)
 Elder (small)
 English oak (large gardens only)
 Gorse (shrub)
 Guelder rose (shrub)

Hawthorn (suitable for coppicing)
 Hazel (suitable for coppicing)
 Honeysuckle (native honeysuckle)
 Hornbeam
 Ivy (climber)
 *Jasmine (night-scented)
 Pussy willow (suitable for coppicing)
 Rowan
 Silver birch



Wild flowers for pond edges & marshy areas

Bog bean
 Bugle
 Creeping Jenny (spring to summer)
 Flag iris
 Hemp agrimony (summer)
 Lady's smock (spring to summer)
 Marsh mallow
 Marsh marigold (spring)

Marsh woundwort
 Meadowsweet
 (summer to early autumn)
 Purple loosestrife (summer)
 Water avens
 Water forget-me-not
 (summer to autumn)
 Water mint (summer to autumn)