

Proposed Large Scale Residential  
Development at Rathgowan, Mullingar,  
Co. Westmeath  
**Applicant: Marina Quarter Ltd.**

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**CHAPTER 14 Biodiversity**

- Appendix 14.1 Value of Ecological Resources
- Appendix 14.2 EPA Impact Assessment Criteria
- Appendix 14.3 Bat Detector Metadata
- Appendix 14.4 Previous Bat Activity Survey (Ash Ecology, 2022)

# Volume III

## Appendices



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## Appendix 14.1

## Value of Ecological Resources

## APPENDIX 14.1 – VALUE OF ECOLOGICAL RESOURCES

The criteria outlined in the table below, taken from the *Guidelines for Assessment of Ecological Impacts of National Road Schemes* published by the NRA, were used for assigning value to designated sites, habitats and species within the Site of the Proposed Development and surrounding area.

**TABLE A1. DESCRIPTION OF VALUES FOR ECOLOGICAL RESOURCES BASED ON GEOGRAPHIC HIERARCHY OF IMPORTANCE (NRA, 2009B).**

Importance	Criteria
<b>International Importance</b>	<ul style="list-style-type: none"> <li>- 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.</li> <li>- 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).</li> <li>- Features essential to maintaining the coherence of the Natura 2000 Network</li> <li>- Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.</li> <li>- Resident or regularly occurring populations (assessed to be important at the national level) of the following:               <ul style="list-style-type: none"> <li>o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or</li> <li>o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive</li> </ul> </li> <li>- Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971).</li> <li>- World Heritage Site (Convention for the Protection of World Cultural &amp; Natural Heritage, 1972).</li> <li>- Biosphere Reserve (UNESCO Man &amp; The Biosphere Programme)</li> <li>- Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979).</li> <li>- Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979).</li> <li>- Biogenetic Reserve under the Council of Europe.</li> <li>- European Diploma Site under the Council of Europe.</li> <li>- Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).</li> </ul>
<b>National Importance</b>	<ul style="list-style-type: none"> <li>- Site designated or proposed as a Natural Heritage Area (NHA).</li> <li>- Statutory Nature Reserve.</li> <li>- Refuge for Fauna and Flora protected under the Wildlife Acts.</li> <li>- National Park.</li> <li>- 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.</li> <li>- Resident or regularly occurring populations (assessed to be important at the national level) of the following:               <ul style="list-style-type: none"> <li>o Species protected under the Wildlife Acts; and/or</li> <li>o Species listed on the relevant Red Data list.</li> <li>o Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive</li> </ul> </li> </ul>
<b>County Importance</b>	<ul style="list-style-type: none"> <li>- Area of Special Amenity.</li> <li>- Area subject to a Tree Preservation Order.</li> <li>- Area of High Amenity, or equivalent, designated under the County Development Plan.</li> </ul>

	<ul style="list-style-type: none"> <li>- Resident or regularly occurring populations (assessed to be important at the County level) of the following: <ul style="list-style-type: none"> <li>o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;</li> <li>o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;</li> <li>o Species protected under the Wildlife Acts; and/or</li> <li>o Species listed on the relevant Red Data list.</li> <li>o Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance.</li> </ul> </li> <li>- 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.</li> <li>- Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county.</li> <li>- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.</li> </ul>
<p><b>Local Importance (higher value)</b></p>	<ul style="list-style-type: none"> <li>- Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared;</li> <li>- Resident or regularly occurring populations (assessed to be important at the Local level) of the following: <ul style="list-style-type: none"> <li>o Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;</li> <li>o Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;</li> <li>o Species protected under the Wildlife Acts; and/or o</li> <li>o Species listed on the relevant Red Data list.</li> <li>o 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;</li> </ul> </li> <li>- 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.</li> </ul>
<p><b>Local Importance (lower value)</b></p>	<ul style="list-style-type: none"> <li>- Sites containing small areas of semi-natural habitat that are of some local importance for wildlife;</li> <li>- Sites or features containing non-native species that is of some importance in maintaining habitat links.</li> </ul>

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Appendix 14.2 EPA Impact Assessment Criteria

## APPENDIX 14.2 – EPA IMPACT ASSESSMENT CRITERIA

### *Criteria used to Define Quality of Effects*

In line with the draft EPA Guidelines (EPA, 2017), the following terms are defined when quantifying the quality of effects.

**TABLE B1. DEFINITION OF QUALITY OF EFFECTS.**

Quality	Definition
Positive Effects	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Neutral Effects	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
Negative / adverse Effects	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

### *Criteria used to Define Significance of Effects*

In line with the draft EPA Guidelines (EPA, 2017), the following terms are defined when quantifying significance of impacts.

**TABLE B2. DEFINITION OF SIGNIFICANCE OF EFFECTS.**

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
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound Effects	An effect which obliterates sensitive characteristics

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### Criteria Used to Define Duration of Effects

In line with the draft EPA Guidelines (EPA, 2017), the following terms are defined when quantifying duration and frequency of effects.

**TABLE B3. DEFINITION OF DURATION OF EFFECTS.**

Quality	Definition
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

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Appendix 14.3 Bat Detector Metadata

**APPENDIX 14.3 – BAT DETECTOR METADATA**

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Recording	Timestamp	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Latitude [WGS84]	Longitude [WGS84]
2180006	17/05/2023 21:38	Common pipistrelle	21	44.7	73.2	43.7	6	94	53.53037	-7.35938
2180009	17/05/2023 21:59	Soprano pipistrelle	8	51.9	60.6	51.2	3	80	53.52914	-7.36082
2180010	17/05/2023 21:59	Soprano pipistrelle	8	51.3	61.1	50.7	3	195	53.52914	-7.36082
2180011	17/05/2023 22:12	Soprano pipistrelle	1	60	66.8	59.6	2.7	0	53.52963	-7.35846
2180012	17/05/2023 22:19	Soprano pipistrelle	2	54.9	58.1	54.2	5.6	609	53.5288	-7.35784
2180013	17/05/2023 22:19	Soprano pipistrelle	23	58.6	90.2	57.6	3	80	53.5288	-7.35784
2180014	17/05/2023 22:24	Soprano pipistrelle	1	56.6	64.1	55.9	5.3	0	53.5288	-7.35785
2180015	17/05/2023 22:24	Soprano pipistrelle	3	54.3	56.3	53.6	6.2	388	53.5288	-7.35785
2180016	17/05/2023 22:25	Soprano pipistrelle	18	57.4	101.3	56.8	4	80	53.5288	-7.35784
2180017	17/05/2023 22:27	Common pipistrelle	25	44.4	57.7	43.8	4	96	53.52903	-7.35772
2180019	17/05/2023 22:33	Soprano pipistrelle	23	52.3	58.7	51.5	7	114	53.52936	-7.35621
2180020	17/05/2023 22:35	Common pipistrelle	12	45.7	48.5	45	7	180	53.52936	-7.35621
2180021	17/05/2023 22:36	Soprano pipistrelle	15	57.7	90.3	57	4	75	53.52935	-7.35622
2180022	17/05/2023 22:39	Common pipistrelle	35	47	68.8	45.6	3	76	53.52935	-7.35621

2180023	17/05/2023 22:52	Common pipistrelle	2	46.3	53.6	45.9	5.3	100	53.5301	-7.35547
2180024	17/05/2023 22:55	Common pipistrelle	3	42.6	48.6	42.1	4	151	53.53009	-7.3555
3750095	28/06/2023 23:54	Soprano pipistrelle	5	56.3	60.2	55.7	3	110	53.52882	-7.35789
3750099	28/06/2023 23:58	Soprano pipistrelle	13	56.9	66.3	56.2	3	75	53.52881	-7.3579
3750097	28/06/2023 23:56	Soprano pipistrelle	1	57	60.4	56.6	2.1	0	53.52881	-7.3579
3750094	28/06/2023 23:54	Common pipistrelle	17	46.2	72.2	45.5	5	100	53.52882	-7.3579
3750093	28/06/2023 23:54	Common pipistrelle	6	46	49.7	45.4	5	132	53.52882	-7.3579
3750092	28/06/2023 23:52	Common pipistrelle	24	47.1	71.1	46.4	5	84	53.52881	-7.35791
3750091	28/06/2023 23:52	Common pipistrelle	13	47.2	55	46.2	4	120	53.52881	-7.3579
3750090	28/06/2023 23:52	Common pipistrelle	17	46.7	55.5	45.8	6	190	53.52881	-7.3579
3750088	28/06/2023 23:51	Common pipistrelle	31	46.9	71.3	45.8	5	90	53.52882	-7.3579
3750087	28/06/2023 23:50	Soprano pipistrelle	4	55.6	61.7	55	3.5	180	53.52882	-7.3579
3750086	28/06/2023 23:50	Soprano pipistrelle	26	54.8	62.8	53.5	6	170	53.52882	-7.3579
3750085	28/06/2023 23:50	Common pipistrelle	9	46.7	57.6	46	3	244	53.52881	-7.35793
3750081	28/06/2023 23:43	Soprano pipistrelle	7	56.4	65.7	55.6	3	170	53.52885	-7.3582
3750078	28/06/2023 23:33	Common pipistrelle	17	44.9	50.6	44	4	100	53.5295	-7.35862
3750077	28/06/2023 23:30	Soprano pipistrelle	22	56.5	69.4	55.4	4	80	53.52949	-7.35863
3750073	28/06/2023 23:27	Soprano pipistrelle	5	56.2	69.9	55.4	3	59	53.52918	-7.35886
3750072	28/06/2023 23:26	Common pipistrelle	26	44.5	52	43.8	5	90	53.52896	-7.35938

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3750071	28/06/2023 23:23	Leisler's Bat	4	21.5	22	20.7	15.7	542	53.52924	-7.36076
3750069	28/06/2023 23:19	Common pipistrelle	13	44.4	76.7	43.7	5	437	53.52923	-7.36076
3750068	28/06/2023 23:18	Leisler's Bat	4	22.2	22.7	21.7	11.3	615	53.52923	-7.36074
3750062	28/06/2023 23:11	Soprano pipistrelle	21	48.6	72.2	47.8	3	80	53.53005	-7.35885
3750061	28/06/2023 23:11	Soprano pipistrelle	26	49.6	81.3	48.8	3	75	53.53008	-7.35887
3750060	28/06/2023 23:09	Soprano pipistrelle	5	49.2	55.1	48.5	2.8	78	53.53031	-7.3593
3750058	28/06/2023 23:07	Soprano pipistrelle	35	47.4	88.5	45.9	4	90	53.5303	-7.35931
3750053	28/06/2023 22:57	Soprano pipistrelle	4	56.1	65	52.7	2	110	53.53085	-7.35684
3750052	28/06/2023 22:57	Soprano pipistrelle	2	52.1	53.6	51	5.9	91	53.53085	-7.35684
3750050	28/06/2023 22:56	Soprano pipistrelle	7	54.2	73.4	52.5	3	60	53.53085	-7.35684
3750049	28/06/2023 22:56	Soprano pipistrelle	6	53.6	72	52.5	3	60	53.53085	-7.35684
3750048	28/06/2023 22:56	Soprano pipistrelle	4	54.2	72.2	52.9	2.7	96	53.53085	-7.35684
3750043	28/06/2023 22:51	Common pipistrelle	13	43.8	50.7	43.2	3	80	53.53083	-7.35685
3750042	28/06/2023 22:50	Soprano pipistrelle	7	49.4	63.3	48.9	4	111	53.53084	-7.35686
3750041	28/06/2023 22:50	Soprano pipistrelle	10	49.3	58.9	48.7	4	80	53.53084	-7.35685
3750040	28/06/2023 22:46	Soprano pipistrelle	27	53.1	82.2	51.4	3	80	53.53014	-7.35546
3750039	28/06/2023 22:45	Common pipistrelle	52	47	85.2	46.2	4	80	53.5301	-7.35545
3750038	28/06/2023 22:45	Common pipistrelle	21	46.9	70	45.8	4	80	53.5301	-7.35545
3750037	28/06/2023 22:45	Soprano pipistrelle	10	48.3	87.3	47.3	4	70	53.5301	-7.35544
3750036	28/06/2023 22:45	Common pipistrelle	134	46.9	84.1	46.1	4	80	53.53009	-7.35543

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3750035	28/06/2023 22:45	Soprano pipistrelle	106	47	87	46.2	4	80	53.53009	-7.35543
3750034	28/06/2023 22:44	Common pipistrelle	102	47.2	82.1	46.1	4	90	53.5301	-7.35542
3750033	28/06/2023 22:44	Common pipistrelle	115	47.6	86.9	46.3	5	100	53.53009	-7.35543
3750032	28/06/2023 22:44	Common pipistrelle	115	47	84.6	46.1	5	95	53.53009	-7.35543
3750031	28/06/2023 22:44	Common pipistrelle	133	47.9	92.1	46.8	4	80	53.53009	-7.35544
3750030	28/06/2023 22:44	Common pipistrelle	135	48	90.7	46.9	5	80	53.53009	-7.35544
3750029	28/06/2023 22:43	Soprano pipistrelle	105	47.5	84.8	46.5	4	80	53.53009	-7.35545
3750028	28/06/2023 22:43	Common pipistrelle	80	47.5	86.1	46.5	5	80	53.53009	-7.35545
3750027	28/06/2023 22:43	Soprano pipistrelle	66	47.3	83.1	46.6	4	110	53.53009	-7.35545
3750026	28/06/2023 22:43	Soprano pipistrelle	28	47.7	87.6	46.6	4	130	53.53009	-7.35544
3750025	28/06/2023 22:42	Soprano pipistrelle	5	48.6	60.9	47.8	3	275	53.53009	-7.35544
3750024	28/06/2023 22:42	Soprano pipistrelle	17	48.3	82.7	46.5	4	73	53.53009	-7.35545
3750023	28/06/2023 22:42	Soprano pipistrelle	69	47.8	86.3	46.9	4	80	53.53009	-7.35544
3750022	28/06/2023 22:42	Soprano pipistrelle	98	47.8	91.3	46.7	4	80	53.53009	-7.35544
3750021	28/06/2023 22:42	Soprano pipistrelle	79	47.9	86.9	46.5	4	80	53.53009	-7.35544
3750020	28/06/2023 22:42	Soprano pipistrelle	3	57.8	61	57.1	3.2	247	53.53009	-7.35544
3750019	28/06/2023 22:41	Soprano pipistrelle	17	48.6	95.3	47.3	4	84	53.5301	-7.35545
3750018	28/06/2023 22:40	Soprano pipistrelle	30	49.2	88.9	47.6	4	83	53.53009	-7.35544
3750017	28/06/2023 22:40	Soprano pipistrelle	17	47.3	83.4	46.6	3	85	53.53009	-7.35544
3750015	28/06/2023 22:40	Soprano pipistrelle	32	47.7	88.7	46.8	4	80	53.53009	-7.35544

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2180090	18/07/2023 23:23	Leisler's Bat	4	25.3	26.7	23.9	7.5	340	53.52917	-7.36091
2180000	18/07/2023 22:20	Soprano pipistrelle	23	48.9	86.7	48.1	4	86	53.5288	-7.35788
2180001	18/07/2023 22:20	Common pipistrelle	16	45	50.7	44.2	6	90	53.52879	-7.35787
2180002	18/07/2023 22:20	Common pipistrelle	18	45.9	52	45.3	2	90	53.52879	-7.35788
2180003	18/07/2023 22:22	Common pipistrelle	18	46.7	59.2	46.1	5	85	53.52879	-7.35788
2180004	18/07/2023 22:22	Common pipistrelle	16	47.3	53.3	46.6	5	100	53.52879	-7.35788
2180005	18/07/2023 22:22	Common pipistrelle	16	47	71.3	46.3	5	90	53.52878	-7.35788
2180006	18/07/2023 22:22	Soprano pipistrelle	21	47.7	77.8	47	4	86	53.52878	-7.35789
2180007	18/07/2023 22:23	Soprano pipistrelle	6	48.6	53.6	47.9	3	80	53.5288	-7.35788
2180008	18/07/2023 22:24	Soprano pipistrelle	16	49.5	87.7	48.9	4	80	53.52879	-7.35786
2180009	18/07/2023 22:24	Common pipistrelle	46	45.2	54.6	44.4	4	90	53.5288	-7.35787
2180010	18/07/2023 22:25	Common pipistrelle	3	44.3	47.9	42.9	6.9	217	53.52878	-7.35788
2180011	18/07/2023 22:25	Common pipistrelle	12	45	49.1	43.4	6	95	53.52878	-7.35788
2180012	18/07/2023 22:25	Common pipistrelle	11	45	51.1	44.1	5	90	53.52878	-7.35788
2180013	18/07/2023 22:25	Common pipistrelle	10	45.3	49.4	43.7	5	224	53.52877	-7.35788
2180014	18/07/2023 22:25	Common pipistrelle	8	45.7	52.5	44.6	4	157	53.52877	-7.35788
2180015	18/07/2023 22:25	Common pipistrelle	10	44.6	54.1	43.7	4	178	53.52877	-7.35787
2180016	18/07/2023 22:26	Common pipistrelle	24	44.7	50	43.6	5	93	53.52877	-7.35787
2180017	18/07/2023 22:29	Leisler's Bat	9	47.6	63.1	46.3	3	478	53.52934	-7.35619
2180018	18/07/2023 22:29	Leisler's Bat	17	27.2	41.3	26.3	10	186	53.52934	-7.35619

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2180019	18/07/2023 22:30	Leisler's Bat	19	27.3	44	26.5	5	210	53.52934	-7.35619
2180020	18/07/2023 22:30	Leisler's Bat	12	26.2	33.2	24.7	10	230	53.52934	-7.35619
2180021	18/07/2023 22:30	Leisler's Bat	26	24	25.9	22.7	13	320	53.52934	-7.35619
2180022	18/07/2023 22:31	Leisler's Bat	5	23.2	24.7	22.1	14	348	53.52935	-7.35617
2180023	18/07/2023 22:31	Soprano pipistrelle	9	49.6	61	48.9	3	79	53.52935	-7.35617
2180024	18/07/2023 22:32	Leisler's Bat	11	25.9	30.5	24.4	9	184	53.52935	-7.35617
2180025	18/07/2023 22:32	Leisler's Bat	14	22.4	24.5	21.1	15	260	53.52935	-7.35617
2180026	18/07/2023 22:32	Leisler's Bat	5	22.2	25.4	21.2	14	375	53.52936	-7.35618
2180027	18/07/2023 22:32	Leisler's Bat	6	21.8	24.3	20.6	18	476	53.52936	-7.35618
2180028	18/07/2023 22:32	Leisler's Bat	4	21.7	22.2	20.7	17.1	284	53.52936	-7.35618
2180029	18/07/2023 22:32	Common pipistrelle	14	45.5	54.7	44.9	3	90	53.52935	-7.35619
2180030	18/07/2023 22:33	Common pipistrelle	2	44.6	54.2	44.1	4	84	53.52935	-7.35618
2180031	18/07/2023 22:33	Common pipistrelle	12	44.3	57	43.7	3	94	53.52935	-7.35619
2180032	18/07/2023 22:33	Common pipistrelle	4	44.8	48.9	44.4	4	158	53.52935	-7.35619
2180033	18/07/2023 22:34	Soprano pipistrelle	20	52.9	73	52.2	4	76	53.52935	-7.35618
2180034	18/07/2023 22:34	Soprano pipistrelle	7	50.7	59.1	50	4	131	53.52935	-7.35618
2180035	18/07/2023 22:34	Common pipistrelle	2	45.4	58.9	44.3	2.7	0	53.52935	-7.35619
2180036	18/07/2023 22:35	Soprano pipistrelle	7	58.7	66.9	58.1	3	123	53.52935	-7.35619
2180037	18/07/2023 22:35	Common pipistrelle	13	45.2	61.4	44.4	4	90	53.52935	-7.35619
2180038	18/07/2023 22:35	Soprano pipistrelle	18	46.3	68.1	45.5	3	90	53.52935	-7.35619

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2180039	18/07/2023 22:35	Common pipistrelle	7	44.7	51.6	43.7	4	113	53.52935	-7.3562
2180040	18/07/2023 22:36	Soprano pipistrelle	16	53	72.3	52.2	6	76	53.52935	-7.35619
2180041	18/07/2023 22:36	Common pipistrelle	2	22.5	23.6	22.1	4.3	0	53.52935	-7.35618
2180042	18/07/2023 22:36	Soprano pipistrelle	14	49.7	94.7	48.9	4	80	53.52935	-7.35618
2180043	18/07/2023 22:36	Soprano pipistrelle	8	57.1	76.9	56.6	5	262	53.52935	-7.35618
2180044	18/07/2023 22:46	Common pipistrelle	3	45.3	49.4	44.5	5.9	213	53.52981	-7.35607
2180045	18/07/2023 22:47	Common pipistrelle	11	46.8	52.9	46	3	90	53.52998	-7.35563
2180046	18/07/2023 22:47	Common pipistrelle	23	47	57.8	46.4	4	84	53.53001	-7.35558
2180047	18/07/2023 22:47	Common pipistrelle	69	46.9	79.1	46.2	5	85	53.53003	-7.35552
2180048	18/07/2023 22:47	Soprano pipistrelle	85	47.4	86.5	46.6	4	80	53.53006	-7.35548
2180049	18/07/2023 22:48	Common pipistrelle	91	47	84.6	46.3	4	90	53.53006	-7.35548
2180050	18/07/2023 22:48	Common pipistrelle	71	47.1	82.9	46.4	4	84	53.53007	-7.35548
2180051	18/07/2023 22:48	Common pipistrelle	72	47.3	82.3	46.5	4	85	53.53007	-7.35548
2180052	18/07/2023 22:48	Soprano pipistrelle	67	47.1	80	46.3	4	80	53.53007	-7.35547
2180053	18/07/2023 22:49	Common pipistrelle	102	46.7	75.7	46	5	90	53.53006	-7.35547
2180054	18/07/2023 22:49	Soprano pipistrelle	70	46.7	77.3	46	4	85	53.53007	-7.35548
2180055	18/07/2023 22:49	Soprano pipistrelle	71	48.4	85.2	47.4	4	85	53.53007	-7.35548
2180056	18/07/2023 22:50	Soprano pipistrelle	51	51.7	88.8	50.8	5	80	53.53006	-7.35548
2180057	18/07/2023 22:50	Soprano pipistrelle	82	48.2	89.1	47.3	4	80	53.53006	-7.35547
2180058	18/07/2023 22:50	Common pipistrelle	69	47	81.8	46.3	4	90	53.53006	-7.35546

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2180059	18/07/2023 22:51	Common pipistrelle	35	46.8	79	46	5	90	53.53006	-7.35547
2180060	18/07/2023 22:51	Common pipistrelle	50	47	82.6	46	5	90	53.53007	-7.35547
2180061	18/07/2023 22:51	Soprano pipistrelle	95	48.5	87.5	47.5	5	85	53.53006	-7.35547
2180062	18/07/2023 22:51	Soprano pipistrelle	88	47.5	83.8	46.5	4	84	53.53007	-7.35548
2180063	18/07/2023 22:52	Common pipistrelle	54	47.3	79.5	46.4	4	90	53.53006	-7.35547
2180064	18/07/2023 22:52	Common pipistrelle	96	46.9	82.1	46.2	5	85	53.53006	-7.35546
2180065	18/07/2023 22:52	Common pipistrelle	73	46.9	80.6	46.1	5	90	53.53005	-7.35546
2180066	18/07/2023 22:52	Common pipistrelle	81	47.1	83.9	46.3	4	85	53.53006	-7.35546
2180067	18/07/2023 22:53	Common pipistrelle	21	45.9	77.8	45.3	5	90	53.53006	-7.35548
2180068	18/07/2023 22:53	Common pipistrelle	71	46.9	79.1	46.2	5	85	53.53006	-7.35548
2180069	18/07/2023 22:53	Common pipistrelle	67	48	76.1	47.2	4	85	53.53006	-7.35548
2180070	18/07/2023 22:53	Soprano pipistrelle	35	47.7	70.2	46.9	5	90	53.53005	-7.35547
2180071	18/07/2023 22:53	Soprano pipistrelle	29	47.8	69.5	47	4	90	53.53005	-7.35547
2180072	18/07/2023 22:54	Soprano pipistrelle	40	47.6	62.9	46.7	5	94	53.53005	-7.35547
2180073	18/07/2023 22:54	Soprano pipistrelle	10	48.8	55	47.9	2	268	53.53005	-7.35547
2180074	18/07/2023 22:54	Soprano pipistrelle	45	47.6	68.3	46.8	5	94	53.53005	-7.35547
2180075	18/07/2023 22:54	Common pipistrelle	71	46.5	76.1	45.8	5	95	53.53005	-7.35547
2180076	18/07/2023 22:55	Soprano pipistrelle	31	46.8	79.7	46.1	4	90	53.53004	-7.35547
2180077	18/07/2023 22:55	Soprano pipistrelle	25	47.7	82.3	46.9	4	84	53.53005	-7.35546
2180078	18/07/2023 22:55	Soprano pipistrelle	21	54	72.5	53.4	5	80	53.53005	-7.35546

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2180079	18/07/2023 22:57	Soprano pipistrelle	4	53.5	56.3	53	5.6	200	53.53056	-7.35629
2180080	18/07/2023 22:59	Soprano pipistrelle	10	47.9	87.6	47.3	4	161	53.53088	-7.35695
2180081	18/07/2023 23:02	Soprano pipistrelle	2	48	57.2	47.3	4.3	161	53.53088	-7.35694
2180082	18/07/2023 23:04	Soprano pipistrelle	16	48.8	57.7	48.2	4	100	53.53088	-7.35693
2180083	18/07/2023 23:10	Soprano pipistrelle	22	47.5	62.6	46.7	5	90	53.53031	-7.35928
2180084	18/07/2023 23:12	Common pipistrelle	18	44.4	55	42.8	6	195	53.53029	-7.3593
2180086	18/07/2023 23:19	Leisler's Bat	5	24.2	26.2	22.8	11.5	434	53.52992	-7.35889
2180087	18/07/2023 23:21	Leisler's Bat	1	26.3	27.8	24.8	6.4	0	53.52996	-7.36008
2180088	18/07/2023 23:21	Leisler's Bat	4	23.5	24.5	21.7	10	371	53.52994	-7.36011
2180089	18/07/2023 23:23	Leisler's Bat	10	26	32	24.9	6	247	53.52917	-7.36091

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Appendix 14.4

Previous Bat Activity Survey  
(Ash Ecology, 2022)

**APPENDIX 14.4 – PREVIOUS BAT ACTIVITY SURVEY (ASH ECOLOGY, 2022).**

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July  
2022

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# Bat Survey Report For a Residential Scheme



**Rathgowan  
Mullingar,  
Co. Westmeath**



ASH Ecology & Environmental

Bat Survey Report – For a Residential Scheme at Rathgowan,  
Mullingar, Co. Westmeath

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Contents

<b>1. INTRODUCTION</b>	<b>4</b>
1.1 Purpose of the Report	4
1.2 Competency of Assessor	6
1.3 Bat Legislation	6
1.4 Derogation licences	7
<b>2. METHODOLOGY</b>	<b>10</b>
2.1 Information Sources	10
2.2 Desk Study	11
2.2.1 Previous Records	11
2.2.2 Species Background	11
2.2.3 Landscape Suitability	14
2.2.4 Bat Roosts	14
2.3 Bat Survey Methodology	15
2.4 Bat Roost Potential Tree Assessment	17
2.5 Landscape Evaluation	21
<b>3. RESULTS</b>	<b>22</b>
3.1 Bat Activity Survey	22
3.2 Bat Potential Tree Assessment	25
3.3 Landscape Evaluation	25
<b>4. RECOMMENDATIONS</b>	<b>26</b>
4.1 Lighting for Bats	26
4.2 Bat Roost Potential Tree Assessment	26
4.3 Bat Roosting Opportunities	27
<b>5. CONCLUSION</b>	<b>28</b>

## **Tables**

Table 1	Historical Bat Records in 10km <sup>2</sup> Grid Square N45 (NBDC website <a href="http://www.nbdc.ie">www.nbdc.ie</a> accessed 26/07/2022)
Table 2	Suitability of the study area for the bat species found in the Rathgowan area (based on the NBDC data) with Irish Red list status indicated.
Table 3	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 4	Classification and Survey Requirements for Bats in Trees
Table 5	Classification of Trees for Risk of Bat Roost Presence
Table 6	Bat Results Summary Data from two Survey Dates – May 15 <sup>th</sup> 2020 and July 25 <sup>th</sup> 2022

## **Figures**

Figure 1	Site Location Map
Figure 2	Aerial Photo of Site showing existing layout and surrounding urban and rural landscapes
Figure 3	Proposed Site Layout
Figure 4	Tree Survey Plan (Arbor-Care (Ltd))
Figure 5	Bat Results with Legend –15 <sup>th</sup> May 2020
Figure 6	Bat Results with Legend –25 <sup>th</sup> July 2022

## **Appendices**

Appendix A	Plates
Appendix B	Bat Data
Appendix C	Batbox Examples

# 1. INTRODUCTION

## 1.1 Purpose of the Report

Ash Ecology and Environmental Ltd (AEE) were commissioned to carry out a series of bat emergence and activity surveys on behalf of on behalf of EnviroGuide Consulting.

The site is located at Rathgowan, Mullingar, Co. Westmeath (Grid Ref 53.531047, - 7.358213), see Figure 1 and currently a series of agricultural fields used for livestock grazing purposes, see Figure 2.

The subject site, which is 12.41 ha in total, is situated to the north west of Mullingar town centre. The site is segregated by the R394 with 6.79 ha to the north and the remaining 5.62 ha to the south. Both sites are accessed via the existing roundabout on the R394. The 6.79ha site is bounded by agricultural lands to the northwest with zoned amenity lands to the east. The R394 runs along the southern boundary with some individual residential units along the south western boundary. The smaller 5.62 site is bounded by residential development to the east, with the R394 to the north and west. The Ashe Road runs along the southern boundary. An ESB substation is situated bounding the site along the northern boundary. Both sites are gently undulating and are traversed by numerous ESB lines and hedgerows.

A series of two bat surveys carried out in May 2020 and July 2022 was required to assess the value of the site for bats, namely the hedgerows and trees. There are no affected buildings on the site. The proposed site layout is shown as Figure 3.



Figure 1 Site Location

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**Figure 2** Aerial Photo of Site showing existing layout and surrounding urban and rural landscapes.



**Figure 3** Proposed Site Layout

## 1.2 Competency of Assessor

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.

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 (EIA), 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. In addition she has completed several bat courses to continue her training and CPD with the most recently (May 2021) a Lantra-accredited course, developed by the Bat Conservation Trust and supported by the Arboricultural Association to access bat tree roost features. Over the past 15 years Aisling has completed 100s of bat surveys providing her with more than adequate experience in the profession.

## 1.3 Bat Legislation

All bat species are protected under the Wildlife Act 1976 to 2021 which make it an offence to wilfully interfere with or destroy the breeding or resting place of these species; however, the Acts permit limited exemptions for certain kinds of situations.

Section 23 of the Wildlife Act 1976 to 2021 contains several exemptions to the protection given to the species listed for protection on Schedule 5 (e.g. for agriculture or construction). In 2005 a further amendment through the European Communities (Natural Habitats) (Amendment) Regulations 2005 (S.I. No. 378 of 2005) removed all of the exemptions provided in Section 23(7) of the Wildlife Act 1976 to 2021 insofar as they relate to Annex IV species, including all species of bats. Those 2005 Regulations were revoked in 2011 except for Regulation 2 which brings about this strengthened protection for bats (and other Annex IV species). All species of bats in Ireland are listed on Schedule 5 of the 1976 Act, and are therefore subject to the provisions of Section 23, which make it an offence to:

- Intentionally kill, injure or take a bat;
- Wilfully interfere with the breeding or resting place of a bat

The Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora ("the Habitats Directive") seeks to protect rare and vulnerable species, including all species of bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All species of bat found in Ireland are listed on Annex IV of the Directive. Member States are required to put in place a system of strict protection (as outlined in Article 12) for species listed on Annex IV ('European protected species'). The lesser horseshoe bat is further protected under Annex II. This Annex relates to the designation of Special Areas of Conservation (SACs). The Habitats Directive is transposed into Irish law by the

European Communities (Birds & Natural Habitats Regulations) 2011 (S.I. No. 477 of 2011) ("the Habitats Regulations"). Under the Habitats Regulations (2011), all bat species are listed on the First Schedule and Regulation 51 makes it an offence to:

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

Across Europe, bats are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention 1979) was instigated to protect migrant species across all European boundaries. EUROBATS (a daughter Agreement under CMS) is of particular relevance in relation to cooperation across international borders for the conservation of bats, many of which are known to migrate long distances. The Irish government has ratified both of these conventions as well as the EUROBATS Agreement.

#### **1.4 Derogation licences**

It is an offence, under Regulation 51 of the European Communities (Birds and Natural Habitats) Regulations, 2011 ('the 2011 Regulations') to:

- a) Deliberately capture or kill a bat in the wild;
- b) Deliberately disturb a bat particularly during the period of breeding, rearing, hibernation and migration;
- c) Damage or destroy a bat's breeding site or resting place, or;
- d) Keep, transport, sell, exchange, offer for sale or offer for exchange any bat taken in the wild, other than those taken legally before the Habitats Directive before the Habitats Directive was implemented.

A person may apply to the Minister under Regulation 54 of the 2011 Regulations for a derogation licence to carry out one or more of these prohibited activities. But, the Minister may only grant such a derogation licence if three criteria are met.

Firstly the Minister may only grant a derogation licence if it is for one of the following specified reasons listed in Regulation 54:

- a) In the interests of protecting wild fauna and flora and conserving natural habitats;
- b) To prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property;
- c) In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and the beneficial consequences of primary importance for the environment;
- d) For the purpose of research and education, of repopulating and introducing these species and for the breeding operations necessary for these purposes, including the artificial propagation of plants, or;

- e) To allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of bats.

Secondly, the Minister may only issue a derogation if there is no alternative to carrying out the prohibited activity. The first aim of the developer, whether from a private company or a public authority, working with professional advice, should be to entirely avoid any potential impact of a proposed development on bats and their breeding and resting places. Alternatives may involve redesigning a development so that bat roosts, and associated commuting routes and feeding areas are kept intact and that bats are not disturbed, for example by inappropriate lighting. It should be noted that the European Commission has a specific understanding of satisfactory alternative solution. "An alternative solution cannot be deemed unsatisfactory merely because it would cause greater inconvenience or compel a change in behaviour" (European Commission, 2021, page 13)<sup>1</sup>. Decisions about what solution is satisfactory must be science-based and should solve the problem of how to strictly protect the bats in light of the development.

Thirdly the Minister may only grant a derogation if it is not detrimental to the maintenance of the populations of bats at a favourable conservation status (FCS) in their natural range. There is case law from the Court of Justice of the European Union (CJEU) to back this up. One example is the Finnish Wolf Case C-674/17. The ruling establishes that the Member State must "clearly and precisely" identify in the derogation what the objectives of the derogation are. It must also establish that the derogation is capable of achieving those objectives and demonstrate that there is no satisfactory alternative. Cumulative effects of derogations must be taken into account when issuing derogations. The maximum number of all derogations must not be detrimental to the maintenance or restoration of the population at FCS. Consideration must be given to other human causes of mortality. Any risk to FCS must be ruled out by detailed conditions based on the level of population, its conservation status and its biological characteristics. The conditions must be precisely defined and they must be monitored to ensure they are implemented.

If any of these three criteria are not satisfied, the Minister cannot issue a derogation licence. It must never be assumed that a derogation licence will automatically be granted.

In summary, it is clear that a developer must first look to avoid all impacts on bats. This may mean looking at alternative solutions and redesigning the project accordingly. If this is not possible, the developer needs to check whether there are grounds to apply for a derogation licence, based on the reasons given in Regulation 54 of the Habitats Regulations. When applying for a derogation licence the developer must clearly state the reason and describe in detail all alternative solutions which were given serious consideration. Any mitigation intended to ensure that there is no impact or minimal impact on the bats must be clearly described in detail, giving examples of how it worked in other places.

If a derogation licence has been refused by the Minister, any aspect of the development for which the derogation licence was sought, must not go ahead, no matter what other permissions are in place.

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<sup>1</sup> <https://op.europa.eu/en/publication-detail/-/publication/bbc7ace0-27e2-11ec-bd8e-01aa75ed71a1/language-en>

A derogation licence is required when on the basis of survey information and specialist knowledge, it appears that:

- The site in question is a breeding site or resting place for bats and/or;
- The proposed activity could impact on a breeding site or resting place of a bat.

No licence is required if the proposed activity is unlikely to result in an offence. The advice given in this document (and see also Mullen et al. 2021)<sup>2</sup> should assist the proponent, or those acting on their behalf, in arriving at a decision on this matter, though it must be recognised that determining whether a particular site is used as a breeding or resting place can be problematic for such mobile animals as bats. Determining whether an activity undertaken near to a roost might impact on that roost (e.g. by removing important flight lines or foraging areas) will also require specialist assessment. Note that if the proposed activity can be timed, organised and carried out so as to avoid committing an offence then no licence is required.

Examples of works that are likely to need a licence because they may result in the destruction of a breeding or resting place and/or disturbance of bats include:

- Demolition of buildings known to be used by bats;
- Conversion of barns or other buildings known to be used by bats;
- Restoration of ruined or derelict buildings;
- Maintenance and preservation of heritage buildings;
- Introduction of artificial lighting inside a roost or near a roost entrance;
- Change of use of buildings resulting in increased ongoing disturbance;
- Removal of trees known to be used by bats;
- Significant alterations to roof voids known to be used by bats. Examples of works that, if carefully planned, may not need a licence include:
  - Works near to or at roosts (e.g. re-roofing) if carried out while bats are not present and the access points and roosting area are not affected;
  - Remedial timber treatment, carried out with the correct (non-toxic to bats) chemicals while bats are not present.

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<sup>2</sup> Mullen, E., Marnell, F & Nelson, B. (2021) Strict protection of animal species. Guidance for public authorities on the application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a public authority. Unpublished Report, National Parks and Wildlife Service. Department of Housing, Local Government and Heritage, Dublin. <https://npws.ie/sites/default/files/files/article-12- guidance-final.pdf>

## 2. METHODOLOGY

### 2.1 Information Sources

A desk-based review of information sources was completed. Information contained on the websites of the National Parks and Wildlife Service (NPWS)<sup>3</sup> and the National Biodiversity Data Centre (NBDC)<sup>4</sup> was reviewed. The following publications and websites were also reviewed and consulted:

- 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.
- Mullen, E., Marnell, F & Nelson, B. (2021) Strict protection of animal species. Guidance for public authorities on the application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a public authority. Unpublished Report, National Parks and Wildlife Service. Department of Housing, Local Government and Heritage, Dublin. <https://npws.ie/sites/default/files/files/article-12-guidance-final.pdf>
- Bat Conservation Trust (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition
- CIEEM (2021) Bat Mitigation Guidelines - A guide to impact assessment, mitigation and compensation for developments affecting bats
- Bat Conservation Ireland <https://www.batconservationireland.org/>
- BTHK (2018) Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Exeter: Pelagic Publishing.
- Bat Conservation Trust (2018) Bats and artificial lighting in the UK Bats and the Built Environment series<sup>5</sup>
- Mitchell-Jones, A.J, & McLeish, A.P. (eds). 2004., 3rd Edition Bat Workers' Manual, JNCC, Peterborough, ISBN 1 86107 558 8
- Bat Conservation Ireland (2012) Bats and Appropriate Assessment Guidelines, Version 1, December 2012. Bat Conservation Ireland, [www.batconservationireland.org](http://www.batconservationireland.org)<sup>6</sup>
- Bat Conservation Ireland (2010) Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers<sup>7</sup>
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (National Roads Authority, 2005).
- Guidelines for the Treatment of Bats during the Construction of National Road Schemes (National Roads Authority, 2005).
- Bats and Lighting in the UK – Bats and the Built Environment Series (Institute of Lighting Professionals, September 2011)
- Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2011).
- Bats and Lighting – Guidance Notes for Planners, Engineers, Architects and Developers (Bat Conservation Ireland);

<sup>3</sup> The National Parks and Wildlife Services map viewer <http://webgis.npws.ie/npwsviewer/>

<sup>4</sup> The National Biodiversity Data Centre [www.NBDC.ie](http://www.NBDC.ie)

<sup>5</sup> <https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/>

<sup>6</sup> [https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIreland-AA-Guidelines\\_Version1.pdf](https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIreland-AA-Guidelines_Version1.pdf)

<sup>7</sup> [https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIrelandGuidelines\\_Lighting.pdf](https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIrelandGuidelines_Lighting.pdf)

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- The Eurobats Mitigation of Lighting Document
- Arboricultural Impact Assessment (Arbor Care Ltd, 2020)

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## 2.2 Desk Study

### 2.2.1 Previous Records

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 10km<sup>2</sup> Grid Square N45. The website the NBDC ([www.nbdc.ie](http://www.nbdc.ie)) was accessed on 26/07/2022 to establish any previous bat records and shown below in Table 1.

**Table 1** Historical Bat Records in 10km<sup>2</sup> Grid Square N45 (NBDC website [www.nbdc.ie](http://www.nbdc.ie) accessed 26/07/2022)

Species Name - Common	Species Name - Latin	Last Documented Record N45
Daubenton's Bat	<i>Myotis daubentonii</i>	26/08/2013
Leisler's Bat	<i>Nyctalus leisleri</i>	19/05/2011
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	02/06/1999

### 2.2.2 Species Background

Ireland had ten known bat species until February 2013, when a single live greater horseshoe bat (*Rhinolophus ferrumequinum*) was found roosting in Co. Wexford<sup>8</sup>. 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.<sup>9</sup>

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.<sup>10</sup>

<sup>8</sup> National Biodiversity Data Centre <http://www.biodiversityireland.ie/new-bat-species-found-in-ireland/>

<sup>9</sup> 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.

<sup>10</sup> NRA (2005) *Guidelines for the Treatment of Bats Prior to the Construction of National Road Schemes*. National Roads Authority, Dublin

### 2.2.2.1 Family Vespertilionidae:

#### Common pipistrelle *Pipistrellus pipistrellus*

This species was only recently separated from its sibling, the soprano or brown pipistrelle *P. pygmaeus*<sup>11</sup>, 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.

#### 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 Down<sup>12</sup> and also in Fermanagh, Longford and Cavan. It has also recently been recorded in Counties Cork and Kerry.<sup>13</sup> 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, caddisflies 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 oversized 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.

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<sup>11</sup> 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.

<sup>12</sup> Richardson, P. (2000) *Distribution Atlas of Bats in Britain and Ireland 1980 - 1999*. The Bat Conservation Trust, London, England.

<sup>13</sup> Kelleher, C. (2005) *International Bat Fieldcraft Workshop, Killarney, Co. Kerry*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government.

### 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, caddisflies 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.

### 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 2005<sup>14</sup> and another in Tipperary in 2006.<sup>15</sup> 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.

## **2.2.2.2 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

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<sup>14</sup> Kelleher, C. 2006a *Nathusius pipistrelle* *Pipistrellus nathusii* and Brandt's Bat *Myotis brandtii* - New Bat Species to Co. Kerry – Irish Naturalists' Journal 28: 258.

<sup>15</sup> Kelleher, C. 2006b Brandt's Bat *Myotis brandtii*, New Bat Species to Co. Tipperary. Irish Naturalists' Journal 28: 345.

been designated in Ireland for its protection. Where it occurs, it is often found roosting within farm buildings.

### 2.2.3 Landscape Suitability

The National Biodiversity Data Centre (NBDC) maps landscape suitability for 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. On average for all bat species the highest range is between 36.44 - 58.56. The overall assessment of bat habitats for the current study area is given as '34.22', deemed 'Moderate' by the author.

Table 2 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).<sup>16</sup>

**Table 2** Suitability of the study area for the bat species found in the Rathgowan area (based on the NBDC data) with Irish Red list status indicated

Common name	Scientific name	Suitability index	Irish red list status
All bats	-	34.22	Least Concern
Soprano pipistrelle	<i>Pipistrellus pygmaeus</i>	46	Least Concern
Brown long-eared bat	<i>Plecotus auritus</i>	39	Least Concern
Common pipistrelle	<i>Pipistrellus pipistrellus</i>	55	Least Concern
Lesser-horseshoe bat	<i>Rhinolophus hipposideros</i>	1	Least Concern
Leisler's bat	<i>Nyctalus leisleri</i>	50	Least Concern
Whiskered bat	<i>Myotis mystacinus</i>	12	Least Concern
Daubenton's bat	<i>Myotis daubentonii</i>	33	Least Concern
Nathusius' pipistrelle	<i>Pipistrellus nathusii</i>	32	Least Concern
Natterer's bat	<i>Myotis nattereri</i>	40	Least Concern

### 2.2.4 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.

<sup>16</sup> 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.

#### **2.2.4.1 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.

#### **2.2.4.2 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.

#### **2.2.4.3 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.

#### **2.2.4.4 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.

### **2.3 Bat Survey Methodology**

The guidance used for the bat emergence surveys and activity surveys followed Marnell et al (2022)<sup>17</sup> for the July 2022 survey and the older 2006<sup>18</sup> guidelines for the May survey in 2020. The Bat Conservation Trust (2016)<sup>19</sup> Guidelines were used for both May 2020 and July 2022 surveys.

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<sup>17</sup> 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.

<sup>18</sup> 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.

<sup>19</sup> The Bat Conservation Trust (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition

A bat activity survey was carried out on the 15<sup>th</sup> of May 2020 (21.24 to 23.35, sunset at 21.24, temperature 11-13°C with a gentle breeze) and 25<sup>th</sup> July 2022 (21.05 to 23.30, sunset at 21.37, temperature 14°C with a gentle breeze). The equipment used included an Elekon Bat Logger M detector. Visual observations were taken with the aid of a powerful L.E.D. torch (AP Pros-Series 220 Lumens High Performance Spotlight).

The BCT guidelines were followed for the assessment rating<sup>20</sup> and classified using Table 4.1 of the BCT guidelines (2016) which is shown as Table 3 overleaf for grading foraging and commuting habitats. General Site photos are contained in Appendix A from May 2020 and July 2022.

**Table 3** 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 <sup>a</sup> 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 <sup>b</sup> ).  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. <sup>c</sup>	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 <sup>a</sup> 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 <sup>a</sup> 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.

<sup>a</sup> For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.

<sup>b</sup> 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.

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

## 2.4 Bat Roost Potential Tree Assessment

Trees that may provide a roosting space for bats were classified using the Bat Tree Habitat Key (BTHK, 2018)<sup>21</sup> and the classification system adapted from Collins (2016). The Potential Roost Features (PRFs) listed in BTHK (2018) were used to determine the PBR value of trees, see Table 4. Consideration was also given to the classification of trees according to the British Standard BS8956 - Surveying for bats in trees and woodland, see Table 5.

A Phase 1 inspection was undertaken to make a list of trees within the proposed development site that may be suitable as roosting sites for bats. Inspections were undertaken visually with the aid of a strong torch beam (AP Pros-Series 220 Lumens High Performance Spotlight) and Celestron 12x56 Prism Binoculars during the daytime searching for PRFs, if visible. To aid this Phase 1 inspection, tree reports, where available, were consulted to supplement the data collected. A RIDGID 36848 Micro CA-150 Hand-Held Borescope for inspection of any accessible crevices on trees (3m from ground).

During the survey, the features listed below on the affected trees were sought as they may provide suitable roost sites for bats:

- 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.
- 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.

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<sup>21</sup> BTHK (2018) Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Exeter: Pelagic Publishing.

**Table 4** Classification and Survey Requirements for Bats in Trees<sup>22</sup>

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 Category 1	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 habitat. Examples include (but are not limited to); woodpecker holes, larger cavities, hollow trunks, hazard beams, etc.	<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 roost is to be affected by proposals a licence from the NPWS will be required.</p> <p>After completion of survey work (and the presence of a bat roost is discounted), a precautionary working</p>

<sup>22</sup> Bat Surveys for Professional Ecologists: Good Practice Guidelines (J., Collins (Bat Conservation Trust), 2016).

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey Work / Actions
		method statement may still be appropriate.
Moderate Potential Category 2	<p>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).</p> <p>Examples include (but are not limited to); woodpecker holes, rot cavities, branch socket cavities, etc.</p>	<p>A combination of aerial assessment by roped access bat workers 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>After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate.</p> <p>If a roost site/s is confirmed a licence from the NPWS will be required.</p>
Low Potential Category 3	<p>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.</p> <p>Examples include (but are not limited to); loose/lifted bark, shallow splits exposed to elements or upward facing holes.</p>	No further survey required but a precautionary working method statement may be appropriate.
Negligible/No potential – Category 4	Negligible/no habitat features likely to be used by roosting bats	None.

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**Table 5** Classification of Trees for Risk of Bat Roost Presence

Tree category and description (following scoping survey)	Secondary (non-specialist) survey recommendations	Secondary (specialist) survey recommendations
<b>Known or confirmed roost</b>	Initially consider if work to tree(s) can be avoided. If not, a specialist bat roost assessment should be undertaken to establish bat species, numbers and the nature of the roost.	
<b>High/medium risk</b> Trees with a suitable potential roost feature, or with several features with some bat roost potential.	<ul style="list-style-type: none"> <li>Secondary (non-specialist) assessment to examine potential roost features previously identified. If roosts cannot reasonably be ruled out a bat specialist should be consulted.</li> <li>Following this assessment the tree could be up-graded or down-graded (see column 1 categories).</li> </ul>	<ul style="list-style-type: none"> <li>Specialist bat roost assessment should be undertaken if work to a tree cannot be avoided.</li> <li>Assessment to include techniques such as endoscope use and dusk/pre-dawn surveys should be undertaken.</li> <li>Following this assessment the tree could be up-graded or down-graded.</li> </ul>
<b>Low risk</b> Trees of sufficient size and age to contain bat roosts but with no obvious potential roost features seen during the scoping survey, or features seen with limited roosting potential only, e.g. small amounts of ivy.	No further assessment is required unless sufficient new evidence is found to upgrade the category.	None
<b>Negligible/no risk</b> Trees with apparently no potential to support bats.		
<i>NOTE Risk equates to the likelihood of bat roost presence.</i>		

The Arboricultural Impact Assessment Report (Arbor Care Ltd, 2020) assessed and describes 10 trees and 1 hedgerow for removal to facilitate the development in the north section of site, listed in Table 6 below. Photos of the affected trees onsite are contained in Appendix A and Figure 4 illustrates where the trees are located within the site.

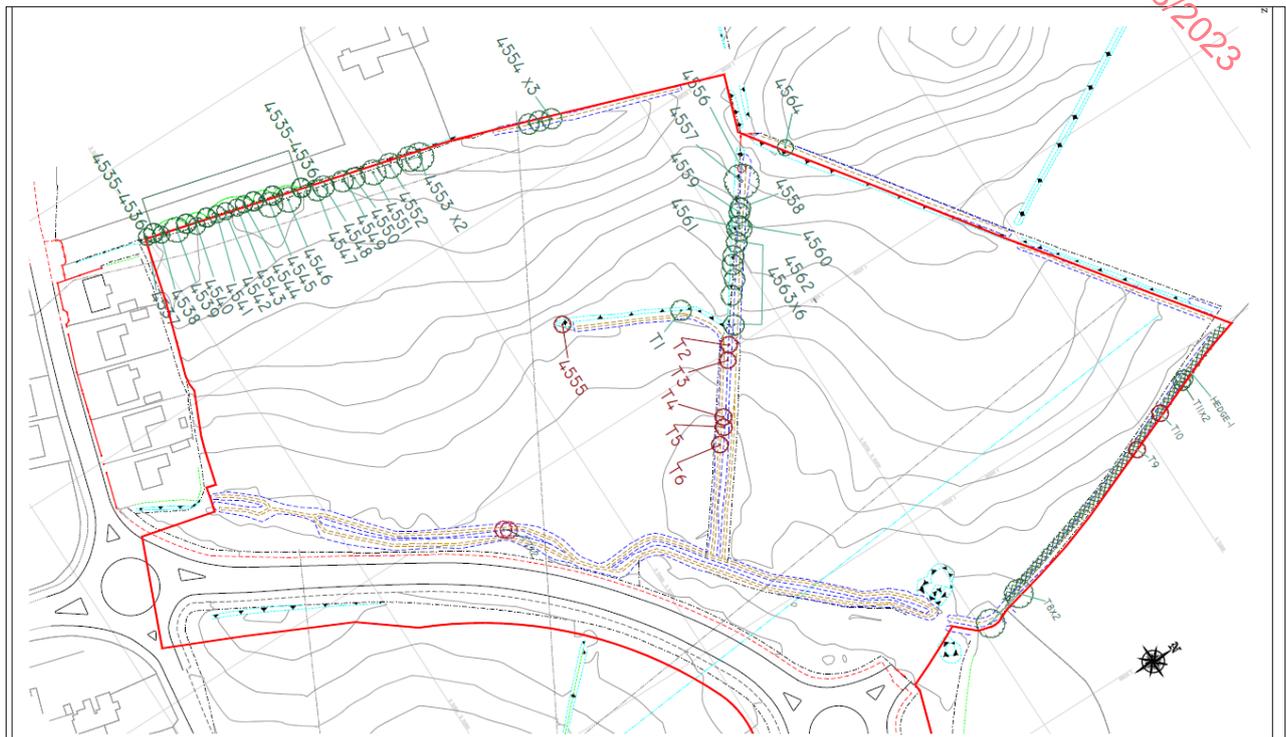
The categories in Table 6 correspond to the 'BS5837: 2012 - Category Retention Rating':

- Category A Trees - Trees of high quality/value with a min. of 40 years life expectancy.
- Category B Trees – Trees of moderate quality/value with a min. of 20 years life expectancy.
- Category C Trees - Trees of low quality/value with a min. of 10 years life expectancy.
- Category U Trees - Trees in such a condition that any existing value would be lost within 10 years or being recommended for removal sound arboricultural practice.

**Table 6** Affected Tree and Hedgerow List

Tree Tag	Species	Age Class	Tree Category
T2	Ash	Mature	B2
T3	Ash	Mature	B2
T4	Ash	Mature	B2
T5	Ash	Mature	B2
T6	Ash	Mature	B2
T7 (1)	Ash	Mature	C2
T7 (2)	Ash	Mature	C2
T9	Ash	Mature	B2
T10	Ash	Mature	B2
4555	Ash	Mature	B2
Hedgerow 1	Ash	Mature	C2

Trees, if identified as Potential Bat Roosts, were inspected during the daytime, where possible, for evidence of bat usage. Evidence of bat usage is in the form of actual bats (visible or audible), bat droppings, urine staining, grease marks (oily secretions from glands present) and claw marks. In addition, the presence of bat fly pupae (bat parasite) also indicated that bat usage of a crevice, for example, has occurred in the past.



**Figure 4** Tree Survey Plan (Arbor-Care (Ltd))

## 2.5 Landscape Evaluation

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).

### 3. RESULTS

#### 3.1 Bat Activity Survey

The survey of May 2020 was carried out in the northern section of the site and the southern part (below the road) had livestock present so was not walked. The survey in July 2022 covered the whole site.

In total four species of bat were detected during May 2020 and three species in July 2022. The tabulated results are summarized in Table 7, with the complete dataset of bat species identified in real time in the field using the Elekon Batlogger M detector presented in Appendix B.

The visual results of the bat surveys (May 15<sup>th</sup> 2020 & 25<sup>th</sup> July 2022) are shown as Figures 5 and 6. The activity during the surveys could be considered Moderate-High given the optimal weather conditions on both occasions.

The passes are indicative of bat activity, and not absolute bat number. Bats tended to pass up and down repeatedly along a treeline which can suggest there are more bats present than is the case.

**Table 7** Bat Results Summary Data– May 15<sup>th</sup> 2020 and July 25<sup>th</sup> 2022

Species Name – Common	Species Name – Latin	Number of Passes	Peak Frequency (kHz)
<b>May 15<sup>th</sup> 2020</b>			
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	34	46.5
Leisler's Bat	<i>Nyctalus leisleri</i>	64	26.9
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	12	56.5
Brown Long Eared	<i>Plecotus auritus</i>	23	35.0
<b>July 25<sup>th</sup> 2022</b>			
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	43	46.5
Leisler's Bat	<i>Nyctalus leisleri</i>	14	26.9
Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	19	56.5

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Figure 5 Bat Results with Legend – May 15<sup>th</sup> 2020

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**Figure 6** Bat Results with Legend – July 25<sup>th</sup> 2022

### 3.2 Bat Potential Tree Assessment

The 10 x Trees affected by the development and 1 Hedgerow are mature. These were assessed July 25<sup>th</sup> 2022 for their bat roost potential features along with risk for same and classified as per Tables 8 and 9. Photos of the 10 affected trees and 1 hedgerow are shown in Appendix A.

**Table 8** Assessment of Affected Trees for Bats, see Tables 4 & 5

No.	Photo No.	Age Class	Presence of Bat Potential Features as per Table 4	Classification of Trees for Risk of Bat Roost Presence as per Table 5
T2	1	B2	Negligible	No Risk
T3	1	B2	Negligible	No Risk
T4	2	B2	Negligible	No Risk
T5	2	B2	Negligible	No Risk
T6	2	B2	Negligible	No Risk
T7 (1)	3	C2	Negligible	No Risk
T7 (2)	3	C2	Negligible	No Risk
T9	4	B2	Negligible	No Risk
T10	5, 6	B2	Moderate	Medium Risk
4555	7, 8	B2	Moderate	Medium Risk
<b>Hedgerows (graded for Commuting and Foraging as per Table 3)</b>				
Hedgerow 1	9	C2	Moderate	Low Risk

It is therefore surmised the majority of affected trees in the northern area of the site are assessed as having 'Negligible' bat roost potential (see Tables 3 and 4) and 'No Risk' for affecting bat roosts (see Table 5). There are two trees (#4555 and T10) with Moderate bat roosting potential due to heavy ivy and peeling bark.

There is an internal treeline close to Tree T4555 which contains other trees with Moderate and High Bat roost potential but will be retained and incorporated into the design.

### 3.3 Landscape Evaluation

The landscape is considered of local importance (Lower value) for bats. There is a good network of hedgerows and treelines in the wider area, however a lack of woodland areas in general with extensive housing to the north, east and south. The majority of habitats in the wider landscape are buildings and artificial surfaces (BL3) and intensive agricultural fields (GA1). Therefore the mature treelines and hedgerows along the site boundaries and internally within the site have the potential to be important for foraging and roosting bats in a local context.

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## 4. RECOMMENDATIONS

### 4.1 Lighting for Bats

In order to minimise disturbance to bats utilising the site in general, the lighting and layout of the proposed development should be designed to minimise light-spill onto habitats 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 proposed areas of habitat creation / landscape planting, or on trees planted.
- Retained treelines should not incur an increase in the current lux level due to the new development.
- Unnecessary light spill controlled through a combination of directional lighting and hooded / shielded luminaires or strategic planting to provide screening vegetation.
- 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 colour rendering of the selected light fitting should be 3000k making the LED fittings a warmer light, helping to further minimize the impact on the local wildlife
- Where lighting is necessary, it shall be of limited height and targeted downwards to prevent overspill.

### 4.2 Bat Roost Potential Tree Assessment

Tree felling protocol should include the following:

- A pre-felling bat survey of trees identified with Moderate Bat Roost potential the night prior to felling, i.e., T10 and T4555.
- Tree-Felling of trees with Moderate Bat Roost Potential should be undertaken during September and October. During this period bats are capable of flight and this may avoid risks associated with tree-felling. It is also outside the bird nesting season. Felling in the winter months 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 48 hours to allow bats/other wildlife 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.
- If bats are found to be using any affected trees as a roost, a derogation licence from the National Parks and Wildlife and Services (NPWS) will be required and any felling postponed until a licence is acquired.

Table 8 below summaries recommendations for each affected tree identified in the AIA Report (Arbor Care Ltd, 2020). Trees used for future landscaping should comprise of mainly native Irish species.

**Table 8** Assessment of Affected Trees for Bats, see Tables 4 & 5

No.	Presence of Bat Potential Features as per Table 4	Classification of Trees for Risk of Bat Roost Presence as per Table 5	Recommendation
T2	Negligible	No Risk	Trees should ideally be removed as per Section 40 of the Wildlife Act 1976 - 2021 (as amended)
T3	Negligible	No Risk	
T4	Negligible	No Risk	
T5	Negligible	No Risk	
T6	Negligible	No Risk	
T7 (1)	Negligible	No Risk	
T7 (2)	Negligible	No Risk	
T9	Negligible	No Risk	
T10	Moderate	Medium Risk	
4555	Moderate	Medium Risk	

### 4.3 Bat Roosting Opportunities

The design of the Proposed Development should incorporate integrated 10 x bat boxes spread across the north and south sections of the site over 4m high (if possible) onto retained mature trees. The trees in which they are placed should not be illuminated. See Appendix C for examples.

## 5. CONCLUSION

The site is mainly improved agricultural grassland (GA1) which will be affected for the development. The vast majority of trees and hedgerows will be retained and positive impacts for bats will be via the supplementary planting of native Irish species and the erection of bat boxes around the site. It was noted that certain areas of the site had higher levels of bat activity and this is possibly attributed to a selection of over mature, standing dead and veteran specimen trees being present which have high bat potential due to features such as hollow cavities and thick ivy growth. For affected trees with 'Moderate' Bat Roost Potential (T10 and T4555) it is recommended they have a bat survey performed the night before to ensure no bats are using these trees.

Finally, in order to preserve the roost potential of the treelines/hedgerows to be retained on site and to minimise disturbance to bats utilising the site in general, the lighting and layout of the proposed works will 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. In that regard the guidelines<sup>23</sup> for lighting and bats will be taken into account for the lighting layout.

Overall with the recommendations implemented from Section 4 any impacts to bats from the proposed development will be slight negative due to the loss of a some hedgerow and mature trees, however compensation will be via new planting and a bat box scheme.

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<sup>23</sup> Bat Conservation Trust (2018) Bats and artificial lighting in the UK Bats and the Built Environment series

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# APPENDICES

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# APPENDIX A



**Plate 1** Tree T2 & T3 (No bat Potential)



**Plate 2** T4, T5 & T6 within this group (No bat potential)



**Plate 3** Tree T7 (1) & T7 (2) (No bat Potential)



**Plate 4** Tree T9 (No bat Potential)



**Plate 5** Tree T10 (Moderate bat Potential)



**Plate 6** Close up of T10



**Plate 7** Tree 4555 (Moderate bat Potential), view 1 **Plate 8** Tree 4555, view 2



**Plate 9** Affected Hedgerow 1 of Ash & Hawthorn. Moderate value for commuting and foraging bats with Tree T10 of Moderate Bat Potential within.

**General Site Photos (North Section of Existing Road)**



**Plate 10** Northern part of site, mainly improved grassland with some recent Bare ground.



**Plate 11** Northern part of site, mainly improved grassland. T7 (x2) shown with red arrow and Tree 4555 with blue arrow.



**Plate 12** Internal Treeline containing Trees with Moderate and High Bat Roost Potential (to be retained, see red double arrow). Affected Tree T4555 shown with blue arrow.

**General Site Photos (South Section of Existing Road)**



**Plate 13** Southern part of site, mainly improved grassland and mature hedgerows. Important for commuting and foraging bats.



**Plate 14** Southern part of site, mainly improved grassland and mature hedgerows. Important hedgerows for commuting and foraging bats present internally and on boundaries.

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# APPENDIX B

15/05/2020	Likely 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]
21:30:17	Leisler's Bat	2	24.1	24.4	23.9	12.1	72	13	53.53147	-7.36085
21:32:58	Leisler's Bat	2	29.6	33.6	28.4	1.3	0	13	53.53032	-7.35989
21:34:28	Leisler's Bat	1	24.1	24.4	23.8	9.2	0	13	53.52993	-7.36047
21:37:03	Leisler's Bat	1	28.7	28.7	28.4	8.5	0	13	53.53018	-7.36014
21:37:21	Leisler's Bat	1	22.6	23.2	22.3	7.9	0	13	53.5303	-7.35998
21:37:56	Leisler's Bat	1	29.9	30.2	29.9	7.9	0	13	53.53042	-7.35989
21:38:43	Leisler's Bat	3	24.9	25	24.6	6.9	1116	12	53.53056	-7.35997
21:39:23	Brown long Eared	3	40.7	44.1	37.7	2.3	540	12	53.53073	-7.35961
21:41:05	Brown long Eared	1	32.3	37.2	25.6	2	0	12	53.53101	-7.35993
21:42:41	Leisler's Bat	1	26.5	27.8	26.5	5.2	0	12	53.53147	-7.3609
21:43:15	Leisler's Bat	1	25.9	29.3	25.6	2.6	0	12	53.53153	-7.36096
21:46:06	Brown long Eared	1	34.5	38.1	34.5	2.6	0	12	53.53169	-7.36194
21:46:37	Brown long Eared	1	31.1	36.6	27.1	2	0	12	53.53148	-7.36207
21:47:17	Leisler's Bat	2	24.4	24.7	24.1	16.4	0	12	53.53133	-7.36215
21:49:06	Brown long Eared	1	34.2	36	33.6	2	0	12	53.53098	-7.36232
21:50:13	Brown long Eared	1	35.1	38.4	34.8	2.6	0	12	53.53068	-7.36249
21:50:24	Brown long Eared	2	21.8	25.3	18.9	3.3	265	12	53.53074	-7.36248
21:50:53	Leisler's Bat	4	24.1	24.5	24	26.4	126	12	53.53094	-7.36244
21:52:56	Leisler's Bat	2	28.4	29.1	27.1	17.7	37	12	53.53082	-7.36244
21:55:24	Common Pipistrelle	1	49.7	53.1	49.1	3.3	0	12	53.53075	-7.36248
21:55:28	Common Pipistrelle	29	47.8	68.5	47.5	4	60	12	53.53076	-7.36245
21:56:30	Common Pipistrelle	19	48	57.2	47.6	4	94	12	53.5307	-7.36251
21:56:36	Common Pipistrelle	28	48.6	64.6	48.2	3	90	12	53.53072	-7.36254
21:56:48	Leisler's Bat	1	33.9	33.9	33.6	6.6	0	12	53.53074	-7.36258
21:57:17	Brown long Eared	1	24.1	27.1	23.5	2.6	0	12	53.53066	-7.36259
21:57:36	Soprano Pipistrelle	58	57.6	81.6	57.1	5	84	12	53.53055	-7.3626
21:57:52	Soprano Pipistrelle	8	57.9	67.3	57.5	3	80	12	53.53052	-7.36262

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15/05/2020	Likely 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]
21:57:59	Soprano Pipistrelle	4	57.4	63	57.1	4.2	251	12	53.53049	-7.36262
21:58:01	Soprano Pipistrelle	13	58.1	73.2	57.8	4	80	12	53.53048	-7.36264
21:58:08	Brown long Eared	1	40.3	46.7	38.7	2	0	12	53.53045	-7.36267
21:58:23	Leisler's Bat	2	22	23.2	21.4	5.9	0	12	53.5304	-7.3627
21:58:26	Leisler's Bat	1	23.2	23.5	22.3	5.2	0	12	53.5304	-7.36272
21:59:18	Leisler's Bat	1	24.4	24.7	22.6	5.2	0	12	53.53059	-7.36269
22:01:57	Brown long Eared	1	30.5	36	30.2	2	0	12	53.53178	-7.36158
22:02:18	Leisler's Bat	3	25.9	25.9	24.7	4.6	0	12	53.53168	-7.36133
22:02:47	Brown long Eared	1	34.5	35.4	31.7	1.3	0	12	53.53151	-7.36101
22:03:00	Brown long Eared	2	20.7	23.2	17.8	2.3	216	12	53.53147	-7.36084
22:03:09	Common Pipistrelle	2	47.3	52.8	47	2.9	88	12	53.5314	-7.36082
22:03:16	Common Pipistrelle	10	49.1	60.7	48.1	2	178	12	53.53137	-7.36084
22:03:30	Leisler's Bat	1	30.8	31.1	29.9	5.2	0	12	53.53132	-7.36085
22:04:55	Brown long Eared	1	42.7	47.3	36.6	1.3	0	12	53.53121	-7.3603
22:05:28	Leisler's Bat	1	21	21.4	20.7	20.3	0	12	53.53104	-7.35992
22:05:36	Leisler's Bat	6	22.1	22.6	21.6	18.1	792	12	53.531	-7.35983
22:05:39	Leisler's Bat	3	21.8	22.2	21.2	16	648	12	53.53099	-7.3598
22:05:49	Common Pipistrelle	41	49.3	59.6	49.1	5	75	12	53.53094	-7.3597
22:06:28	Brown long Eared	2	23.8	40.3	22.3	1.3	0	12	53.53088	-7.3597
22:07:10	Common Pipistrelle	1	46.1	47	45.4	6.6	0	12	53.5308	-7.35976
22:07:16	Common Pipistrelle	11	44.6	52.2	44.3	6	180	12	53.53078	-7.35976
22:09:00	Leisler's Bat	1	32.9	38.1	30.8	5.2	0	12	53.53045	-7.35985
22:18:58	Leisler's Bat	1	31.1	31.4	30.8	6.6	0	12	53.529	-7.36047
22:19:44	Leisler's Bat	1	23.8	24.7	23.2	7.9	0	12	53.5292	-7.36092
22:19:49	Leisler's Bat	2	26.2	32.3	25.6	8.5	0	12	53.52923	-7.36089
22:22:55	Leisler's Bat	4	25.5	28.7	24.8	10.3	372	12	53.53008	-7.35995
22:30:19	Leisler's Bat	1	24.1	24.4	24.1	12.5	0	12	53.53084	-7.35875

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22:30:22	Common Pipistrelle	4	47.2	51	46.9	5	234	12	53.53118	-7.35817
22:30:50	Leisler's Bat	2	29.9	31.1	27.8	15.7	0	12	53.53109	-7.35793
22:31:24	Common Pipistrelle	9	43.5	49.7	42.9	5	110	12	53.53108	-7.35757
22:32:30	Common Pipistrelle	6	47.5	51.5	46.8	4.8	146	12	53.53118	-7.35806
22:32:46	Common Pipistrelle	3	47.4	56.9	47	5.2	130	12	53.53119	-7.35813
22:33:06	Common Pipistrelle	8	47.8	53.3	47.2	4	100	12	53.53123	-7.35818
22:33:16	Common Pipistrelle	5	47.6	52.6	47.4	3	315	12	53.53123	-7.35818
22:33:46	Common Pipistrelle	1	48.5	48.5	48.2	5.9	0	12	53.53122	-7.35818
22:34:01	Leisler's Bat	1	27.1	27.5	27.1	7.2	0	11	53.53019	-7.36015
22:34:09	Leisler's Bat	1	27.1	27.5	27.1	11.8	0	11	53.53013	-7.36022
22:34:43	Leisler's Bat	1	28.4	28.4	28.1	4.6	0	11	53.52988	-7.36051
22:35:05	Brown long Eared	1	21.7	27.8	17.4	2	0	11	53.53123	-7.35811
22:37:05	Leisler's Bat	1	28.4	28.7	28.4	4.6	0	11	53.53016	-7.36016
22:38:19	Brown Long Eared	4	34.3	37.8	32.3	3.3	248	11	53.53043	-7.3599
22:39:02	Leisler's Bat	2	26.8	27.5	26.2	5.9	501	11	53.53069	-7.35983
22:39:45	Leisler's Bat	1	24.1	24.1	23.8	13.1	0	11	53.5309	-7.35993
22:40:24	Leisler's Bat	2	24.1	24.4	23.9	10.2	476	11	53.53112	-7.36036
22:41:53	Brown Long Eared	2	26.2	34.8	24.4	1.3	0	11	53.53129	-7.36087
22:43:26	Leisler's Bat	1	28.4	28.7	26.5	9.2	0	11	53.53152	-7.36099
22:44:00	Leisler's Bat	1	22	23.8	21.4	5.2	0	11	53.5317	-7.36131
22:46:43	Brown Long Eared	1	35.1	36	32	1.3	0	11	53.53143	-7.3621
22:47:09	Leisler's Bat	3	23.9	24.4	21	18.6	230	11	53.53135	-7.36214
22:47:43	Leisler's Bat	2	24.4	24.7	24.1	7.9	0	11	53.53124	-7.36223
22:50:44	Leisler's Bat	1	24.4	24.4	23.5	9.8	0	11	53.53086	-7.36244
22:50:55	Leisler's Bat	2	24.1	24.4	24.1	12.5	0	11	53.53095	-7.3624
22:51:11	Leisler's Bat	1	28.4	28.7	28.1	7.9	0	11	53.53097	-7.36241
22:55:30	Common Pipistrelle	26	47.7	67.6	47.4	4	60	11	53.53072	-7.36248

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22:56:33	Common Pipistrelle	15	47.9	57.1	47.5	3	100	11	53.53072	-7.36249
22:56:41	Common Pipistrelle	21	48.8	67.8	48.4	3	90	11	53.53072	-7.3625
22:57:38	Soprano Pipistrelle	56	57.4	77.6	56.9	5	85	11	53.53056	-7.36257
22:57:50	Soprano Pipistrelle	2	55.1	57.6	54.9	3.9	412	11	53.53056	-7.36258
22:57:56	Soprano Pipistrelle	4	58.2	64.8	57.6	3.4	177	11	53.53055	-7.36262
22:58:01	Soprano Pipistrelle	3	58.6	60.8	56.6	3.9	68	11	53.53051	-7.36264
22:58:04	Soprano Pipistrelle	12	58.1	71	58	4	80	11	53.5305	-7.36266
22:58:12	Soprano Pipistrelle	1	58.3	61.6	58.3	3.3	0	11	53.53046	-7.36269
22:58:22	Soprano Pipistrelle	1	57.6	62.5	56.7	7.9	0	11	53.53043	-7.36269
22:59:49	Common Pipistrelle	1	47.9	50.3	47.6	2.6	0	11	53.52992	-7.3629
22:59:53	Leisler's Bat	1	24.1	24.4	23.8	8.5	0	11	53.5299	-7.3629
23:00:23	Common Pipistrelle	1	48.5	52.5	48.2	3.3	0	11	53.52984	-7.36287
23:02:53	Leisler's Bat	1	24.4	24.7	24.1	9.2	0	11	53.52978	-7.36105
23:03:51	Leisler's Bat	1	27.1	27.5	27.1	7.9	0	11	53.53016	-7.3605
23:04:29	Leisler's Bat	1	29.9	30.5	29.6	6.6	0	11	53.53041	-7.36018
23:04:36	Brown Long Eared	1	35.1	41.2	33.2	1.3	0	11	53.53044	-7.36009
23:04:38	Brown Long Eared	2	26.2	29	21.7	1.3	0	11	53.53044	-7.36009
23:04:51	Common Pipistrelle	12	49.4	57.1	49.2	4	243	11	53.5305	-7.35993
23:05:18	Common Pipistrelle	3	49.9	52.7	49.8	4.6	748	11	53.53069	-7.3598
23:05:28	Leisler's Bat	10	21.3	21.6	21	17.9	840	11	53.53074	-7.35977
23:05:37	Soprano Pipistrelle	7	51.2	68.4	50.7	3	77	11	53.53078	-7.35972
23:05:43	Common Pipistrelle	6	51.9	55	50.6	2.2	401	11	53.53079	-7.35971
23:05:52	Common Pipistrelle	18	49.8	57.2	49.4	3	218	11	53.53081	-7.35966
23:07:14	Common Pipistrelle	1	45.8	46.7	45.1	7.2	0	11	53.53077	-7.35972
23:07:20	Common Pipistrelle	4	43.7	51	43.4	6	392	11	53.53076	-7.35974
23:08:21	Leisler's Bat	1	25.9	27.1	25.3	7.9	0	11	53.53052	-7.35984
23:10:54	Leisler's Bat	1	27.1	27.5	27.1	5.2	0	11	53.52989	-7.36048

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23:11:59	Leisler's Bat	1	27.1	27.5	26.8	6.6	0	11	53.52942	-7.36101
23:12:59	Leisler's Bat	1	27.1	27.5	27.1	6.6	0	11	53.52918	-7.361
23:15:44	Leisler's Bat	1	27.1	27.5	26.8	4.6	0	11	53.52876	-7.35897
23:17:20	Leisler's Bat	1	28.4	28.7	28.4	10.5	0	11	53.52878	-7.35894
23:18:01	Leisler's Bat	1	27.1	27.5	27.1	6.6	0	11	53.52886	-7.35964
23:18:38	Leisler's Bat	2	26.4	27.5	25.9	5.9	493	11	53.52891	-7.36021
23:19:21	Leisler's Bat	1	24.4	24.7	24.1	22.3	0	11	53.52905	-7.36078
23:19:44	Leisler's Bat	1	33.9	34.5	33.6	4.6	0	11	53.52917	-7.36091
23:20:18	Brown Long Eared	1	23.8	32	18.9	2	0	11	53.52944	-7.36065
23:22:13	Leisler's Bat	2	24.1	24.4	23.9	9.2	35	11	53.5299	-7.36017
23:22:55	Leisler's Bat	4	21.8	22.3	21.4	12.2	639	11	53.53007	-7.35995
23:27:21	Leisler's Bat	1	27.1	27.5	26.8	10.5	0	11	53.53049	-7.35921
23:27:59	Leisler's Bat	1	22.9	23.5	22.6	5.2	0	11	53.53057	-7.35904
23:28:01	Leisler's Bat	1	24.4	25.3	24.1	4.6	0	11	53.53059	-7.35902
23:28:18	Leisler's Bat	2	21.4	21.7	19.2	9.8	0	11	53.53066	-7.35876
23:30:15	Common Pipistrelle	18	47.5	57	47.1	5	170	11	53.5309	-7.35733
23:30:32	Common Pipistrelle	17	44.2	51.5	43.8	5	105	11	53.53095	-7.35715
23:31:00	Common Pipistrelle	8	48.1	55.3	47.8	2	201	11	53.531	-7.35707
23:31:24	Common Pipistrelle	17	43	48.7	42.7	5	110	11	53.5311	-7.35737
23:32:32	Common Pipistrelle	6	47.3	50.9	46.9	4	147	11	53.53118	-7.35804
23:32:47	Brown Long Eared	2	25	25.3	17.4	1.3	0	11	53.5312	-7.35812
23:33:09	Common Pipistrelle	1	46.1	50	45.8	5.2	0	11	53.53119	-7.35813
23:33:19	Common Pipistrelle	12	47.5	54	47.1	4	100	11	53.53119	-7.35814
23:34:54	Leisler's Bat	1	24.1	24.4	24.1	13.1	0	11	53.5312	-7.3581
23:34:59	Brown Long Eared	3	33.6	35.4	32	3.3	0	11	53.5312	-7.3581

RECEIVED: 24/08/2023

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25/07/2022	Species	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temperature	Latitude [WGS84]	Longitude [WGS84]
21:35:13	Leisler's Bat	4	23.6	25.6	22.9	9.8	273	14	53.53052	-7.357926
21:44:08	Leisler's Bat	66	24.8	27.7	23.9	12	205	14	53.53019	-7.359148
21:45:15	Leisler's Bat	4	23.6	24.8	23	14	325	14	53.52981	-7.358522
21:46:08	Common Pipistrelle	15	43.6	45.8	42.7	6	100	14	53.52906	-7.359907
21:47:52	Common Pipistrelle	21	44.4	48.1	43.2	7	100	14	53.52898	-7.357679
21:50:10	Soprano Pipistrelle	13	53	70.4	52.1	3	80	14	53.5314	-7.360149
21:51:00	Soprano Pipistrelle	9	56.1	77.4	52.4	5.2	90	14	53.52896	-7.357562
21:53:15	Soprano Pipistrelle	2	51.7	53.8	51.2	4.6	349	14	53.53163	-7.358402
21:54:08	Leisler's Bat	2	25.6	27.8	22.3	7.9	244	14	53.53166	-7.358338
22:03:13	Common Pipistrelle	1	47.6	47.9	47.3	8.5	0	14	53.53148	-7.360565
22:05:57	Leisler's Bat	4	23.6	24.8	23	14	325	14	53.53152	-7.360673
22:06:56	Leisler's Bat	5	24.8	26.2	23.8	9	498	14	53.52896	-7.357519
22:10:52	Soprano Pipistrelle	3	58	63.6	57.3	3	173	14	53.53255	-7.358801
22:11:27	Soprano Pipistrelle	1	54.9	59.2	54	7.3	90	14	53.53152	-7.360691
22:11:32	Common Pipistrelle	41	46.5	68.4	45.9	5	84	14	53.53254	-7.358822
22:12:07	Common Pipistrelle	23	49.5	76.6	49	4	80	14	53.53241	-7.358772
22:12:55	Leisler's Bat	4	24.6	26.8	23.9	12.5	158	14	53.52896	-7.357485
22:13:19	Soprano Pipistrelle	39	57	74.2	54.7	3	75	14	53.5324	-7.358778
22:13:53	Common Pipistrelle	2	47.7	51.1	47.3	3.3	188	14	53.52898	-7.357383
22:14:00	Common Pipistrelle	12	47.5	67	47	3	80	14	53.5324	-7.358763
22:14:15	Common Pipistrelle	18	58.2	71.9	57.3	3	90	14	53.53235	-7.358628
22:14:30	Common Pipistrelle	2	48.3	50	48	3.6	168	14	53.53224	-7.358562
22:14:44	Common Pipistrelle	1	45.8	55.5	45.4	6.6	0	14	53.53215	-7.358528
22:14:46	Soprano Pipistrelle	10	57.6	72.7	56.6	3	80	14	53.53211	-7.35847
22:14:58	Leisler's Bat	36	26.6	31.6	25.4	7	213	14	53.52904	-7.35711
22:15:40	Common Pipistrelle	1	45.4	50.3	45.1	7.2	0	14	53.53216	-7.358534
22:15:55	Common Pipistrelle	3	48.2	50.3	47.2	5.2	156	14	53.53207	-7.358459
22:16:00	Common Pipistrelle	17	47.3	61.2	47	3	85	14	53.53199	-7.358418

25/07/2022	Species	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temperature	Latitude [WGS84]	Longitude [WGS84]
22:16:04	Common Pipistrelle	35	48.4	71.9	47.9	3	84	14	53.53266	-7.358911
22:16:09	Leisler's Bat	19	24	26.7	23.4	9	220	14	53.52909	-7.356863
22:16:32	Common Pipistrelle	9	46.9	56.1	46.4	4	157	14	53.53268	-7.359412
22:20:47	Leisler's Bat	4	23.6	25.6	22.9	9.8	273	14	53.53168	-7.361139
22:20:54	Common Pipistrelle	13	48.4	62.9	47.3	3	97	14	53.53234	-7.360036
22:21:19	Soprano Pipistrelle	2	57.5	60.2	57.3	2.6	79	14	53.53231	-7.360124
22:21:24	Common Pipistrelle	3	52.5	56.7	52.3	3.3	159	14	53.53161	-7.360967
22:21:50	Soprano Pipistrelle	7	55	73.3	54.2	3	80	14	53.53148	-7.360881
22:22:00	Common Pipistrelle	19	53.7	74.9	53.2	4	170	14	53.53161	-7.360967
22:23:07	Common Pipistrelle	16	46.5	51	46.1	5	90	14	53.53161	-7.360967
22:24:04	Leisler's Bat	5	24.5	26.6	23.5	9.8	462	14	53.52931	-7.358443
22:24:38	Common Pipistrelle	9	44.1	49.3	43.6	7	200	14	53.53082	-7.361185
22:26:15	Common Pipistrelle	18	47	60.8	46.3	4	80	14	53.53159	-7.360894
22:27:33	Common Pipistrelle	17	46.8	60.5	46.1	3	77	14	53.53155	-7.360762
22:27:46	Common Pipistrelle	1	47.6	47.9	47.3	8.5	0	14	53.53076	-7.362478
22:28:00	Common Pipistrelle	5	45.9	51.4	45.6	5.8	413	14	53.53152	-7.360695
22:28:46	Common Pipistrelle	29	48.3	59.4	47.5	3	100	14	53.53147	-7.360619
22:28:56	Common Pipistrelle	72	47.7	65.1	47	3	94	14	53.53144	-7.36048
22:30:56	Common Pipistrelle	18	47.3	61.7	46.7	5	110	14	53.52934	-7.358459
22:31:04	Common Pipistrelle	1	48.2	51.9	47.9	3.3	90	14	53.52947	-7.358402
22:31:12	Soprano Pipistrelle	15	56	64.7	53	5.7	196	14	53.52964	-7.358225
22:31:29	Common Pipistrelle	16	47.6	61.1	46.9	5	180	14	53.52971	-7.3583
22:32:42	Common Pipistrelle	1	47	47.3	46.4	5.2	0	14	53.53144	-7.360456
22:32:55	Common Pipistrelle	1	46.7	51.9	46.4	7.2	0	14	53.53144	-7.360456
22:33:14	Common Pipistrelle	3	47.7	51.3	46.2	5	134	14	53.53142	-7.360395
22:33:25	Soprano Pipistrelle	11	56.2	64.4	53.4	5.2	388	14	53.52975	-7.358398
22:34:15	Leisler's Bat	13	24.5	29.6	23.6	9	210	14	53.52979	-7.358479
22:38:14	Common Pipistrelle	21	47.9	56	46.8	3	76	14	53.53148	-7.360646
22:38:15	Common Pipistrelle	12	52.2	76.4	51.6	3	80	14	53.53037	-7.362688

25/07/2022	Species	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temperature	Latitude [WGS84]	Longitude [WGS84]
22:39:16	Soprano Pipistrelle	7	55	73.3	54.2	3	80	14	53.53017	-7.362769
22:41:09	Soprano Pipistrelle	13	53.3	60.8	52.6	5	90	14	53.53065	-7.362544
22:43:13	Common Pipistrelle	9	44.1	49.3	43.6	7	200	14	53.53005	-7.362825
22:45:20	Common Pipistrelle	23	47.7	61.7	46.7	5	100	14	53.52969	-7.358255
22:50:59	Common Pipistrelle	1	47.6	47.9	47.3	8.5	0	14	53.52994	-7.362852
22:57:42	Soprano Pipistrelle	6	56.3	59	54.4	4.9	100	14	53.5298	-7.362877
23:03:35	Soprano Pipistrelle	9	54.1	65.1	53.5	3	198	14	53.52966	-7.362243
23:06:52	Soprano Pipistrelle	20	54	65.1	53.3	6	85	14	53.53016	-7.36039
23:08:21	Common Pipistrelle	29	46.7	59.8	46.3	4	84	14	53.5314	-7.360409
23:09:24	Common Pipistrelle	1	47.9	48.2	47.6	4.6	0	14	53.53141	-7.360436
23:10:46	Soprano Pipistrelle	22	56	67.3	51.4	2	75	14	53.5314	-7.360419
23:12:18	Leisler's Bat	66	24.8	27.7	23.9	12	205	14	53.53045	-7.359863
23:15:55	Common Pipistrelle	12	51.6	61.7	50.9	5	80	14	53.53045	-7.359864
23:17:13	Common Pipistrelle	29	46.4	65.3	45.9	5	90	14	53.53139	-7.360393
23:22:19	Common Pipistrelle	2	45.8	47.9	45.4	2	0	14	53.53128	-7.360173
23:25:26	Leisler's Bat	24	21.6	22.2	20.7	15	325	14	53.53034	-7.359185
23:28:42	Common Pipistrelle	4	46.9	51.9	46.6	3.5	121	14	53.53129	-7.360174
23:30:30	Soprano Pipistrelle	4	56.6	59.2	56.2	2.2	580	14	53.53134	-7.360154
23:30:58	Soprano Pipistrelle	7	54.2	59.1	53.7	6	173	14	53.53026	-7.359369