REFERENCE DOCUMENTS for PROPOSED LARGER TURBINES AND MET MASTS AT UPPERCHURCH WINDFARM for EIAR 2021 and AA 2021

REFERENCE DOCUMENT 34 of 36

This document contains the following:

UWF Replacement Forestry

- **2018 Natura Impact Statement for Whole UWF Project Elements 1 to 5 – Volume D4 (Volume 4 of 6)**
  - Appendix A11: Biodiversity Information: EIAR for UWF Grid Connection Ch.8 Biodiversity
  - Appendix A14: Biodiversity Information: EIAR Appendix 8.1: Detailed Biodiversity Data and Supplementary Information
  - Appendix A15: Biodiversity Information: EIAR Appendix 8.1.7: Confidential Annex

VOLUME D: APPROPRIATE ASSESSMENT REPORTING

Whole Upperchurch Windfarm Project

Natura Impact Statement
for
Whole UWF Project Elements 1 to 5

May 2018

Volume D4 (Volume 4 of 6)

Appendix A11: Biodiversity Information: EIAR for UWF Grid Connection Ch.8 Biodiversity
Appendix A14: Biodiversity Information: EIAR Appendix 8.1: Detailed Biodiversity Data and Supplementary Information
Appendix A15: Biodiversity Information: EIAR Appendix 8.1.7: Confidential Annex

INIS Environmental Consultants Ltd
Planning and Environmental Consultants

Produced by INIS Environmental Consultants Ltd., Suite 11, Shannon Commercial Properties, Information Age Park, Gort Road, Ennis, Co. Clare
T: +353 (0) 65 6892441, M: +353 (0) 87 2831725,

f. www.facebook.com/inis.env

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T: +353 (0) 65 6892441, M: +353 (0) 87 2831725,

f. www.facebook.com/inis.env

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May 2018

Appendix A11: Biodiversity Information

EIAR for UWF Grid Connection Ch.8 Biodiversity

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f. www.facebook.com/inis.env

UWF Grid Connection EIA Report

Volume C2: EIAR Main Report

Chapter 8: Biodiversity

Topic Chapter Authors:

Inis

EIAR Coordinator:

ECOPOWER

May 2018

Topic Biodiversity

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Figures and mapping referenced in this topic chapter can be found in **Volume C3 EIAR Figures.**

List of Appendices

Appendices referenced in this topic chapter can be found in **Volume C4 EIAR Appendices.**

Glossary of Terms

Term	Definition
Afforestation	The establishment of a forest or stand of trees (forestation) in an area where there was no previous tree cover
Anadromous	Fish that migrate up rivers from the sea to spawn
Appropriate Assessment	An assessment required by the EU Habitats Directive where a project (or plan) would be likely to have a significant effect on a European site, either alone or in combination with other plans or projects
Avoidance	Prevention of impacts occurring, having regard to predictions about potentially negative environmental effects (e.g. project decisions about site location or design).
Baseline Environment	The conditions that would pertain in the absence of the proposed project at the time that the project would be constructed / operated / decommissioned. The definition of these baseline conditions should be informed by changes arising from other causes (e.g. other consented developments)
Bern Convention	Convention on the Conservation of European Wildlife and Natural Habitats in Bern in 1992 ensures that governments take into account the conservation needs of species during the formulation of planning and development policies
Biodiversity	The biological diversity of the earth's living resources. The total variability among organisms and ecosystems. In common usage, and within these Guidelines, biodiversity is used to describe the conservation of the natural environment, rather than describing the variation within it.
Catchment	A catchment area is a hydrological unit. Each drop of precipitation that falls into a catchment area eventually ends up in the same river. Catchment areas are separated from each other by watershed
Climate change	A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.
Compensation	Measures taken to make up for the loss of, or permanent damage to, ecological features despite mitigation. Any replacement area should be similar in terms of biological features and ecological functions that have been lost or damaged, or with appropriate management have the ability to reproduce the ecological functions and conditions of those biological features.
Competent Authority	An organisation or individual who is responsible for determining an application for consent for a project. Competent authorities in relation to Appropriate Assessment in Ireland are set out in SI 477 of 2011.
Conceptual Site Model	Model used to facilitate the identification of source-pathway-receptor links between a project and the receiving environment
Connectivity	A measure of the functional availability of the habitats needed for a particular species to move through a given area. Examples include the flight lines used by bats to travel between roosts and foraging areas or the corridors of appropriate habitat needed by some slow colonising species if they are to spread.
Conservation objective	Objective for the conservation of biodiversity (e.g. specific objective within a management plan or broad objectives of policy).
Conservation status	The state of a species or habitat including for example, extent, abundance, distribution and their trends.
Couches	Overground nest like structure used by Otter for resting and/or breeding
Cumulative impact / effect	Additional changes caused by a proposed development in conjunction with other developments or the combined effect of a set of developments taken together.

Term	Definition
Degradation	The condition or process of degrading or being degraded.
Designated Sites	General term for sites which have been designated for nature conservation and for which legal protection has been conferred onto the sites. In Ireland, these included Special Areas of Conservation and Special Protection Areas. In addition to Natural Heritage Areas designated under national legislation.
Displacement	The action of moving something from its place or position.
Distribution	The geographical presence of a feature. This can depend on factors such as climate and altitude.
Disturbance	Disturbance is a temporary change in environmental conditions that causes a pronounced change in an ecosystem.
Ecosystem	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit
Effect	Outcome to an ecological feature from an impact. For example, the effects on a dormouse population from loss of a hedgerow. See also 'Impact'.
EIAR	Environmental Impact Assessment Report
Endangered	A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (Section V of IUCN Red List Categories and Criteria (2012) Version 3.1 2nd edn.), and it is therefore considered to be facing a very high risk of extinction in the wild.
Enhancement	The genuine enhancement of the natural heritage interest of a site or area because the project includes improved management or new habitats or features, which are better than the prospective management, or the habitats or features present there now. There is, therefore, a net or new benefit to the natural heritage
Environmental Impact Assessment (EIA)	Assessment of projects carried out under the EIA Directive and Regulations.
Environmental Impact Assessment Report	A document describing the effects of a project on the environment prepared during EIA
European sites	Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs) which comprise the Natura 2000 network which are designated under European legislation
Fauna	Fauna is all of the animal life of any particular region or time.
Favourable condition	Satisfactory condition of an ecological feature. In some cases, favourable condition is specifically defined (e.g. for some designated sites).
Flora	Flora is the plant life occurring in a particular region or time.
Flora Protection Order	The current list of plant species protected by Section 21 of the Wildlife Act, 1976 is set out in the Flora (Protection) Order, 2015, which supersedes orders made in 1980, 1987 and 1999.
Fragmentation	The breaking up of a habitat, ecosystem or land-use type into smaller parcels with a consequent impairment of ecological function.
Groundwater	Groundwater is the water found underground in the cracks and spaces in soil, sand and rock. It is stored in and moves slowly through geologic formations of soil, sand and rocks called aquifers.
Habitat	The place or type of site where an organism or population naturally occurs. Often used in the wider sense referring to major assemblages of plants and animals found together
Hinterland	Area of surrounding landscape

Term	Definition
Holts	Created or existing underground shelter used by Otter for resting and/or breeding
Hydrological	Associated with or related to the scientific study of the properties, distribution, and effects of water on the earth's surface, in the soil and underlying rocks, and in the atmosphere.
Impact	Actions resulting in changes to an ecological feature. For example, the construction activities of a development removing a hedgerow. See also 'Effect'
Important ecological features	Ecological features requiring specific assessment within EcIA. Ecological features can be important for a variety of reasons (e.g. quality and extent of designated sites or habitats, habitat / species rarity).
Larvae	Plural form of larva; The active immature form of an insect, especially one that differs greatly from the adult and forms the stage between egg and pupa
Life-cycle stages	In this context, the stages of a project; i.e. Construction, Operational and Decommissioning
Mitigation/Mitigation Measures	Measures taken to avoid or reduce negative impacts. Measures may include: locating the development and its working areas and access routes away from areas of high ecological interest, fencing off sensitive areas during the construction period, or timing works to avoid sensitive periods. An example of a reduction measure is a reed bed silt trap that is designed to minimise the amount of polluted water running directly into an ecologically important watercourse. See also compensation (which is separate from mitigation).
Natura Impact Statement	Under the European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011), an EcIA report including the scientific assessment of a plan or project in relation to relevant Natura 2000 sites and other information required to enable a competent authority to carry out an Appropriate Assessment
Natural Heritage Area	The basic designation for wildlife in Ireland is the Natural Heritage Area (NHA). This is an area considered important for the habitats present or which holds species of plants and animals whose habitat needs protection.
Non-native invasive species	Any non-native animal or plant that has the ability to spread causing damage to the environment, the economy, our health and the way we live. Equivalent of 'alien species' as used by the Convention on Biological Diversity
Non-Volant	Incapable of flight
Population	A collection of individuals (plants or animals), all of the same species and in a defined geographical area.
Precautionary Principle	The principle that the absence of complete information should not preclude precautionary action to mitigate the risk of significant harm to the environment.
Project Design Measure	Measures for environmental protection, incorporated into the design of the project.
Proposed Natural Heritage Area	Proposed NHAs (pNHAs) were published on a non-statutory basis in 1995 and have not since been statutorily proposed or designated. These sites are of significance for wildlife and habitats are subject to limited protection, in the form of agri-environmental farm planning schemes, NPWS approval for afforestation schemes on pNHA lands and recognition of the ecological value of pNHAs by Planning and Licencing Authorities
Qualifying Interest	Habitats listed on Annex I and Species listed on Annex II of the EU Habitats Directive for which Special Areas of Conservation have been designated.
Rarity	A measure of relative abundance
Receptors	Any ecological or other defined feature (e.g. human beings) that is sensitive to or has the potential to be affected by an impact.

Term	Definition
Replacement	The creation of a habitat that is an acceptable substitute for the habitat which has been lost.
Restoration	The re-establishment of a damaged or degraded system or habitat to a close approximation of its pre-degraded condition.
Riparian	Relating to or situated on the banks of a river
Roost	Resting place for a bird or bat
SAC/cSAC	Site designated according to the habitats directive. Special area of conservation means a site of Community importance designated by the Member States through a statutory, administrative and/or contractual act where the necessary conservation measures are applied for the maintenance or restoration, at a favourable conservation status, of the natural habitats and/or the populations of the species for which the site is designated
Scoping	The process of determining the content and extent of the matters which should be covered in the environmental information (the EIA Report) to be submitted to a Competent Authority for developments which are subject to EIA.
Screening	Determination of whether or not an EIA is necessary.
Sensitive Aspect	Any sensitive receptor in the local environment which could be impacted by the project.
Sett	Series of underground tunnels and chambers of varying complexity used by Badgers for resting and breeding
Significance	The importance of the outcome of the impact (or the consequence of change) for the receiving environment.
Source-Impact-Pathways	Method used to identify the source of any potential impacts, predicting any potential impacts and identifying the pathways by which the potential impacts can reach the sensitive receptor
SPA	Area classified under Article 4 of the birds directive (Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds).
Special Conservation Interest	Species listed on Annex I of the EU Birds Directive as well as wetland habitats for which Special Protection Areas have been designated for the conservation of birds.
Sustainable Development	Sustainable development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for future generations.
Taxa	Plural form of Taxon; a taxonomic group of any rank, such as a species, family, or class.
Tributary	A river or stream which flows into a larger river or lake
Turbary	Turf-cutting, the legal right to cut turf or peat for fuel on common ground or on another person's ground
Upland	Area of hilly or mountainous land. Upland habitats are defined as unenclosed areas of land over 150 m and contiguous areas of related habitat that extend below this altitude
Vulnerable	A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V of IUCN Red List Categories and Criteria (2012) Version 3.1 2nd edn.), and it is therefore considered to be facing a high risk of extinction in the wild.
Zone(s) of Influence	The area(s) over which ecological features may be affected by the biophysical changes caused by the proposed project and associated activities.

List of Abbreviations

Abbreviation	Full Term
AA	Appropriate Assessment
ABP	An Bord Pleanála
AMM	Ecopower Additional Mitigation Measure developed by members of the EIAR Team
BCI	Bat Conservation Ireland
BOCCI	Birds of Conservation Concern in Ireland
BPM	Ecopower Best Practice Measure developed by members of the EIAR Team
BWI	Birdwatch Ireland
CIEEM	Chartered Institute of Ecology and Environmental Management
CIRIA	Construction Industry Research and Information Association
DAHRGA	Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs
DoEHLG	Department of Environment, Heritage and Local Government
EcIA	Ecological Impact Assessment
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ERFB	Eastern Regional Fisheries Board
FPO	Flora Protection Order
GSI	Geological Survey of Ireland
IEEM	Institute of Ecology and Environmental Management
IFI	Inland Fisheries Ireland
IFM	Institute of Fisheries Management
JNCC	Joint Nature Conservation Committee
NBDC	National Biodiversity Data Centre
NGO	Non-Governmental Organisation
NHA	Natural Heritage Area
NIS	Natura Impact Statement
NPWS	National Parks and Wildlife Service
NRA	National Roads Authority
OSI	Ordnance Survey of Ireland
PD	Ecopower Project Design Environmental Protection Measure developed by members of the EIAR Team
PEA	Preliminary Ecological Appraisal
pNHA	Proposed Natural Heritage Area
RFI	Request for Further Information
SAC/cSAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SNH	Scottish Natural Heritage
SPA	Special Protection Area
UGC	Underground Cable
UWF	Upperchurch Windfarm

Topic Biodiversity

8 Environmental Factor: Biodiversity

8.1 Introduction to the Biodiversity Chapter

8.1.1 What is Biodiversity?

Biodiversity is the variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part. This includes diversity within and between species and ecosystems.

8.1.2 Overview of Biodiversity in the Local Environment

The UWF Grid Connection is located within the Slievefelim to Silvermines mountains area. The receiving environment is representative of typical upland habitats, and includes lands under active management for agriculture and forestry. Features of the local environment on or around the works include the Mulkear, Clare and Bilboa rivers in the Lower River Shannon catchment and tributaries of the Multeen River such as the Clodiagh, Owenbeg and the Turraheen River which form part of the Lower River Suir catchment.

Birds, bats and other mammals, amphibians, reptiles and invertebrates are present within the receiving environment.

European Sites such as the Slievefelim to Silvermines Mountains SPA, the Lower River Shannon cSAC, and the Lower River Suir cSAC, are found in the surrounding area. Both of the cSACs mentioned are designated for the protection of salmonids and freshwater aquatic species. The Slievefelim to Silvermines Mountains SPA is designated for the protection of Hen Harrier. NHAs and pNHAs are also found within the surrounding area.

The location of the UWF Grid Connection is illustrated on OSI Mapping on Figure GC 8.1: UWF Grid Connection Location Map.

Figures and mapping referenced in this topic chapter can be found in **Volume C3 EIAR Figures**.

8.1.3 Sensitive Aspects of the Biodiversity environment included for further evaluation

Any sensitive receptor in the local environment which could be impacted by the project is a Sensitive Aspect. The following Sensitive Aspects **are included in this topic chapter** as they could be potentially impacted:

Sensitive Aspect No. 1	European Sites	Section 8.2
Sensitive Aspect No. 2	National Sites	Section 8.3
Sensitive Aspect No. 3	Aquatic Habitats & Species	Section 8.4
Sensitive Aspect No.4	Terrestrial Habitats	Section 8.5
Sensitive Aspect No.5	Hen Harrier	Section 8.6
Sensitive Aspect No.6	General Bird Species	Section 8.7
Sensitive Aspect No.7	Bats	Section 8.8
Sensitive Aspect No.8	Non-Volant Mammals	Section 8.9
Sensitive Aspect No.9	Amphibians & Reptiles	Section 8.10
Sensitive Aspect No.10	Marsh Fritillary	Section 8.11

Each of the above listed Sensitive Aspects are evaluated individually in Sections 8.2 to 8.11 of this Chapter.

To help readers navigate to individual sensitive aspect sections, the colour codes for each Sensitive Aspect used above are also used in the Sensitive Aspect sections Section 8.2 to 8.11. The colour-codes have been applied to section headings, tables and on side-tabs on the edge of the pages.

8.1.4 Sensitive Aspects excluded from further evaluation

The following Sensitive Aspects **are excluded from this topic chapter**:

General Invertebrates other than Marsh Fritillary	Effects evaluated as Neutral[1] due to the scale of the works (construction, operational and decommissioning) and small number of machines/vehicles at any one location, in addition to the general low ecological value of habitats in the receiving environment in terms of Invertebrate diversity.
Natterjack toad (*Bufo (Epidalea) calamita*),	Effects evaluated as not likely, due to the location of the Elements of the UWF Whole Project beyond the geographical range of this species.
Slow worm (*Anguis fragilis*)	Effects evaluated as not likely, due to the location of the Elements of the UWF Whole Project beyond the geographical range of this legless lizard species.

8.1.5 Overview of the Subject Development

The UWF Grid Connection is the subject development, being the subject of a current application to An Bord Pleanála. The main parts of the UWF Grid Connection are identified in Table 8-1 below.

Table 8-1: Subject Development – UWF Grid Connection

Project ID	The Subject Development	Composition of the Subject Development
Element 1	The Subject Development UWF Grid Connection (GC)	Mountphilips Substation Mountphilips – Upperchurch 110kV UGC Grid Connection Access Roads Grid Connection Ancillary Works

Note: The UWF Grid Connection is 'Element 1' of the Whole UWF Project.

A description of the location, size and design, life-cycle stages, use of natural resources, emissions and wastes, and the vulnerability to major accidents and natural disasters is provided in Chapter 5: Description of the Development – UWF Grid Connection (Volume C2 EIAR Main Report).

This EIA Report is also available on www.upperchurchwindfarmgridconnection.ie.

8.1.6 The Authors of the Biodiversity Chapter

This report was written by Howard Williams BSc CEnv MCIEEM CBiol MRSB MIFM (Senior Environmental Consultant); Christopher Cullen Dip. Eng. Dip. Ecol. ACIEEM (Senior Ecologist); Sarah Ingham BSc MSc ACIEEM (Project Ecologist/GIS); Peter O Connor MSc. (GIS) and John Deasy BSc. MSc. (Ecologist/GIS) of Inis Environmental Consultants: an established consultancy providing expertise in environmental project management and specialist ecological services.

[1] "No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error". See EPA, August 2017, and Table 8-9.

8.1.7 Sources of Baseline Information

The information sources outlined in Table 8-2 were reviewed during desktop studies and confirmed during fieldwork in order to gather information on the baseline environment. The recommendations in the guidelines listed in the table, have been considered during the preparation of this chapter.

Table 8-2: Sources of Baseline Information for Biodiversity

Type	Source
Consultation	Feedback was received from • An Bord Pleanála • Tipperary County Council • Developments Application Unit • National Parks and Wildlife Service • Inland Fisheries Ireland • Irish Peatland Conservation Council See Chapter 3: The Scoping Consultations, and Appendices A3.1, A3.2.
Guidelines	<u>Ecological Evaluation</u> • Guidelines for Assessment of Ecological Impacts of National Road Schemes. Dublin – (National Roads Authority, 2009) • Guidelines for Ecological Impact Assessment in the United Kingdom- (CIEEM, 2016). • Barbour, M.T. and Stribling, J.B. (1991) Use of Habitat Assessment in Evaluating the Biological Integrity of Stream Communities. In: Methods in Stream Ecology (Eds. Hauer, F.R. and Lamberti, G.A. Academic Press. • Kelly & King (2001) A review of the ecology and distribution of three lamprey species, Lampetra fluviatilis (L.), Lampetra planeri (Bloch), and Petromyzon marinus (L.): A context for conservation and biodiversity considerations in Ireland. Biology and the Environment. 101B(3):165-185. • Kennedy, GJA & Strange, CD (1986) The effects of intra- and inter-specific competition on the distribution of stocked juvenile Atlantic salmon, Salmo salar L., in relation to depth and gradient in an upland trout, Salmo trutta L., stream. J. Fish. Biol., 29(2):199-214. • Greenberg, L.A. and Dahl, J. 1998. Effect of habitat type on growth and diet of brown trout (Salmo trutta L.) in stream enclosures. Fisheries Management & Ecology 5: 331-348. • Hatfield, T. & Bruce, J. (2000) Predicting Salmonid Habitat–Flow Relationships for Streams from Western North America. North American Journal of Fisheries Management 20:1005–1015, 2000 • O'Grady, M.F., Curtin, J (1993) The Enhancement of drained salmonid rivers in Ireland. A bioengineering perspective. Hydroecol. Appl., 5(2):7-26. • Collins, J. (ed.) (2016). Bat surveys for professional ecologists: good practice guidelines (3rd edn). The Bat Conservation Trust, London. • Billington, G.E. & Norman, G.M. (1997). The Conservation of Bats in Bridges Project – A report on the survey and conservation of bat roosts in bridges in Cumbria. • Percival, S.M. Predicting the effects of wind farms on birds in the UK: the development of an objective assessment method. [ed.] M., Janss, F.E., Ferrer, M. De Lucas. Madrid -(Quercus, 7, pp. 137-152).2007 <u>Hen Harrier</u> • Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms. (Scottish Natural Heritage, 2014).

Type	Source
	• Raptors: A Field Guide for surveys and Monitoring, third Edition (Hardey *et al.,* 2014). Other Birds • Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms. (Scottish Natural Heritage, 2014. • Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. (National Roads Authority, 2008). • Assessing the effectiveness of monitoring methods for Merlin Falco columbarius in Ireland: the Pilot Merlin Survey 2010. Lusby, J., Fernandez-Bellon, D., Noriss, D., Lauder, A. Kilcoole, Co. Wicklow. : BirdWatch Ireland, 2011, Irish Birds, Vols. Volume 9, Number 2, pp. 143-154. • Bibby CJ, Burgess ND, Hill DA and Mustoe SH (2000). Bird Census Techniques, 2nd Edition. Academic Press, London. • Birdwatch Ireland. An assessment of the effects of Arterial Drainage Maintenance on Kingfisher and other riparian birds. Wicklow: Birdwatch Ireland and OPW, 2010. • Cummins, S., Bleasdale, A., Douglas, C., Newton, S., O'Halloran, J. & Wilson, H.J. (2010) The status of Red Grouse in Ireland and the effects of land use, habitat and habitat quality on their distribution. Irish Wildlife Manuals, No. 50. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland. Terrestrial Habitats • A Guide to the Habitats of Ireland. The Heritage Council, Kilkenny. (Fossitt, 2000). • Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.,* 2011). Bats • Guidelines for the Treatment of Bats during the Construction of National Road Schemes (National Roads Authority, 2005). • Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (National Roads Authority, 2005). • Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Ed.) Collins, 2016 Badgers • Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (National Roads Authority, 2005). • Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. (National Roads Authority, 2008). Otters • Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (National Roads Authority, 2006). • The Good Roads Guide: Nature Conservation Advice in Relation to Otters *Design Manual for roads and Bridges* (Highways Agency, 1999, HA 81/99). • Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. (National Roads Authority, 2008). Aquatic Habitats & Species • Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (National Roads Authority, 2005). • Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016). • Water Framework Directive (2000/60/EC). • UK Pollution Prevention Guidelines (PPG).

Type	Source
	• Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board, not dated). • CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648. London, 2006). • CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. (CIRIA Report No. C532. London, 2006). • Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. (National Roads Authority, 2008).
Desktop	• NPWS website • National Biodiversity Data Centre website(NBDC); • Environmental Protection Agency website (EPA); • Inland Fisheries Ireland (IFI); • Birdwatch Ireland (BWI); • Bat Conservation Ireland (BCI); • Butterfly Ireland; • North Tipperary County Development Plan 2010-2016 (as varied), adopted in December 2015 • Draft North Tipperary Local Biodiversity Action Plan 2007 • North Tipperary Heritage Plan 2013-2018 • Tipperary Renewable Energy Strategy 2016 • South Tipperary Biodiversity Action Plan 2010-2015 <u>In co-ordination with and by review of the other EIA Report Chapters as follows</u>: • Chapter 10: Soils • Chapter 11: Water • Chapter 12: Air <u>Consented Upperchurch Windfarm planning documents</u> • Ecopower Developments Ltd. (2012) Upperchurch Windfarm Environmental Impact Statement 13510003 • Ecopower Developments Ltd. (2013) Upperchurch Windfarm Response to Further Information 13510003 • Ecopower Developments Ltd. (2013) Upperchurch Windfarm Badger Sett Survey prepared by Malachy Walsh and Partners (MWP) • Ecopower Developments Ltd. (2013) Upperchurch Windfarm Bat Survey prepared by Malachy Walsh and Partners (MWP) • Ecopower Developments Ltd. (2013) Upperchurch Windfarm Ecological Management Plan prepared by Malachy Walsh and Partners (MWP) • An Bord Pleanála (2014) Inspectors Report for Upperchurch Windfarm PL22.243040 • An Bord Pleanála (2014) Grant of Permission for Upperchurch Windfarm PL22.243040 <u>Other Projects planning documents</u> • Castlewaller Woodland Partnership (2007) Castlewaller Windfarm Environmental Impact Statement prepared by Fehily Timoney and Company • Castlewaller Woodland Partnership (2007). Response to RFI from North Tipperary County Council prepared by Fehily Timoney and Company

Type	Source
	• ESB Wind Development Ltd. and Coillte (2013) Bunkimalta Wind Energy Project Environmental Impact Statement prepared by ESBI • An Bord Pleanála (2013) Inspectors Report for Bunkimalta Wind Energy Project PL22.241924
Fieldwork	• Field Walking • Habitat Surveys • Species specific surveys

NOTE: GREY Shading relates to additional information to facilitate the cumulative evaluations.

Note: Information from the Upperchurch Windfarm planning documents listed above (2013 EIS, 2013 RFI, 2014 Inspectors report etc.) were used throughout this EIA Report chapter to describe the baseline and receiving environment and to describe the effects of the UWF on the environment.

Further detail on the information referenced in Table 8-1 above is provided in Appendix 8-1: Section A8-1.2 Baseline Information. Appendix 8-1 can be found at in Volume C4 EIAR Appendices and includes:

- Desktop Review Datasets
- Fieldwork methods per receptor
- Dates and Times of habitat surveys
- Dates and Times of other, species specific surveys

8.1.7.1 Certainty and Sufficiency of Information Provided

A clear documentary trail is provided throughout this chapter, and chapter appendix, Appendix 8-1, to the competency of data and methods used and the rationale for selection of same. The information used to compile this chapter is collated from reports and documents generated by local authorities and statutory agencies, including the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs and North Tipperary County Development Plan 2010 (as varied), with remit in the regulatory field. In all cases the most recent publications available are relied on. All documentation used is referenced at the end of the chapter.

In respect of Biodiversity no significant limitations of difficulties were encountered.

8.1.8 Methodology for Evaluating Effects

8.1.8.1 Determining the Importance of Biodiversity receptors (excluding birds) (NRA 2009)

Table 8-3 outlines the Guidance from which receptor/resource evaluations (excluding birds) have been derived.

Table 8-3: NRA Evaluation Guidance (NRA 2009)

Resource Evaluation	NRA Criteria
International Importance	• 'European Site' including Special Area of Conservation (SAC), Site of Community Importance (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation. • Proposed Special Protection Area (SPA). Site that fulfils the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive, as amended). Features essential to maintaining the coherence of the Natura 2000 Network. • Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive. • Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or Species of animal and plants listed in Annex II and/or IV of the Habitats Directive. • Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl Habitat 1971). World Heritage Site (Convention for the Protection of World Cultural & Natural Heritage, 1972). • Biosphere Reserve (UNESCO Man & The Biosphere Programme). Site hosting significant species populations under the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals, 1979). • Site hosting significant populations under the Berne Convention (Convention on the Conservation of European Wildlife and Natural Habitats, 1979). • Biogenetic Reserve under the Council of Europe. European Diploma Site under the Council of Europe. • Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).
National Importance	• Site designated or proposed as a Natural Heritage Area (NHA). • Statutory Nature Reserve. • Refuge for Fauna and Flora protected under the Wildlife Acts. • National Park. • Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA); • Statutory Nature Reserve; • Refuge for Fauna and Flora protected under the Wildlife Act; and/or a National Park. • Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. Site containing 'viable areas' of the habitat types listed in Annex I of the Habitats Directive.

Resource Evaluation	NRA Criteria
County Importance	• Area of Special Amenity. • Area subject to a Tree Preservation Order. • Area of High Amenity, or equivalent, designated under the County Development Plan. • Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. • Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive that do not fulfil the criteria for valuation as of International or National importance. • County important populations of species, viable areas of semi-natural habitats or natural heritage features identified in the National or Local BAP, if this has been prepared. • Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or populations of species that are uncommon within the county. • Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.
Local Importance (Higher Value)	• Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; • Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species of animal and plants listed in Annex II and/or IV of the Habitats Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list. • Sites containing semi natural habitat types with high biodiversity in a local context and a high degree of naturalness, or populations of species that are uncommon in the locality; • Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
Local Importance (Lower Value)	• Sites containing small areas of semi natural habitat that are of some local importance for wildlife; • Sites or features containing non-native species that is of some importance in maintaining habitat links.

8.1.8.2 Percival and NRA Evaluation Criteria for biodiversity receptors (birds)

8.1.8.2.1 Determining Bird Sensitivity (Percival 2007 & NRA 2009)

Table 8-4 outlines the Guidance from which avian (bird) receptor/resource evaluations have been derived.

Table 8-4: Bird Sensitivity Rating Equivalency (Percival 2007 and NRA 2009 Combined)

Sensitivity of Bird receptor	Percival 2007 criteria	NRA Resource Evaluation	NRA Criteria	Combined Criteria
Very High	Species is cited interest of SPA. Species present in Internationally important numbers.	International Importance.	Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive	Species is cited interest of SPA. Species present in Internationally important numbers. Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive
High	Other non-cited species which contribute to integrity of SPA. Ecologically sensitive species (<300 breeding pairs in UK) and less common birds of prey. Species listed on Annex 1 of the EU bird's directive. Regularly occurring relevant migratory species which are rare or vulnerable	National Importance	Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list	Other non-cited species which contribute to integrity of SPA Ecologically sensitive species (<300 breeding pairs nationally) and less common birds of prey. Species listed on Annex 1 of the EU bird's directive. Regularly occurring relevant migratory species which are rare or vulnerable Resident or regularly occurring populations (assessed to be important at the national level) of the following: Species protected under the Wildlife Acts; and/or Species listed on the

Sensitivity of Bird receptor	Percival 2007 criteria	NRA Resource Evaluation	NRA Criteria	Combined Criteria
				relevant Red Data list (in this case BOCCI Red list).
Medium	Species present in regionally important numbers (>1% of regional population). Species occurring within SPA's but not crucial to the integrity of the site. Species listed as priority species in the UK BAP subject to special conservation measures	County Importance	Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; County important populations of species. Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.	Species present in regionally important numbers (>1% of regional population). Species occurring within SPA's but not crucial to the integrity of the site. Resident or regularly occurring populations (assessed to be important at the County level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; County important populations of species. Species that are rare or are undergoing a decline in quality or extent at a national level.
Low	Species covered above which are present very infrequently or in very low numbers. Any other species of conservation interest not covered above, e.g. species listed on the red or amber lists of the BoCCI.	Local Importance (High Value)	Locally important populations of priority species or habitats or natural heritage features identified in the Local BAP, if this has been prepared; Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species	Locally important populations of priority species identified in the Local BAP, if this has been prepared; Resident or regularly occurring populations (assessed to be important at the Local level) of the following: Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; Species protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list.

Sensitivity of Bird receptor	Percival 2007 criteria	NRA Resource Evaluation	NRA Criteria	Combined Criteria
			protected under the Wildlife Acts; and/or Species listed on the relevant Red Data list.	Amber listed species.
Negligible	Species that remain common and widespread	Local Importance (Low Value)	n/a	Species that remain common and widespread Green Listed Species.

8.1.8.2.2 Determining Magnitude of Effect to Birds (Percival 2007)

Table 8-5 outlines the definition of terms in respect of magnitude for avian receptor evaluations. This rating system has also been used as a general guide for magnitude quantification throughout.

Table 8-5: Birds - Definition of Terms relating to Magnitude (Percival 2007)

Magnitude	Description
Very High	Total loss or very major alteration to key elements/ features of the baseline conditions such that the post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether. Guide: < 20% of population / habitat remains
High	Major loss or major alteration to key elements/ features of the baseline (pre-development) conditions such that post development character/ composition/ attributes will be fundamentally changed. Guide: 20-80% of population/ habitat lost
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of baseline will be partially changed. Guide: 5-20% of population/ habitat lost
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns. Guide: 1-5% of population/ habitat lost
Negligible	Very slight change from baseline condition. Change barely distinguishable, approximating to the "no change" situation. Guide: < 1% population/ habitat lost

8.1.8.2.3 Determining Risk of Effect to Birds (Percival 2007)

Table 8-6 outlines probability rating definitions used to inform avian receptor impact appraisal.

Table 8-6: Birds - Risk classifications or likelihood that an impact will occur (Percival 2007)

Probability	Description	Comments
High	Impact is likely to occur (>50% likelihood)	Species known to be vulnerable to specific impact
Medium	Impact may occur (5-50% likelihood)	Species may be affected by specific impact
Low	Impact is very unlikely (<5% likelihood)	Species known to be tolerant to specific impact

8.1.8.2.4 Determining Significance of Effect to Birds (Percival 2007 & EPA 2017 combined)

Table 8-7 outlines the significance matrix used for avian receptor impact appraisal.

Table 8-7: Birds - Significance Matrix for high probability impacts (Percival 2007 with equivalent EPA Significance Ratings).

Significance		Sensitivity			
		Very High	**High**	**Medium**	**Low**
Magnitude	**Very High**	Very high/ Very significant	Very high/ Very significant	High/ Significant effects	Medium/ Moderate effects
	High	Very high/ Very significant	Very high/ Very significant	Medium/ Moderate effects	Low/ Slight effects
	Medium	Very high/ Very significant	High/ Significant effects	Low/ Slight effects	Very low/ Not Significant
	Low	Medium/ Moderate effects	Low/Slight effects	Low/Slight effects	Very low/ Not Significant
	Negligible	Low/ Slight effects	Very low/ Not Significant	Very low/ Not Significant	Very low/ Not Significant

8.1.8.3 EPA EIAR Guidance Definitions of Effects

Table 8-8 to 8-13 outline the EPA evaluation criteria utilised in this appraisal of the Environmental Factor, Biodiversity. This criteria is included in the Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, August 2017)

Table 8-8: Probability of Effects (EPA, August 2017)

Likely Effects	Unlikely Effects
The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.	The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.

Table 8-9: Quality of Effects (EPA, August 2017)

Quality of Effect	Description
Positive Effect	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or removing nuisances or improving amenities)
Neutral Effect	No effects or effects that are imperceptible, within the normal bounds of variation or within the margin of forecasting error.
Negative/Adverse Effect	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).

Table 8-10: Significance of Effects (EPA, August 2017)

Significance of Effect	Description
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	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends
Significant	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	An effect which obliterates sensitive characteristics

Table 8-11: Duration of Effects (EPA, August 2017)

Duration of Effect	Description
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

Table 8-12: Types of Effects (EPA, August 2017)

Type of Effect	Description
Effect/Impact	A change resulting from the implementation of a project
Likely Effects	The effects that are specifically predicted to take place – based on an understanding of the interaction of the proposed project and the receiving environment.
Indirect Effects (a.k.a. secondary effects)	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway
Cumulative Effects	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
'Do Nothing' Effects	The environment as it would be in the future should the subject project not be carried out.
'Worst Case' Effects	The effects arising from a project in the case where mitigation measures substantially fail
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Reversible Effects	Effects that can be undone, for example through remediation or restoration
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect
Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents (e.g. combination of SOx and NOx to produce smog).

Table 8-13: Definition of Terms – Source, Pathway, Receptor (EPA, August 2017)

Term	Description
Source	The activity or place from which an effect originates
Pathway	The route by which an effect is conveyed between a source and a receptor.
Receptor	Any element in the environment which is subject to impacts
Effect/Impact	A change resulting from the implementation of a project

8.2 Sensitive Aspect No.1: European Sites

This Section provides a description and evaluation of the Sensitive Aspect - European Sites.

We note that findings in respect of Likely Significant effects on European Sites are fully considered and evaluated in the Natura Impact Statement for Whole UWF Project Elements 1 to 5 (herein referred to as the NIS). This NIS is included in Volume E: Appropriate Assessment Reporting of the planning application for the UWF Grid Connection. In line with EIA Directive Guidance, findings are summarised herein; however, and for the avoidance of doubt, we refer the NIS for detailed examination and analysis of likely significant effects in respect of European Sites.

8.2.1 BASELINE CHARACTERISTICS of European Sites

8.2.1.1 STUDY AREA for European Sites

The study area for European Sites in relation to the UWF Grid Connection is described in Table 8-14 and illustrated on Figure GC 8.2: European Sites within the UWF Grid Connection Study Area - Overview map and Maps 1 – 5 (Volume C3 EIAR Figures).

Table 8-14: UWF Grid Connection Study Area for European Sites

Study Area for European Sites	Justification for the Study Area Extents
15km from the construction works area boundary.	An evaluation distance of 15km is currently recommended in the case of projects (DoEHLG, 2009).

8.2.1.2 Baseline Context and Character of European Sites in the UWF Grid Connection Study Area

European sites such as candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs) designated within the Natura 2000 network are herein considered. A total of 23 European or Natura Sites have been identified within 15km of the Whole UWF Project. Further detail on these sites, including conservation interest, magnitude, and proximity to the subject development are included in the Natura Impact Statement for Whole UWF Project Elements 1 to 5 which can be found in Volume E Appropriate Assessment Report. European Sites and their respective distance to the Whole UWF Project are also summarised overleaf.

The UWF Grid Connection passes through the boundary of the Lower River Shannon cSAC at three locations, two of which occur in proximity to the Newport (Mulkear) River in the townland of Oakhampton (Watercourse Crossing W10 constitutes one instance in addition the 110kV UGC route utilises an *existing* trackway within the SAC boundary *en route* to the above crossing point). The third location is at the Bilboa River west of Kilcommon village (Watercourse Crossing W57). Drilling (Horizontal Directional Drilling) will be used to facilitate the above crossings; therefore no in-stream works will take place within the boundary of a cSAC. The footprint of the majority of the UWF Grid Connection drains downstream to the Lower River Shannon) cSAC, with a smaller area draining to the Lower River Suir cSAC (the easternmost 1.2km of the 110kV UGC).

The UWF Grid Connection traverses the Slievefelim to Silvermines Mountains SPA from the townland of Newross, east of Newport to the townland of Knocknabansha near Upperchurch village, and will require works within the SPA.

The location of European Sites within the UWF Grid Connection Study Area is outlined on Table 8-15 and illustrated on Figure GC 8.2: European Sites within the UWF Grid Connection Study Area, watercourse

crossing locations are identified on Figure GC 8.4: Aquatic Habitats & Species within the UWF within the UWF Grid Connection Study Area.

Table 8-15: Summary of European Sites within the UWF Grid Connection Study Area

European Site	Distance from UWF Grid Connection
Anglesey Road SAC (002125)	3.3 km south of the UWF Grid Connection cable route
Bolingbrook Hill SAC (002124)	6.3 km north of the UWF Grid Connection cable route.
Clare Glen SAC (000930)	4.5 km south of the UWF Grid Connection cable route.
Glenomra Wood SAC (001013)	11.2 km west of the UWF Grid Connection cable route.
Glenstal Wood SAC (001432)	5.8 km south of the UWF Grid Connection cable route.
Keeper Hill SAC (001197)	2.0 km north of the UWF Grid Connection
Lough Derg (Shannon) SPA (004058)	10.4 km north of the UWF Grid Connection
Lower River Shannon SAC (002165)	0 km – The UWF Grid Connection cable route passes through the boundary of the Lower River Shannon SAC at three locations; 70m along a farm track on the northern side of the Mulkear river at Oakhampton and under the Mulkear River at Oakhampton/Newross, Co. Tipperary and under the Bilboa River at Laghile/Churchquarter, Co. Tipperary.
Lower River Suir SAC (002137)	4.4 km east of the UWF Grid Connection cable route.
Philipston Marsh SAC (001847)	13.1 km south of the UWF Grid Connection
Silvermine Mountain SAC (000939)	7.2 km north of the UWF Grid Connection
Silvermine Mountain West SAC (002258)	5.7 km north of the UWF Grid Connection
Slieve Bernagh Bog SAC (002312)	11.5 km west of the UWF Grid Connection cable route.
Slievefelim to Silvermines SPA (004165)	The UWF Grid Connection cable route is within the boundaries of the Slievefelim to Silvermines SPA.

Features of Interest are summarised in Table 8-16. Further detail on the distinguishing aspects of these designated sites is provided in the Natura Impact Statement for Whole UWF Project Elements 1 to 5 which can be found in Volume E Appropriate Assessment Report., which accompanies the planning application.

Table 8-16: Features of Interest in respect of European Sites under consideration

European Site	Features of Interest
Anglesey Road SAC (002125)	Priority Annex I Habitats: Species-rich Nardus Grassland* (6230)
Bolingbrook Hill SAC (002124)	Priority Annex I Habitats: Species-rich Nardus Grassland* (6230) Annex I Habitats: Northern Atlantic Wet Heath (4010) / European Dry Heath (4030)
Clare Glen SAC (000930)	Annex I Habitats: Old sessile oak woods (91A0) Annex II Species: Killarney Fern (Trichomanes speciosum)
Glenomra Wood SAC (001013)	Annex I Habitats: Old sessile oak woods (91A0)
Glenstal Wood SAC (001432)	Annex II Species: Killarney Fern (Trichomanes speciosum)
Keeper Hill SAC (001197)	Priority Annex I Habitats: Blanket Bogs (* if active bog) (7130)

European Site	Features of Interest
	Annex I Habitats: Northern Atlantic Wet Heath (4010)
Lough Derg (Shannon) SPA (004058)	Cormorant (Phalacrocorax carbo); Tufted Duck (Aythya fuligula); Goldeneye (Bucephala clangula); Common Tern (Sterna hirundo); Wetland and Waterbirds
Lower River Shannon SAC (002165)	Priority Annex I Habitats: Alluvial Forests* (91E0) / Coastal Lagoons* (1150) Annex I Habitats: Sandbanks (1110) / Estuaries (1130) /Mudflats and sand flats (1140)/Large shallow inlets and bays (1160)/Reefs (1170)/Vegetation of stony banks (1220)/Vegetated sea cliffs (1230)/Salicornia mudflats (1310) / Atlantic salt meadows (1330)/Mediterranean salt meadows (1410)/Floating river vegetation (3260)/Molinia meadows (6410) Annex II species: Freshwater Pearl-Mussel (Margaritifera margaritifera);Atlantic Salmon (Salmo salar);Sea Lamprey (Petromyzon marinus);Brook Lamprey (Lampetra planeri);River Lamprey (Lampetra fluviatilis);Bottlenose Dolphin (Tursiops truncates);Otter (Lutra lutra)
Lower River Suir SAC (002137)	Priority Annex I Habitats: Alluvial forests* (91E0) / Yew woodlands* (91J0) Annex I Habitats: Atlantic salt meadows (1330) / Mediterranean salt meadows (1410) / Floating river vegetation (3260) / Hydrophilous tall herb fringe communities (6340) / Old sessile oak woods (91A0) Annex II species: Freshwater Pearl-Mussel (Margaritifera margaritifera); White-clawed Crayfish (Austropotamobius pallipes); Sea Lamprey (Petromyzon marinus);Brook Lamprey (Lampetra planeri);River Lamprey (Lampetra fluviatilis);Twaite Shad (Alosa fallax fallax);Atlantic Salmon (Salmo salar);Otter (Lutra lutra)
Philipston Marsh SAC (001847)	Annex I Habitats: Transition mires and quaking bogs (7140)
Silvermine Mountain SAC (000939)	Priority Annex I Habitats: Species-rich Nardus Grassland* (6230) Annex I Habitats: Northern Atlantic Wet Heath (4010)
Silvermine Mountain West SAC (002258)	Annex I Habitats: Northern Atlantic Wet Heath (4010)/European Dry Heath (4030)/Calaminarian grasslands (6130)
Slieve Bernagh Bog SAC (002312)	Priority Annex I Habitats: Blanket Bogs (* if active bog) (7130) Annex I Habitats: Northern Atlantic Wet Heath (4010)/European Dry Heath (4030)
Slievefelim to Silvermines SPA (001179)	Hen Harrier (Circus cyaneus)

8.2.1.3 Importance of European Sites

The EU Habitats Directive (92/43/EEC) on the Conservation of Natural Habitats and of Wild Fauna and Flora formed a basis for the designation of Special Areas of Conservation (SACs). Similarly, Special Protection Areas are legislated for under the Birds Directive (Council Directive 79/409/EEC on the Conservation of Wild Birds). Collectively SACs and SPAs are referred to as Natura 2000 sites, or 'European' sites. In general terms, they are considered to be of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community.

8.2.1.4 Sensitivity of European Sites

SAC designated sites are sensitive to hydrological changes to groundwater and surface water quality which may affect water dependant ecosystems. Within individual Designated Sites (both SAC's and SPA's), specific species may be sensitive to disturbance, displacement, habitat loss or accidental mortality, which could

reduce their favourable conservation status. Designated sites are also sensitive to encroachment by invasive species.

Further detail, including currently known threats and pressures on designated sites are included in included in the Natura Impact Statement for Whole UWF Project Elements 1 to 5 which can be found in Volume E Appropriate Assessment Report.

8.2.1.5 Trends in the Baseline Environment (the 'Do-Nothing' scenario)

8.2.1.5.1 Special Protection Areas (SPAs)

Trends in respect of taxa designated under the EU Birds Directive (SPA's) are reported to the EU under Article 12[2] of said directive. The most recently available trend information covers the period 2008-2012. Longer term trends in regard to wintering and breeding taxa across the SPA network are largely unknown[3].

The 2014 Report covers 196 bird species, including species which live in Ireland all year round and others which migrate here for summer or winter. It provides a picture of both short-term and long-term trends for some species, and similarly a view of the breeding range trends in some species. However, there is an absence of long-term data for some species. The report was required to provide information on trends rather than a conclusive assessment of status, as is the case in the Article 17 report. In summary, 58% of species populations were stable or increasing in the short term, while 27% were decreasing. However, looking at long term data (where available) 36% were stable or increasing, while 28% were decreasing[4].

8.2.1.5.2 Special Areas of Conservation (SACs)

Reporting on trends with regard to protected habitats and species under the EU Habitats Directive is provided to the EU under Article 17 of said directive. The most recently available trend information in respect of individual habitats and species was published in 2013[5].

Habitats

In the cited 2013 report on the Habitats Directive, 9% of the 58 listed habitats are assessed as "favourable", 50% as "inadequate" and 41% as "bad". Since 2007 nine (16%) habitats demonstrate a genuine improving trend, 18 (31%) habitats are considered to be declining, no change is reported for 28 (48%) habitats and an unknown trend reported for 3 (5%) habitats. Many of the coastal habitats and lakes are assessed as "inadequate", with ongoing declines. "Inadequate" but improving trends are noted for some marine habitats. Several of the peatland and grassland habitats remain in "bad" status with ongoing declines; however, improvements are noted in some woodland habitats. Fens are assigned a "bad" but unknown trend due to the lack of national data to support the assessments.

There is no evidence that there will be any major decline in pressures over the next 12 years. Some potential improvements however have been noted for the following:

1. A decline in invasive infestation of woodlands due to improved forestry management.
2. Management of aquaculture related pressures impacting Estuaries and Mudflats

[2] https://circabc.europa.eu/sd/a/a211d525-ff4d-44f5-a360-e82c6b4d3367/IE_A12NatSum_20141031.pdf

[3] http://cdr.eionet.europa.eu/Converters/run_conversion?file=/ie/eu/art12/envuvesya/IE_birds_reports-14328-144944.xml&conv=343&source=remote#A082_B

[4] Summarised from "Evaluation study to support the Fitness Check of the Birds and Habitats Directives" available online at https://www.npws.ie/sites/default/files/publications/pdf/Fitness%20Check%2015%204%2015.pdf.

[5] https://www.npws.ie/article-17-reports-0/article-17-reports-2013

3. A reduction in pollution from household waste, sewage systems and pollution arising from agricultural or forestry related activities. These improvements are likely to be observed in certain lake habitats.

There is some evidence that climate change is negatively impacting coastal habitats. Predictions indicate that degraded upland habitats, in particular, will become less resilient to the impacts of climate change in the immediate future. These predictions relate mainly to drier summers and higher levels of more intense rainfall which are likely to result in bog bursts and landslides which may indirectly impact other habitats e.g. lakes. Ecologically unsuitable grazing regimes were one of the highest impacting pressures reported. The grazing pressures noted were both intensive and non-intensive grazing. Non-intensive grazing is assigned as a pressure where a habitat has not recovered from the impacts of overgrazing and even a small amount of grazing is still considered to negatively impact the habitat. Abandonment and succession were also considered to negatively impact habitat quality.

The most prevalent pollution sources are from agricultural or forestry related activities and household sewage systems. Mechanical peat extraction is considered a High intensity pressure for Blanket bog and also indirectly impacts lake and river habitats. Peatlands were also significantly impacted by drainage.

Species

For the 61 resident species (including 3 species groups) 52% are assessed as “favourable”, 20% as “inadequate”, 12% as “bad” and 16% as “unknown” There are less unknowns than reported in 2007 (the previous reporting period), due to improved knowledge of cetaceans; in those cases, the “unknown” ratings were elevated to a “favourable” status in 2013. Therefore, with further improved knowledge of cetaceans it is likely that the proportion of species in “favourable” status will increase.

Since 2007 4 (6%) species demonstrate a genuine improving trend, 6 (10%) species are considered to be declining, with no genuine change reported for 50 species (82%).

Many species remain in “favourable” status. Population increases and Range expansion have been observed for Otter and Pine Marten respectively. Improvements in habitat extent for Natterjack toad have been achieved by conservation action. However, on-going declines are reported for all Vertigo and Pearl mussel species and Marsh fritillary.

Pollution is considered the biggest pressure and threat impacting the conservation status of species. Human intrusion and disturbances was reported frequently but never at a high intensity. Agricultural practices have a high impact on species that occur within agricultural systems, e.g. Vertigo species and Marsh Fritillary.

There is no evidence that there will be any major decline in the incidence of pressures over the next 12 years, however the impact of aquaculture related pressures on Maërl species should reduce. Invasive species are considered likely to increase as a threat to a number of species.

The do-nothing scenario is that in the absence of the subject development these trends would continue as documented above in respect of the species and habitats which form the basis for designation under the respective EU directives of the EU Sites under consideration.

8.2.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to designated sites, as identified above, will be the receiving environment at the time of construction due to the short separation period. Further trends in species and habitats as identified in reporting to Europe are likely overlap the operational phase, dependant on the occurrence of causal mechanisms such as identified pressures.

European Sites

Sensitive Aspect

8.2.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

UWF Grid Connection is part of a whole project which comprises the following Other Elements; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Grid Connection is Element 1. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.

The Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in order to present the totality of the project.

NOTE: GREY Shading relates to additional information to facilitate the cumulative evaluations

8.2.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to European Sites considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 8.2.2.2.1 below. We also refer to the Natura Impact Statement which accompanies the planning application as Volume E.

The evaluation of cumulative impacts to European Sites also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to European Sites with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter.

The results of this scoping exercise are that: Bunkimalta Windfarm, Castlewaller Windfarm, Gortnahalla Wind Turbine, Newport Distributor Road, Killuragh Digester Plant, Housing Developments in Doon and Annacotty, Agricultural Developments – Milking Parlour in Cappamore, Milking Parlour in Lisnagry, Slatted Sheds and Stores in Pallasgreen, Slatted Shed in Gortussa, Industrial warehouse Units at Thurles, Thurles Regional Water Treatment Works Forestry, Agriculture, Turf-Cutting have been scoped in for evaluation of cumulative effects to European Sites.

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8.2.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 8-17.

Table 8-17: Cumulative Evaluation Study Area for European Sites

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 2: UWF Related Works Element 3: UWF Replacement Forestry Element 4: Upperchurch Windfarm (UWF) Element 5: UWF Other Activities	15km from the construction works areas/activity locations/afforestation lands	Professional judgement and as per Best Practice (CIEEM, 2016,NRA, 2008, Lusby et al.,2010,SNH 2014)
<u>Other Projects or Activities:</u> Bunkimalta Windfarm Castlewaller Windfarm Gortnahalla Wind Turbine Newport Distributor Road Killuragh Digester Plant Housing Developments in Doon and Annacotty, Agricultural Developments – Milking Parlour in Cappamore, Milking Parlour in Lisnagry, Slatted Sheds and Stores in Pallasgreen, Slatted Shed in Gortussa, Industrial warehouse Units at Thurles, Thurles Regional Water Treatment Works Forestry Agriculture Turf-Cutting	The boundary of - the Slievefelim to Silvermines SPA plus 5km, and - the regional Mulkear River catchment, -the regional Clodiagh River catchment	Research on the spatial ecology of Hen Harriers has shown that foraging females spend most of their time within 1km of the nest, while males hunt mostly within 2km of the nest (Arroyo et al., 2009, Irwin et al., 2012, Arroyo et al., 2014). Therefore, landscape and habitat changes within 1km of the nest may impact on both male and female foraging, while changes up to 2km from the nest are more likely to affect males only (Arroyo et al., 2014). SNH (2014) also recommend a 2km study area extent from a proposal site within which data should be collected. A 5km area around the SPA in conjunction with a 2km area around the various elements of the Whole UWF Project will ensure all likely effects are evaluated in the context of the Species and the SPA. The Mulkear River is one of the regional catchments in which the Whole UWF Project is located. The Mulkear River catchment drains to the Lower River Shannon SAC. Extending the scoping area beyond the Mulkear River catchment would mean that the whole of the River Shannon catchment would be included and therefore at this vast scale, the effect of the Whole UWF Project would likely be Neutral (no effect) in relation to cumulative impacts. The Clodiagh River (Tipperary) is one of the regional catchments in which the Whole UWF Project is located. The Clodiagh River catchment drains to the Lower River Suir SAC. Extending the scoping area beyond the Clodiagh River catchment would mean that a much larger proportion of the River Suir catchment would be included and therefore at this scale, the effect of the Whole UWF Project would be Neutral (no effect) in relation to cumulative impacts.

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8.2.2.2.1 Potential for Impacts to European Sites

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect European Sites. The results of this evaluation are included in Table 8-18.

The location of, and study area boundary associated with, the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure CE 8.2: European Sites within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-18: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Included for the evaluation of cumulative effects
Other Projects or Activities	
Bunkimalta Windfarm Castlewaller Windfarm Gortnahalla Wind Turbine Development, Newport Distributor Road Killuragh Digester Plant Housing Developments in Doon and Annacotty, Agricultural Developments – Milking Parlour in Cappamore, Milking Parlour in Lisnagry, Slatted Sheds and Stores in Pallasgreen, Slatted Shed (Pigs) in Gortussa, Industrial warehouse Units at Thurles, Thurles Regional Water Treatment Works Forestry Agriculture Turf-Cutting	Yes, included for the evaluation of cumulative effects

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8.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.2.2.3.1 Element 2: UWF Related Works

The UWF Related Works are mainly located in the Clodiagh (Tipperary[6]) River sub-catchment of the River Suir which drains downstream to the Lower River Suir cSAC, to the south of Holycross village (no works occur within the SAC). Some of the footprint of the UWF Related Works also drains downstream to the Lower River Shannon cSAC. The UWF Related Works location HW7 is located within the Slieve Felim to Silvermines Mountains SPA- however no works are required at this location.

The location of European Sites within 15km of UWF Related Works is outlined on Table 8-19 and illustrated on Figure CE 8.2: European Sites within the Cumulative Evaluation Study Area. European Sites are also illustrated on Figure RW 8.2: European Sites within the UWF Related Works Study Area. Figure RW 8.2 is part of the EIA Report for the UWF Related Works, and is included in Volume F: Reference Documents with this planning application.

Table 8-19: Summary of European Sites within the UWF Related Works Study Area

European Site	Distance from UWF Related Works
Anglesey Road SAC (002125)	2.9 km south of the UWF Related Works
Bolingbrook Hill SAC (002124)	7.2 km north west of the UWF Related Works
Keeper Hill SAC (001197)	10.9 km northwest of the UWF Related Works
Kilduff, Devilsbit Mountain SAC (000934)	13.7 km northeast of the UWF Related Works
Lower River Shannon SAC (002165)	1.5km west of the UWF Related Works
Lower River Suir SAC (002137)	3km east of the UWF Related Works
Philipston Marsh SAC (001847)	13.0 km south of the UWF Related Works
Silvermine Mountain SAC (000939)	11.5km northwest of the UWF Related Works
Silvermine Mountain West SAC (002258)	12.5 km north of the UWF Related Works
Slievefelim to Silvermines SPA (004165)	The UWF Related Works is within the boundaries of the Slievefelim to Silvermines SPA.

[6] We note that there are 2 River Clodiagh's within the River Suir catchment, the above sited Clodiagh (Tipperary) River but also the Clodiagh (Waterford) River (including the only designated Freshwater Pearl Mussel sub-catchment in the Suir catchment). There is no hydrological connection between the two Clodiagh Rivers.

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8.2.2.3.2 Element 3: UWF Replacement Forestry

UWF Replacement Forestry is located entirely in the Clodiagh (Tipperary) River sub-catchment which drains downstream to the Lower River Suir cSAC. The UWF Replacement Forestry is located in its entirety outside the Slieve Felim to Silvermine Mountains SPA.

The location of European Sites within 15km of the other elements of the UWF Replacement Forestry is outlined on Table 8-20 and illustrated on Figure CE 8.2: European Sites within the Cumulative Evaluation Study Area. European Sites are also illustrated on Figure RF 8.2: European Sites within the UWF Replacement Forestry Study Area. Figure RF 8.2 is part of the EIA Report for the UWF Replacement Forestry, and is included in Volume F: Reference Documents with this planning application.

Table 8-20: Summary of European Sites within the UWF Replacement Forestry Study Area

European Site	Distance from UWF Replacement Forestry
Anglesey Road SAC (002125)	5 km south of the UWF Replacement Forestry
Bolingbrook Hill SAC (002124)	8.1 km of the UWF Replacement Forestry
Keeper Hill SAC (001197)	12.1km northwest of the UWF Replacement Forestry
Kilduff, Devilsbit Mountain SAC (000934)	16.1 km northeast of the UWF Replacement Forestry
Lower River Shannon SAC (002165)	4.1km west of the UWF Replacement Forestry
Lower River Suir SAC (002137)	4.9km east of the UWF Replacement Forestry
Silvermine Mountain SAC (000939)	12.5km northwest of the UWF Replacement Forestry
Silvermine Mountain West SAC (002258)	13.6km north west of the UWF Replacement Forestry
Slievefelim to Silvermines SPA (004165)	1.4km west of the UWF Replacement Forestry

8.2.2.3.3 Element 4: Upperchurch Windfarm

The already consented Upperchurch Windfarm is located mainly in the Clodiagh (Tipperary) River sub-catchment which drains downstream to the Lower River Suir cSAC. Some of the footprint of the Upperchurch Windfarm does drain downstream to the Lower River Shannon cSAC (we refer chapter 11 Water for further information). The Upperchurch Windfarm is located in its entirety outside the Slieve Felim to Silvermine Mountains SPA.

The location of European Sites within 15km of the Upperchurch Windfarm is illustrated on Figure CE 8.2: European Sites within the Cumulative Evaluation Study Area.

Table 8-21: Summary of European Sites within the UWF Study Area

European Site	Distance from Upperchurch Windfarm
Anglesey Road SAC (002125)	2.5 km south west
Bolingbrook Hill SAC (002124)	6.9 km north west
Keeper Hill SAC (001197)	10.7 km north west
Kilduff, Devilsbit Mountain SAC (000934)	13.3 km north east
Lower River Shannon SAC (002165)	2.7 km west
Lower River Suir SAC (002137)	2.8 km east and c.4.1km downstream
Philipston Marsh SAC (001847)	13.6 km south west
Silvermine Mountain SAC (000939)	11.0 km north west
Silvermine Mountain West SAC (002258)	11.2 km north west
Slievefelim to Silvermines SPA (004165)	Adjacent to the western boundary of turbines T17 to T21.

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8.2.2.3.4 Element 5: UWF Other Activities

The UWF Other Activities are partially located in the Clodiagh (Tipperary) River sub-catchment which drains downstream to the Lower River Suir cSAC, where Haul Route Activities HA21-23 and Upperchurch Hen Harrier Scheme exist in proximity to the Upperchurch Windfarm. Further Haul Route Activity locations such as tree trimming, overlaying of matting on verges and temporary street furniture removal extend northwards and then west before termination at Foynes. This brings a number of HA locations into closer proximity to European Sites such as the River Shannon and River Fergus SPA, and the Lower River Shannon SAC. No works however are proposed in respect of these activities in proximity to European Sites.

The location of European Sites within 15km of the UWF Other Activities is outlined on Table 8-22 and illustrated on Figure CE 8.2: European Sites within the Cumulative Evaluation Study Area.

Table 8-22: Summary of European Sites within the UWF Other Activities Study Area

European Site	Distance from Other Activities
Anglesey Road SAC (002125)	2.5km south of UWF Other Activities
Askeaton Fen Complex SAC (002279)	7.3km west of UWF Other Activities
Barrigone SAC (000432)	3km east of UWF Other Activities
Bolingbrook Hill SAC (002124)	6.3km north of UWF Other Activities
Clare Glen SAC (000930)	4.5km south of UWF Other Activities
Curraghchase Woods SAC (000174)	9.3km west of UWF Other Activities
Glenomra Wood SAC (001013)	9.1km northwest of UWF Other Activities
Glenstal Wood SAC (001432)	5.8km south of UWF Other Activities
Keeper Hill SAC (001197)	2km north of UWF Other Activities
Kilduff, Devilsbit Mountain SAC (000934)	8.7km northeast of UWF Other Activities
Lough Derg (Shannon) SPA (004058)	8.1 km northwest of UWF Other Activities
Lough Derg, North-East Shore SAC (002241)	12.9km northwest of UWF Other Activities
Lower River Shannon SAC (002165)	0km of UWF Other Activities
Lower River Suir SAC (002137)	0m: The HA19 location on the R503 overlaps the Site boundary
Philipston Marsh SAC (001847)	13.9km southwest of UWF Other Activities
Ratty River Cave SAC (002316)	14.8km of UWF Other Activities
River Shannon and River Fergus Estuaries SPA (004077)	354m northwest of UWF Other Activities
Silvermine Mountain SAC (000939)	8.5km southwest of UWF Other Activities
Silvermine Mountain West SAC (002258)	9.5 km southwest of UWF Other Activities
Slieve Bernagh Bog SAC (002312)	9.6km northwest of UWF Other Activities
Slievefelim to Silvermines SPA (004165)	0m southwest of UWF Other Activities
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	5.9km south of UWF Other Activities
Tory Hill SAC (000439)	10.3km southeast of UWF Other Activities

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8.2.2.3.5 Other Projects or Activities

Bunkimalta Windfarm: a consented windfarm located within the Slievefelim to Silvermines SPA, c.2.5km to the north of the UWF Grid Connection. The windfarm is also located upstream of the Lower River Shannon SAC.

Castlewaller Windfarm: a consented windfarm located within the Slievefelim to Silvermines SPA, immediately adjacent to the UWF Grid Connection. It is similarly located upstream of the Lower River Shannon cSAC.

Gortnahalla Wind Turbine Development: a consented single turbine development within the Clodiagh River catchment. The turbine development is also located upstream of the Lower River Suir cSAC.

Newport Distributor Road: a consented inner relief road located between the R503 and a local County Road, in Newport town, Co. Tipperary, is located c.150m south east of the Lower River Shannon SAC at its closest.

Killuragh Digester Plant: a digester plant to process farm slurry and other organic material, located in the Lower River Shannon catchment area, near Pallasgreen, County Limerick.

Housing Developments in Doon and Annacotty: construction of 25 No. houses at Doon, 288 no. houses in Annacotty, both developments located in the Lower River Shannon SAC catchment area.

Agricultural Developments: construction of milking parlours in Cappamore and Lisnagry County Limerick, and slatted sheds and stores in Pallasgreen. All of these developments are located in the Lower River Shannon SAC catchment area. A proposed change of use from hay storage to a slatted unit for pigs in Gortussa is located within the Clodiagh (Tipperary) Lower River Suir cSAC catchment area.

Thurles Regional Water Treatment Works comprise consented water treatment works abstracting from the Clodiagh River catchment.

Forestry/Agriculture/Turf-Cutting occur within the Slievefelim to Silvermines SPA, and adjacent to, or in the case of Turf cutting, upstream of the Lower River Shannon cSAC /Lower River Suir cSAC.

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8.2.2.4 Cumulative Information: Baseline Characteristics – Character

Features of Interest are summarised in Table 8-23. Further detail on the distinguishing aspects of these designated sites is provided in included in the Natura Impact Statement for Whole UWF Project Elements 1 to 5 which can be found in Volume E Appropriate Assessment Report.

Table 8-23: Features of Interest in respect of European Sites under consideration

European Site	Features of Interest
Anglesey Road SAC (002125)	Priority Annex I Habitats: Species-rich *Nardus* Grassland* (6230)
Askeaton Fen Complex SAC (002279)	Priority Annex I Habitats: *Cladium* Fens* (7210) Annex I Habitats: Alkaline Fens (7230)
Barrigone SAC (000432)	Priority Annex I Habitats: Orchid-rich Calcareous Grassland* (6210) /Limestone Pavement* (8240) Annex I Habitats: Juniper Scrub (5130) Annex II Species: Marsh Fritillary (*Euphydryas aurinia*)
Bolingbrook Hill SAC (002124)	Priority Annex I Habitats: Species-rich *Nardus* Grassland* (6230) Annex I Habitats: Northern Atlantic Wet Heath (4010) / European Dry Heath (4030)
Clare Glen SAC (000930)	Annex I Habitats: Old sessile oak woods (91A0) Annex II Species: Killarney Fern (*Trichomanes speciosum*)
Curraghchase Woods SAC (000174)	Priority Annex I Habitats: Alluvial Forests* (91E0) / Yew Woodlands* (91J0) Annex II Species: Lesser Horseshoe Bat *(Rhinolophus hipposideros*)
Glenomra Wood SAC (001013)	Annex I Habitats: Old sessile oak woods (91A0)
Glenstal Wood SAC (001432)	Annex II Species: Killarney Fern (*Trichomanes speciosum*)
Keeper Hill SAC (001197)	Priority Annex I Habitats: Blanket Bogs (* if active bog) (7130) Annex I Habitats: Northern Atlantic Wet Heath (4010)
Kilduff, Devilsbit Mountain SAC (000934)	Priority Annex I Habitats: Species-rich *Nardus* Grassland* (6230) Annex I Habitats: European Dry Heath (4030)
Lough Derg (Shannon) SPA (004058)	Cormorant (*Phalacrocorax carbo*); Tufted Duck (*Aythya fuligula*); Goldeneye (*Bucephala clangula*); Common Tern (*Sterna hirundo*); Wetland and Waterbirds
Lough Derg, North-East Shore SAC (002241)	Priority Annex I Habitats: *Cladium* Fens* (7210) / Limestone Pavement* (8240)/Alluvial Forests* (91E0)/Yew Woodlands* (91J0) Annex I Habitats: Alkaline Fens (7230) / Juniper Scrub (5130)
Lower River Shannon SAC (002165)	Priority Annex I Habitats: Alluvial Forests* (91E0) / Coastal Lagoons* (1150) Annex I Habitats: Sandbanks (1110) / Estuaries (1130) /Mudflats and sand flats (1140)/Large shallow inlets and bays (1160)/Reefs (1170)/Vegetation of stony banks (1220)/Vegetated sea cliffs (1230)/*Salicornia* mudflats (1310) / Atlantic salt meadows (1330)/Mediterranean salt meadows (1410)/Floating river vegetation (3260)/*Molinia* meadows (6410) Annex II species: Freshwater Pearl-Mussel (*Margaritifera margaritifera*);Atlantic Salmon (*Salmo salar*);Sea Lamprey (*Petromyzon marinus*);Brook Lamprey (*Lampetra planeri*);River Lamprey (*Lampetra fluviatilis*);Bottlenose Dolphin (*Tursiops truncates*);Otter (*Lutra lutra*)
Lower River Suir SAC (002137)	Priority Annex I Habitats: Alluvial forests* (91E0) / Yew woodlands* (91J0)

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European Site	Features of Interest
	Annex I Habitats: Atlantic salt meadows (1330) / Mediterranean salt meadows (1410) / Floating river vegetation (3260) / Hydrophilous tall herb fringe communities (6340) / Old sessile oak woods (91A0) Annex II species: Freshwater Pearl-Mussel (*Margaritifera margaritifera*); White-clawed Crayfish (*Austropotamobius pallipes*); Sea Lamprey (*Petromyzon marinus*);Brook Lamprey (*Lampetra planeri*);River Lamprey (*Lampetra fluviatilis*);Twaite Shad (*Alosa fallax fallax*);Atlantic Salmon (*Salmo salar*);Otter (*Lutra lutra*)
Philipston Marsh SAC (001847)	Annex I Habitats: Transition mires and quaking bogs (7140)
Ratty River Cave SAC (002316)	Annex I Habitats: Caves (8310) Annex II Species: Lesser Horseshoe Bat (*Rhinolophus hipposideros*)
River Shannon and River Fergus Estuaries SPA (004077)	Cormorant (*Phalacrocorax carbo*);Whooper Swan (*Cygnus cygnus*);Light-bellied Brent Goose (*Branta bernicla hrota*);Shelduck (*Tadorna tadorna*);Wigeon (*Anas penelope*);Teal (*Anas crecca*);Pintail (*Anas acuta*);Shoveler (*Anas clypeata*) ;Scaup (*Aythya marila*) ;Ringed Plover (*Charadrius hiaticula*) ;Golden Plover (*Pluvialis apricaria*) ;Grey Plover (*Pluvialis squatarola*) ;Lapwing (*Vanellus vanellus*) ;Knot (*Calidris canutus*) ;Dunlin (*Calidris alpina*) ;Black-tailed Godwit (*Limosa limosa*) ;Bar-tailed Godwit (*Limosa lapponica*) ;Curlew (*Numenius arquata*);Redshank (*Tringa totanus*) ;Greenshank (*Tringa nebularia*) ;Black-headed Gull (*Chroicocephalus ridibundus*) ;Wetland and Waterbirds
Silvermine Mountain SAC (000939)	Priority Annex I Habitats: Species-rich *Nardus* Grassland* (6230) Annex I Habitats: Northern Atlantic Wet Heath (4010)
Silvermine Mountain West SAC (002258)	Annex I Habitats: Northern Atlantic Wet Heath (4010)/European Dry Heath (4030)/Calaminarian grasslands (6130)
Slieve Bernagh Bog SAC (002312)	Priority Annex I Habitats: Blanket Bogs (* if active bog) (7130) Annex I Habitats: Northern Atlantic Wet Heath (4010)/European Dry Heath (4030)
Slievefelim to Silvermines SPA (001179)	Hen Harrier (*Circus cyaneus*)
Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (004161)	Hen Harrier (*Circus cyaneus*)
Tory Hill SAC (000439)	Priority Annex I Habitats: Orchid-rich Calcareous Grassland* (6210)/*Cladium* Fens* (7210) Annex I Habitats: Alkaline Fens (7230)

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8.2.3 PROJECT DESIGN MEASURES for European Sites

At the conception of the UWF Grid Connection, the design team evaluated the potential for significant impacts to the environment. Impacts will only take place where three components exist together; (1) the source of the impact (project), (2) the receptor of the impact (sensitive aspect) and (3) a pathway between the source and the sensitive aspect. The objective of mitigation measures is to avoid, prevent or reduce, one of the three components of an impact by choosing an alternative location, alternative design or an alternative process.

These are the Project Design Environmental Protection Measures, which are shortened to 'Project Design Measures' in this EIA Report.

The development as evaluated in the EIA Report incorporates the Project Design Measures.

The Project Design Measures outlined in Table 8-24 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **European Sites**.

Table 8-24: UWF Grid Connection Project Design Measures relevant to European Sites

PD ID	Project Design Environmental Protection Measure (PD)
PD01	All construction works will be carried out during daylight hours.
PD02	Flag-men will be used at temporary site entrances rather than creating sightlines by the removal of roadside boundaries. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a in a safe and efficient manner.
PD05	Land reinstatement will not be carried out during very wet weather or when the soil is waterlogged.
PD06	If any compaction has occurred along the construction works area, these areas will be ploughed with a sub-soiler to loosen the subsoil layer
PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted
PD09	New permanent access roads will have a permanent surface water drainage network in place which will include check dams. These check dams will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD10	Only precast concrete culverts or structures will be used at watercourse crossing locations. No batching of wet cement will take place on-site.
PD11	Instream construction works will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the affected reach. Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margin to stabilise banks, add flood protection and provide riparian buffer.
PD12	A phased approach will be undertaken in relation to watercourse crossing works, earthworks, forestry felling and excavation dewatering, where these works occur within 50m of a Class 1 or Class 2 watercourse. The phased approach will only permit one of main potential sediment producing activities, listed above, to be carried out within 50m of a Class 1 or Class 2 watercourse, at any one time.
PD13	All excavated material will be removed for temporary or permanent storage at a suitable location more than 50m away from all other Class 1 and Class 2 watercourses.
PD14	Temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.
PD15	Permanent overburden storage berms will be graded and seeded immediately after emplacement.
PD16	For works within 50m of a Class 1 or Class 2 watercourse, additional mitigation measures include double silt fencing, temporary drain blocking, placement of straw bale arrangements along

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	preferential surface water flowpaths and, where necessary, the use of matting to prevent ground erosion and rutting.
PD17	Where dewatering of trenches or excavations is required, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated prior to discharge using an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster, as appropriate.
PD18	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse
PD19	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound. All fuel will be stored in bunded, locked storage containers.
PD20	Overnight parking of plant and machinery will only be permitted at locations which are greater than 50m from watercourses and where there is an existing hard-core surface in place.
PD21	No refuelling of plant or equipment will be permitted within 100m of identified wells
PD22	In-stream works at Class 1 and Class 2 watercourses will only be undertaken during the IFI specified period (July, August and September) and will be carried out to best practice (IFI, 2016).
PD23	In-stream works will not be undertaken without isolation of flow within the watercourse, any fish within the isolated section will be removed using electrofishing and, following collection of biometrics, transferred immediately downstream of the crossing point and placed back in the water. The water will then be isolated from the works by over pumping, flume (pipe) or channel diversion methods.
PD24	All new permanent watercourse culverts will be sized to cope with a minimum 100-year flood event. All pipe culverts will be a minimum of 900mm in diameter regardless of the anticipated flood flow.
PD25	All new permanent culverts in Class 1 and Class 2 type watercourses will be bottomless or clear spanning.
PD26	If works are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory hen harrier breeding surveys will be completed, before such works initiate, such that all pre-breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary. These surveys will be completed prior to the start-up of all construction activities, until construction is complete and for 3 years thereafter. No construction works will take place within 500m of an active hen harrier breeding attempt or active nesting activity, during the breeding season (March to August).
PD27	During the hen harrier roosting season (October to February inclusive), construction works within 1000m of a roost will be limited to the period between one hour after sunrise to one hour before sunset.
PD28	Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season i.e. not during the period of March to August inclusive where possible. This includes hedgerow and scrub removal in addition to hedgerow trimming.
PD29	Confirmatory surveys for active Otter holts and activity (particularly holts at which breeding females or cubs are present) will be carried out 150m upstream and downstream of watercourse crossing locations.
PD30	All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer/outside of 1 hours after sunrise or before sunset during winter.
PD31	If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken while cubs are present in the holt and NPWS will be notified immediately
PD32	No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work, such as digging by hand or scrub clearance will not take place within 15m of such holts, except under license.
PD33	The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any possibly invasive works and declared as 'out of bounds'. Fencing will be in accordance with Clause 303 of the NRA's Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox

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	talks with site staff and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt (NRA, 2006) and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
PD45	At Mountphilips Substation, water for welfare facilities will be obtained from a Rain Water Harvesting system. Waste water will be collected in tanks and removed from site by an appropriately licensed operator, for treatment in a licensed water treatment plant. These two measures will avoid the need for a new well or mains water connection and will avoid the need to treat waste water on-site.
PD46	Mountphilips Substation will have a permanent surface water drainage network in place which will include check dams. These check dams will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD47	All Joint Bays will be located at least 25m from a Class 1 or Class 2 watercourse, with 35 no. of the total 38 no. located greater than 50m from a Class 1 or Class 2 watercourse.
PD48	Only precast concrete chambers will be used at joint bays locations. No batching of wet cement will take place on-site.
PD49	Lower River Shannon SAC: The route of the 110kV UGC is located along an existing farm track within the SAC boundary. Construction works will be confined to the existing track within the SAC boundary.
PD50	Lower River Shannon SAC: There will be no storage of overburden within the Lower River Shannon SAC
PD51	Lower River Shannon SAC: All excavated material will be removed for temporary or permanent storage at a suitable location more than 100m away from the Newport (Mulkear) River, Clare River and Bilboa River.
PD52	Lower River Shannon SAC: No in-streams works are proposed at the Newport (Mulkear) River and Bilboa River crossings (which are located within the SAC) and therefore there will be no placement of cement within the river channels. The 110kV UGC will be installed by horizontal directional drilling technique.
PD53	Lower River Shannon SAC: All runoff from the construction works areas associated with the horizontal directional drilling works at the Newport (Mulkear) River and Bilboa River (which are located within the Lower River Shannon SAC) and at the Clare River (which is located upstream of the SAC), will be directed into a suitable water treatment train such as a Siltbuster and treated for sediment. This will also mean that in the unlikely event of an oil/fuel spill or leak, any contaminated water can be contained and removed off-site.
PD54	Lower River Shannon SAC: At the Newport (Mulkear) and Bilboa River crossings, drilling activities will be carried out at least 15m from the Lower River Shannon SAC boundary. Double silt fencing will be set up between the drilling rig and the SAC boundary – the 1st silt fence close to the rig and the 2nd silt fence close to the SAC boundary. No works or activities will be conducted on the SAC side of these fences. For the Clare River (which is not in an SAC) drilling activities will be carried out at least 15m away from the river bank. Double silt fencing will be set up as before and no works or activities will be conducted on the river side of these fences.
PD55	Lower River Shannon SAC: Drilling fluid returns will be contained within a sealed tank / sump, and pumped onto a skip for removal off-site to an appropriately licenced facility.
PD56	Lower River Shannon SAC: The drilling works at the Newport (Mulkear) River and Bilboa River will not be carried out during the months of May, June or July.
PD57	Lower River Shannon SAC: There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the boundary of the Lower River Shannon SAC.
PD58	Lower River Shannon SAC: There will be no storage of fuels within 100m of the Newport (Mulkear) River, Clare River or Bilboa River.
PD62	Slievefelim to Silvermine Mountain SPA: All new permanent access roads within the SPA will be 'concealed access roads' which will be created immediately following construction works by covering the hardcore surface of the new road with a vegetated layer using the following method - firstly a geotextile material is laid on the road, covered in a layer of load bearing root-zone mix of peat and stone and then covered in turn by interlocking rigid geocells. The geocells and roadside berms (where present) will be planted with a mix of mature native Irish or Scottish heathers and grasses, with the

	mix depending on location. Where heather is being planted a depth of at least 150mm of peat will be provided. These 'concealed access roads' will provide a load bearing surface for occasional maintenance vehicles. Within the SPA, the establishment of the Concealed Access Roads will be overseen by a competent peatland ecologist and a hen harrier expert.
PD63	Slievefelim to Silvermine Mountain SPA: All temporary storage berm locations will be re-instated to the biodiversity value of the underlying habitat. Permanent berms will be immediately re-seeded with native heather and upland grass species. Harvester crossing points will be covered with topsoil and reseeded immediately as will any other temporary land-use change locations. Within the SPA, this reinstatement will be overseen by a competent peatland ecologist and a hen harrier expert, outside the SPA this reinstatement will be overseen by the Project Ecologist.
PD64	Slievefelim to Silvermine Mountain SPA: Annual visual inspections of the lands over the 110kV UGC and the testing/inspection/planned maintenance at Joint Bays, will be scheduled outside of the hen harrier breeding season, on those parts of the 110kV UGC which occurs within the boundary of the Slievefelim to Silvermines SPA.

8.2.4 EVALUATION OF IMPACTS to European Sites

As previously referenced, the likely effects of the UWF Grid Connection and then the cumulative effects of the UWF Grid Connection together with the other elements of the Whole UWF Project and together with Other Projects or Activities on European Sites are identified and evaluated in the Natura Impact Statement for Whole UWF Project Elements 1 to 5 (herein referred to as the NIS). Conceptual Site Models were used to facilitate the identification of source-pathway-receptor links, between the project and the sensitive Biodiversity receptor - European Sites and is presented in Section 4.2 of the NIS.

As a result of the Conceptual Site Model exercise, a number of effects were screened in for evaluation at Stage Two of the Appropriate Assessment reporting process, and these impacts, are evaluated in **Section 5.3 Potential Impacts on Key Species and Habitats** of the NIS. Identified possible effects (alone or in combination) on Key Habitats or Species where source pathway linkage exists to a European Site(s) include effects on Aquatic Ecology and Fisheries, Otter, and Hen Harrier.

We refer to the Natura Impact Statement for Whole UWF Project Elements 1 to 5, which is included in Volume E: Appropriate Assessment Reporting of the planning application for the UWF Grid Connection, for a full evaluation of the likely significant effects of the Whole UWF Project on European Sites under consideration.

8.2.4.1 Description and Rationale for Excluding (Scoping Out) Impacts

As a result of this Conceptual Site Model exercise, a number of effects were screened out from evaluation at Stage One of the Appropriate Assessment reporting process. We refer Section 4.2 of the NIS for detailed examination and analysis and **Section 4.3 Stage One Screening Conclusion** of the NIS.

8.2.5 Mitigation Measures for Impacts to European Sites

Environmental protection measures were incorporated into the project design (Project Design Measures), and that design was subject to examination and analysis in the NIS (see Volume E: Appropriate Assessment Reporting), following Stage 1 Screening (wherein Project Design was not considered). The examination and analysis conducted at Stage Two of the Appropriate Assessment process has concluded that, following the consideration of Project Design measures at Stage 2, in the absence of additional mitigation, significant effects are likely in respect of the Lower River Shannon cSAC.

Additional mitigation measures to be introduced in this regard (in particular, Additional Mitigation Measures AMM-01: Disturbance to or Displacement of Otter) are detailed in Section 5.3 of the NIS, along with information of the efficacy of both those additional measures and the considered Project Design in ensuring the avoidance of significant effects on the integrity of European Sites under consideration, in light of their respective Conservation Objectives.

8.2.6 Evaluation of Residual Impacts to European Sites

Potentially significant effects have been evaluated, and it is concluded that neither the UWF Grid Connection, nor the Whole UWF Project, nor any other Element of the Whole UWF Project, alone or in combination, will result in any effects that will adversely affect the integrity of the European Sites under consideration, having regard to their respective conservation objectives, in circumstances where “no reasonable scientific doubt” remains as to the absence of such adverse effects.

8.2.7 Application of Best Practice and the EMP for European Sites

Best Practice Measures (BPM), although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

The following Best Practice Measures have been developed, for the protection of **European Sites,** by the authors of this topic chapter, using industry best practice:

GC-BPM-12	Monitoring of nesting and roosting Hen Harrier (*Circus cyaneus*)
GC-BPM-16	Monitoring of non-native invasive plant species
GC-BPM-17	Best practice measures for the removal of vegetation during construction
GC-BPM-19	Disturbance to and/or displacement of nesting Common Kingfisher (*Alcedo atthis*).
GC-BPM-21	Disturbance and/or physical injury to Other Mammals
GC-BPM-22	Management of general non-native invasive species

These Best Practice Measures are included in full at the end of this topic chapter, and also form part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.2.7.1 Surface Water Management Plan

Water quality and the existing drainage regime will be managed under a Surface Water Management Plan (SWMP) which will be implemented by the appointed Contractor during the construction stage of the UWF Grid Connection.

The Surface Water Management Plan will provide the water management framework for construction works and will ensure that work is carried out with minimal impact on the surface water environment and in accordance with the Project Design and Best Practice Measures and environmental commitments made in this EIA Report.

The Surface Water Management Plan is part of the Environmental Management Plan for UWF Grid Connection, and accompanies this planning application as Volume D.

8.2.7.2 Invasive Species Management Plan

In addition to the Best Practice Measures relating to Invasive Species, an Invasive Species Management Plan has been developed to prevent the introduction and/or spread of invasive species.

The Invasive Species Management Plan includes monitoring and biosecurity measures which will inform the actions required to effectively respond to any incursions and to control existing invasive species populations. The Invasive Species Management Plan also forms part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.2.8 Summary of Impacts to European Sites

In summary it can be concluded that in light of the conservation objectives and rationale for designation of the European Sites under consideration; the potential for significant effects exists as a result of the Whole Upperchurch Windfarm Project. These potentially significant effects have been evaluated, and with the implementation of Additional Mitigation Measures AMM-01 in respect of Otter, it is concluded that neither the UWF Grid Connection, nor the Whole Upperchurch Windfarm Project, nor any other Element of the Whole UWF Project, alone or in combination, will result in any effects that will adversely affect the integrity of the European Sites under consideration, having regard to their respective conservation objectives, in circumstances where "no reasonable scientific doubt" remains as to the absence of such adverse effects.

European Sites

Sensitive Aspect

Biodiversity

Topic

8.3 Sensitive Aspect No.2: National Sites

This Section provides a description and evaluation of the Sensitive Aspect - National Sites, which relates to Irish designated sites of ecological importance and comprises both Natural Heritage Areas (NHAs) and proposed NHAs (pNHA's).

8.3.1 BASELINE CHARACTERISTICS of National Sites

8.3.1.1 STUDY AREA for National Sites

The study area for National Sites in relation to the UWF Grid Connection is described in Table 8-25 and is illustrated on Figure GC 8.3: National Sites within the UWF Grid Connection Study Area (Volume C3 EIAR Figures).

Table 8-25: UWF Grid Connection Study Area for National Sites

Study Area for National Sites	Justification for the Study Area Extents
15km from the construction works area boundary	Professional Judgement

8.3.1.2 Baseline Characteristics of National Sites in relation to UWF Grid Connection Study Area

A total of 3 NHA's and 21 No. pNHAs are found within 15km of the UWF Grid Connection. The location and spatial extent of these NHA's and pNHA's is illustrated on Figure GC 8.3: National Sites within the UWF Grid Connection Study Area (Volume C3 EIAR Figures).

The location of the NHA's in the UWF Gird Connection Study Area is described in Table 8-26, the features of interest for these sites are summarized in Table 8-27.

Table 8-26: List of NHA's within the UWF Grid Connection Study Area

Site name and code	Distance from nearest point of UWF Grid Connection
Bleanbeg Bog NHA (Site Code: 002450)	0 m The UWF Grid Connection overlaps the boundary of Bleanbeg Bog NHA in the townland of Castlewaller where the 110kV UGC will be located within an existing forestry track. The construction of the 110kV UGC does not require works in habitats for which the NHA is designated nor will it affect the hydrology of the NHA (the existing forestry track is located downslope of the bog- we refer Chapter 11 Water). No other aspects of the UWF Grid Connection works are within an NHA or pNHA boundary.
Grageen Fen and Bog NHA (Site Code: 002186)	4.9 km southwest of UWF Grid Connection
Mauherslieve Bog NHA (Site Code: 002385)	6.5 m north of UWF Grid Connection

National Sites
Sensitive Aspect

Table 8-27: Features of Interest of NHAs within the UWF Grid Connection Study Area

Site name and code	Feature of Interest
Bleanbeg Bog NHA (Site Code: 002450)	Bleanbeg Bog NHA consists primarily of upland blanket bog and is located approximately 7 km east of Newport in south Tipperary. The site is situated in the townlands of Bleanbeg, Glencroe, Fiddane and Castlewaller. It incorporates a broad plateau of upland blanket bog habitat that grades into heath, upland grassland on peaty soil, and cutover bog. The western boundary of the site is defined by the transition from intact blanket bog to cutover bog, while the northern, eastern and southern sides of the site are bounded by conifer plantation. Peatlands are the feature of interest for this site. The red data book species Red Grouse and Irish Hare have been recorded on site. A pair of Hen Harriers, also a Red Data Book species, nest within 1 km of the site and are known to forage over the site.
Grageen Fen and Bog NHA (Site Code: 002186)	Peatlands are the feature of interest for this site. The site is an example of an upland blanket bog and fen habitat.
Mauherslieve Bog NHA (Site Code: 002385)	Peatlands are the feature of interest for this site. Irish Hare have been recorded on site. Mauherslieve Bog NHA is a site of considerable conservation value featuring intact upland blanket bog. Blanket bog habitat is a globally scarce resource. It is largely confined to coastal regions at temperate latitudes with cool, wet, oceanic climates. North-west Europe contains some of the best-developed areas of blanket bog in the world.

Further detail on these sites (pNHA's), are included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.2). Appendix 8-1 can be found at Volume C4 EIAR Appendices.

8.3.1.3 Importance of National Sites

Natural Heritage Areas (NHA) are sites of national importance[7] for nature conservation established under the Wildlife (Amendment) Act, 2000, and protected under the Wildlife Acts, 1976-2000, or through planning legislation.

Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation. Prior to statutory designation, pNHA's are subject to limited protection including but not limited to, Agri-environmental schemes, Forest Service requirements (in respect of the approval of lands for forestry) and due recognition by Planning and Licensing Authorities.

8.3.1.4 Sensitivity of National Sites

Bleanbeg Bog NHA and other National Sites are sensitive to hydrological changes to groundwater and surface water quality which may affect water dependant ecosystems. Within individual Sites, specific species or features of interest may be sensitive to disturbance and/or displacement, which could reduce their conservation status. Sites are also sensitive to encroachment by invasive species and habitat loss or degradation from human activities such as turf cutting.

Further detail on designated sites is included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.2).

Topic **Biodiversity**

[7] Cited from "Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs Contribution and Observations to National Planning Framework - Ireland 2040, Our Plan Consultation Issues Paper & SEA Scoping Document" available online at http://npf.ie/wp-content/uploads/2017/09/0633-Department-of-Arts-Heritage-Regional-Rural-and-Gaeltacht-Affairs.compressed.pdf

8.3.1.5 Trends in the Baseline Environment (the 'Do-Nothing' scenario)

No trends are currently available in respect of NHA's or pNHA's. The do-nothing scenario is therefore that in the absence of the UWF Grid Connection that any existing trends would continue in respect of the features of interest which form the basis for designation.

8.3.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to National Sites, as identified above, will be the receiving environment at the time of construction (c.late 2018/2019) due to the short separation period. As longer terms trends are unavailable, it is considered that existing pressures (such as turf-cutting) are likely to continue into the operational stage; however, we note that longer term mitigating strategies such as the National Peatlands Strategy 2015 are in place, and may result in longer term positive trends.

National Sites
Sensitive Aspect

8.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

UWF Grid Connection is part of a whole project which comprises the following Other Elements; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Grid Connection is Element 1. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.

The Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in order to present the totality of the project.

NOTE: GREY Shading relates to additional information to facilitate the cumulative evaluations

8.3.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to National Sites considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 8.3.2.2.1 below.

The evaluation of cumulative impacts to National Sites also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to National Sites with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.3: Scoping of Other Projects or Activities (Section A2.3 .1 and Section A2.3. 8).

The results of this scoping exercise are that: it is evaluated that no Other Projects or Activities are likely to cause cumulative effects with either the UWF Grid Connection or the Other Elements of the Whole UWF Project, and therefore no Other Projects or Activities are scoped in for evaluation of cumulative effects to National Sites.

8.3.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements which are described in Table 8-28.

Table 8-28: Cumulative Evaluation Study Area for National Sites

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 2: UWF Related Works	15km from the boundary of construction works, afforestation lands, activity locations.	Professional Judgement
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

Topic
Biodiversity

8.3.2.2.1 Potential for Impacts to National Sites

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect National Sites. The results of this evaluation are included in Table 8-29.

The location of the Other Elements in relation to National Sites is illustrated on Figure CE 8.3: National Sites within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures). The Features of Interest for these sites are described in Section 8.3.2.4.

Table 8-29: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Evaluated as excluded: No potential for effects 4 No. NHA sites and 17 No. pNHA sites are located within 15km of the UWF Related Works. The NHA sites include: Bleanbeg Bog NHA, Mauherslieve Bog NHA, Grageen Fen and Bog NHA, and Gortacullin Bog NHA. It is evaluated that there is no potential for effects to these NHAs, or to the pNHAs within 15km or their Features of Interest due to: • The UWF Related Works will not overlap any NHA or pNHA boundary, Mauherslieve Bog NHA is the closest NHA site, located 4.3km to the west. • There is no potential for impacts to the Features of Interest of the National Sites due to distance and absence of any ecological connectivity, or source pathway links for hydrological effects (as evaluated in Chapter 11: Water, Section 11.7).
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects 2 No. NHA sites and 9 No. pNHA sites are located within 15km of the UWF Replacement Forestry. The NHA sites include: Bleanbeg Bog NHA and Mauherslieve Bog NHA. Mauherslieve Bog NHA is the closest NHA site, located 6.1km to the west of the UWF Replacement Forestry. It is evaluated that there is no potential for effects to these NHAs, or to the pNHAs within 15km or their Features of Interest due to: • The UWF Replacement Forestry will not overlap any NHA or pNHA boundary, Mauherslieve Bog NHA is the closest NHA site, located 6.1km to the west. • There is no potential for impacts to the Features of Interest of the National Sites due to distance and absence of any ecological connectivity, or source pathway links for hydrological effects (as evaluated in Chapter 11: Water, Section 11.7).
Element 4: Upperchurch Windfarm (UWF)	Evaluated as excluded: No potential for effects Similar to the UWF Related Works, the Upperchurch Windfarm is within 15km of the Bleanbeg Bog NHA, Mauherslieve Bog NHA), Grageen Fen and Bog NHA and Gortacullin Bog NHA. It is evaluated that there is no potential for effects to these NHAs, or to the pNHAs within 15km or their Features of Interest due to: • The Upperchurch Windfarm will not overlap any NHA or pNHA boundary, Mauherslieve Bog NHA is the closest NHA site, located over 4km to the west, • There is no potential for impacts to the Features of Interest of the National Sites due to distance and absence of any ecological connectivity, or source pathway links for hydrological effects (as evaluated in Chapter 11: Water, Section 11.7).
Element 5: UWF Other Activities	Evaluated as excluded: Neutral effects/No potential for effects: 8 No. NHA sites are and 60 No. pNHA sites are located within 15km of the UWF Other Activities. The NHA sites include: Bleanbeg Bog NHA, Grageen Fen and Bog NHA, Mauherslieve Bog NHA, Woodcock Hill Bog NHA, Moyreen Bog NHA, Carrigkerry Bogs NHA, Scohaboy Bog NHA and Gortacullin Bog NHA. Mauherslieve Bog NHA is the

	closest NHA site, located 4.8km to the northwest of the closest location of UWF Other Activities. UWF Other Activities overlap a single pNHA (Inner Shannon Estuary – South Shore) where Haul Route Activities will involve street furniture removal and replacement on existing roadway roundabouts along the N69 (Dock Road, Limerick). Neutral effects are likely to this pNHA due the location of the activity within the public road corridor and the absence of drainage or excavation works. No potential for effects to any NHA or pNHA caused by other activities due the absence of construction excavations or drainage works and the separation distances to sites.

8.3.2.3 Cumulative Information: Baseline Characteristics – Context

Figure CE 8.3: National Sites within the Cumulative Evaluation Study Area illustrates the locations of all NHA's and pNHA's within 15km of the other elements of the Whole UWF Project.

8.3.2.3.1 Element 2: UWF Related Works

Not applicable – This Element has been evaluated as excluded, see Section 8.3.2.2.1.

8.3.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – This Element has been evaluated as excluded, see Section 8.3.2.2.1.

8.3.2.3.3 Element 4: Upperchurch Windfarm

Not applicable – This Element has been evaluated as excluded, see Section 8.3.2.2.1.

8.3.2.3.4 Element 5: UWF Other Activities

Not applicable – This Element has been evaluated as excluded, see Section 8.3.2.2.1.

8.3.2.3.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 8.3.2.1.

8.3.2.4 Cumulative Information: Baseline Characteristics – Character

The features of interest of the NHA sites within 15km of the Elements of the Whole UWF Project are described in Table 8-30.

Table 8-30: Features of Interest in respect of National Sites within 15km of the Whole UWF Project

Site name and code	Feature of Interest
Bleanbeg Bog NHA (Site Code: 002450)	Bleanbeg Bog NHA consists primarily of upland blanket bog and is located approximately 7 km east of Newport in south Tipperary. The site is situated in the townlands of Bleanbeg, Glencroe, Fiddane and Castlewaller. It incorporates a broad plateau of upland blanket bog habitat that grades into heath, upland grassland on peaty soil, and cutover bog. The western boundary of the site is defined by the transition from intact blanket bog to cutover bog, while the northern, eastern and southern sides of the site are bounded by conifer plantation. Peatlands are the feature of interest for this site. The red data book species Red Grouse and Irish Hare have been recorded on site. A pair of Hen Harriers, also a Red Data Book species, nest within 1 km of the site and are known to forage over the site.
Grageen Fen and Bog NHA (Site Code: 002186)	Peatlands are the feature of interest for this site. The site is an example of an upland blanket bog and fen habitat.
Mauherslieve Bog NHA (Site Code: 002385)	Peatlands are the feature of interest for this site. Irish Hare have been recorded on site. Mauherslieve Bog NHA is a site of considerable conservation value featuring intact upland blanket bog. Blanket bog habitat is a globally scarce resource. It is largely confined to coastal regions at temperate latitudes with cool, wet, oceanic climates. North-west Europe contains some of the best-developed areas of blanket bog in the world.
Woodcock Hill Bog NHA (Site Code: 002402)	Peatlands are the feature of interest for this site. This site is an area of upland blanket bog and wet heath.
Moyreen Bog NHA (Site Code: 002361)	Peatlands are the feature of interest for this site. This site is a good example of lowland blanket bog. Red Grouse and Common Frog have been recorded on the site.
Carrigkerry Bogs NHA (Site Code: 002399)	Peatlands are the feature of interest for the site. Irish Hare and Red Grouse are plentiful. Also occurring are Snipe, Meadow Pipit and Fox Moth
Scohaboy Bog NHA (Site Code: 000937)	Peatlands are the feature of interest for this site. The site is a large raised bog. The Irish Red Data Book species Bird Cherry (Prunus padus) has been recorded from the site (in the past).
Gortacullin Bog NHA (Site Code: 002401)	Peatlands are the feature of interest for the site. The site contains a mosaic of upland bog and wet heath. Red Grouse has been recorded on the site.

8.3.3 PROJECT DESIGN MEASURES for National Sites

At the conception of the UWF Grid Connection, the design team evaluated the potential for significant impacts to the environment. Impacts will only take place where three components exist together; (1) the source of the impact (project), (2) the receptor of the impact (sensitive aspect) and (3) a pathway between the source and the sensitive aspect. The objective of mitigation measures is to avoid, prevent or reduce, one of the three components of an impact by choosing an alternative location, alternative design or an alternative process.

Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the development – these are the Project Design Environmental Protection Measures, which are shortened to 'Project Design Measures' in this EIA Report.

The development as evaluated in the EIA Report incorporates the Project Design Measures.

The Project Design Measures outlined in Table 8-31 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **National Sites**.

Table 8-31: UWF Grid Connection Project Design Measures relevant to National Sites

PD ID	Project Design Environmental Protection Measure (PD)
PD10	Only precast concrete culverts or structures will be used at watercourse crossing locations. No batching of wet cement will take place on-site.
PD19	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound. All fuel will be stored in bunded, locked storage containers.
PD24	All new permanent watercourse culverts will be sized to cope with a minimum 100-year flood event. All pipe culverts will be a minimum of 900mm in diameter regardless of the anticipated flood flow.
PD59	Bleanbeg Bog NHA: The route within Bleanbeg Bog NHA is along an existing forestry track. There will be no excavation of blanket bog
PD60	Bleanbeg Bog NHA: There will be no storage of overburden within the Bleanbeg Bog NHA boundary.
PD61	Bleanbeg Bog NHA: There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the boundary of the Bleanbeg Bog NHA.

8.3.4 EVALUATION OF IMPACTS to National Sites

In this Section, the likely direct and indirect effects of the UWF Grid Connection are identified and evaluated. Cumulative effects with Other Elements are not relevant, as all Other Elements have been evaluated as excluded in Section 8.3.2.2.1.

A conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) - National Sites.

As a result of the exercise, **no impacts were included for evaluation**

Table 8-32: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
No Impacts were Included	*Reduction in habitats for which site is designated, (construction stage)*
	Blanket Bog habitat degradation from Surface water and groundwater quality effects resulting from leakages and spillage of oils, fuels and chemicals, (construction stage)
	Blanket Bog Habitat degradation as a result of Water Level Impacts from Excavations and Groundworks, (construction stage)
	Blanket Bog Habitat degradation resulting from Surface and Groundwater Contamination, (construction stage)
	Disturbance to species utilising the site, (construction stage)
	Operational Stage Impacts
	Decommissioning Impacts

The source-pathway-receptor links and the rationale for excluded impacts are described in **Section 8.3.4.1**.

8.3.4.1 Description and Rationale for Excluded Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-33 below.

Table 8-33: Description and Rationale for Excluded Impacts to National Sites

Key: 1: UWF Grid Connection; 2: UWF Related Works; 3: UWF Replacement Forestry; 4: Upperchurch Windfarm; 5: UWF Other Activities

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Excavation works	1	Landcover	Reduction in habitats for which site is designated	Rationale for Excluding: No potential for impact No direct loss of habitat for which the site is designated
Oils, Fuels and Chemicals	1	Surface water and Groundwater Flowpaths	Blanket Bog habitat degradation from Surface water and groundwater quality effects resulting from leakages and spillage of oils, fuels and chemicals	Rationale for Excluding: Neutral impact Cross factor effects via habitat degradation are scoped out as: The route of the UWF Grid Connection through the NHA does not intersect blanket bog as it uses an existing forestry track on the verge of the bog. Therefore, there will be no excavation of peat or crossing overland on peat. Also, there will be no refuelling of vehicles or plant permitted within the NHA (Project Design Measure). Any small leaks would be limited to a short section of mineral subsoils underneath the existing access track. The access road exists downslope (down-gradient) of the bog and therefore there can be no surface water or groundwater flow from the works area towards the bog. The overall effects (if any) on the NHA will be Neutral.
Excavation works	1	Surface water and Groundwater Flowpaths	Blanket Bog Habitat degradation as a result of Water Level Impacts from Excavations and Groundworks	Rationale for Excluding: No potential for impacts Cross factor effects via habitat degradation are scoped out as: The route of the UWF Grid Connection through the NHA does not intersect blanket bog as it uses an existing forestry track on the verge of the bog. (Therefore, there will be no excavation of peat). In addition, no groundwater inflows were recorded within the mineral subsoil in any of the trial pits (3 no.) undertaken along the route of the grid connection110kV UGC within the NHA (the trial pits were undertaken in March 2017 when conditions were seasonally wettest and a low groundwater table would not be expected at this time) and therefore there is no potential for increased groundwater drainage under the bog as a result of the temporary open trench. There was also no evidence of a potentially higher groundwater table in the mineral subsoils below the route within the NHA either. There will be no requirement for dewatering of the cable trench within the NHA. Due to the lack of groundwater

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				seepage noted in the trial holes adjacent to the NHA and the absence of a groundwater table, there will be no potential for the temporary trench to act as a preferential flow path for groundwater flow. Also, the trench will be backfilled after the works are complete and there will be no alteration of surface water or groundwater drainage within the NHA.
Cement Based Compounds	1	Soils Subsoil and Bedrock pore space	Blanket Bog Habitat degradation resulting from Surface and Groundwater Contamination	Rationale for Excluding: Neutral impact Cross factor effects via habitat degradation are scoped out as: The route of the UWF Grid Connection through the NHA does not intersect blanket bog as it uses an existing forestry track on the verge of the bog. Therefore, there will be no excavation of peat or placement of cement within peat. The will be no contamination of blanket bog by cement as the proposed works is downslope of the bog and within mineral subsoil. Contact with the cement will be limited to a short section of mineral subsoils underneath the existing access track. The access road exists downslope (down-gradient) of the bog and therefore there can be no indirect effects as a result of contaminated surface water runoff or groundwater flow towards the bog) Only a temporary (and reversible) increase in the pH of the subsoil in direct contact with the cement is likely to occur. The cement will also not come in contact with groundwater as no groundwater table was found during the excavation of the 3 no. trial pits within the NHA. The effects, which will be localised to the cable trench will only persist until after the cement mix has hardened and the residual high alkalinity leachate flushed out / diluted by rainfall. The trench will be backfilled with natural material and therefore there will be no exposed cement material. The overall effects on the NHA will be Neutral
Noise and Human Activity	1	Air and Visibility	Disturbance to species utilising the site	Rationale for Excluding: Neutral effects predicted as: The scale of the machinery involved in the works is relatively minor and will comprise primarily of a tracked excavator to dig the trench where the cable will be laid. Levels of noise are not expected to be sufficient to disturb species within the NHA, will be located off the bog, of short duration, and reversible.

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Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Excavation works	1	Landcover	**Mauherslieve Bog NHA** - Reduction in habitats for which site is designated	Rationale for Excluding: No potential for impact No habitats for which the site is designated will be reduced nor will the extent of the NHA be reduced
Excavation works	1	Surface Water Groundwater	**Mauherslieve Bog NHA** - Habitat degradation resulting from Water Quality effects	Rationale for Excluding: No potential for cross factor impacts, as the NHA is upslope of construction works areas, therefore no impacts via surface water or groundwater are possible.
All other identified NHAs and pNHA's				Rationale for Excluding: No potential for impacts No direct or indirect impact on identified NHAs or pNHAs due to distance and absence of any ecological connectivity or source pathway links.
Operational Stage				
Operational Stage Impacts on Bleanbeg Bog NHA				Rationale for Excluding: No potential for impacts No works associated with the UWF Grid Connection are expected to take place within the NHA boundary, any infrequent operational maintenance will be carried out at joint bays, which are all located within existing or new access roads, outside of the NHA boundary, will not require any excavation of peat or any works within the NHA, and any works will be downslope of the Bleanbeg Bog NHA and Mauherslieve Bog NHA, therefore no impacts via surface water or groundwater are possible.
Decommissioning Stage				
The UWF Grid Connection will not be decommissioned; therefore there is no potential for this project to cause any effect on Bleanbeg Bog NHA.				

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8.3.5 Mitigation Measures for Impacts to National Sites

Mitigation measures were incorporated into the UWF Grid Connection project design including the Project Design Measures. No additional mitigation measures are required as **no potential for impacts or Neutral impacts** are concluded by the topic authors as likely to occur to National Sites as a consequence of the UWF Grid Connection.

8.3.6 Evaluation of Residual Impacts to National Sites

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Description and Rationale for Excluded Impacts to National Sites in Section 8.3.4.1, i.e. **no potential for impact/Neutral impact**.

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8.3.7 Application of Best Practice and the EMP for National Sites

Best Practice Measures (BPM), although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

The following Best Practice Measures have been developed, for the protection of **National Sites,** by the authors of this topic chapter, using industry best practice:

GC-BPM-12	Monitoring of nesting and roosting Hen Harrier (*Circus cyaneus*)
GC-BPM-16	Monitoring of non-native invasive plant species
GC-BPM-21	Disturbance and/or physical injury to Other Mammals
GC-BPM-22	Management of general non-native invasive species
GC-BPM-23	Best practice methods to ensure the protection of common frog (*Rana temporaria*) and smooth newt (*Triturus (Lissotriton) vulgaris*).
GC-BPM-24	Best practice methods to ensure the protection of Viviparous lizard (*Lacerta (Zootoca) vivipara*)

These Best Practice Measures are included in full at the end of this topic chapter, and also form part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.3.7.1 Invasive Species Management Plan

In addition to the Best Practice Measures relating to Invasive Species, an Invasive Species Management Plan has been developed to prevent the introduction and/or spread of the invasive species.

The Invasive Species Management Plan includes monitoring and biosecurity measures which will inform the actions required to effectively respond to any incursions and to control existing invasive species populations. The Invasive Species Management Plan also forms part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.3.7.2 Surface Water Management Plan

Water quality and the existing drainage regime will be managed under a Surface Water Management Plan (SWMP) which will be implemented by the appointed Contractor during the construction stage of the UWF Grid Connection.

The Surface Water Management Plan will provide the water management framework for construction works and will ensure that work is carried out with minimal impact on the surface water environment and in accordance with the Project Design and Best Practice Measures and environmental commitments made in this EIA Report.

The Surface Water Management Plan is part of the Environmental Management Plan for UWF Grid Connection, and accompanies this planning application as Volume D.

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8.3.8 Summary of Impacts to National Sites

No impacts to National Sites are concluded by the topic authors as likely to occur.

Table 8-34: Summary of the impacts to National Sites

Impact to Bleanbeg Bog NHA:	**No Impact**
Evaluation Impact Table	*Section 8.3.4.1*
Project Life-Cycle Stage	Construction/Operation
UWF Grid Connection	**No Potential for Impacts / Neutral Impacts**
Element 2: UWF Related Works	No Potential for Impacts
Element 3: UWF Replacement Forestry	No Potential for Impacts
Element 4: Upperchurch Windfarm	No Potential for Impacts
Element 5: UWF Other Activities	No Potential for Impacts
CUMULATIVE IMPACTS:	
All Elements of the Whole UWF Project	No Potential for Cumulative Impacts

The greyed out boxes in the above summary table relate to the cumulative information for the Other Elements of the Whole UWF Project, which are included to show the totality of the project.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to National Sites with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.3.2.1).

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8.4 Sensitive Aspect No.3: Aquatic Habitats & Species

This Section provides a description and evaluation of the Sensitive Aspect - Aquatic Habitats & Species.

8.4.1 BASELINE CHARACTERISTICS of Aquatic Habitats & Species

8.4.1.1 STUDY AREA for Aquatic Habitats & Species

The study area for Aquatic Habitats & Species in relation to the UWF Grid Connection is described in Table 8-35 and illustrated on Figure GC 8.4: Aquatic Habitats & Species within the UWF Grid Connection Study Area-Overview map and Maps 1 – 5 (Volume C3 EIAR Figures).

Table 8-35: UWF Grid Connection Study Area for Aquatic Habitats & Species

Study Area for Aquatic Habitats & Species	Justification for the Study Area Extents
Watercourse Crossing Locations	As per Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Scheme, NRA, (2008)

8.4.1.2 Baseline Context and Character of Aquatic Habitats & Species in the UWF Grid Connection Study Area

In respect of aquatic habitats and aquatic species, the existing environment comprises surface water bodies and their affected sub-catchment areas within the upper reaches of tributaries draining to the River Shannon and River Suir regional catchments.

90 no. watercourses flow through the construction works area boundary associated with the UWF Grid Connection. The majority of the watercourses which occur within the UWF Grid Connection Study Area are located in the River Shannon regional catchment (W1 to W63, and W66 to W90), with just 2 No. watercourses located in the River Suir regional catchment (W64 and W65).

There are three main watercourses along the route of the 110kV UGC, all of which are within the Mulkear sub-catchment; the Newport (Mulkear) River (W10) itself, the Clare River (W36) and the Bilboa River (W57). At the proposed crossing locations all three watercourses are evaluated as containing good salmonid habitat, with good/high biological water quality and good ecological status.

The Newport (Mulkear) River (W10), Clare River (W36) and Bilboa River (W57), which flow through the study area, were generally 4 to 6 metres wide. The smaller Munnia River (W7), Reardnogy Beg River (W43 and W44) are c.1-2m wide, and the remaining Class 1 or Class 2 watercourses were generally shallow fast flowing streams which ranged between 0.5m and 2m wide.

All watercourse crossing locations were subject to a site visit by an aquatic ecologist and surveyed to evaluate fisheries habitat suitability, riparian and instream habitat and potential for protected aquatic species. In summary the majority of watercourse crossings for all project elements are minor streams and land drains, which have been subject to previous anthropogenic modification (arterial drainage, drainage maintenance, channel modification, abstractions, diversions, etc.). This has resulted in the reduction of ecological status and fisheries potential in the majority of cases. A number of watercourse crossing points are heavily poached by cattle and in poor condition due to effluent run-off.

A summary of the results of the field surveys for the UWF Grid Connection is included in Table 8-36.

Watercourse crossing locations, watercourse classifications and the boundary of various sub-catchments are identified on Figure GC 8.4: Aquatic Habitats & Species within the UWF Grid Connection Study Area.

Table 8-36: Summary of Watercourses within the UWF Grid Connection Study Area

Class	Watercourse Description	Watercourse Crossing ID	Total No. of Water-courses	Total With In-Stream Works
Class 1	EPA mapped blue line, major river or stream (fisheries value)	W7, W8, **W10**, W11, W12, W27, W32, **W36**, W42, W47, W48, W55, **W57**, W61 W66, W67, W74, W76, W84, W89,	20	9
Class 2	Headwater Stream Equivalent to EPA blue line but not mapped (fisheries value)	W1, W3, W4, W13, W38, W46, W50, W54, W56, W70, W72, W73, W75, W90	14	6
Class 3	Sub-optimal, heavily vegetated with low or no flow during dry periods (low fisheries value)	W2, W6, W35, W49, W62 W83, W85, W86, W87, W88	10	4
Class 4	Drain (no fisheries value)	W5, W9, W14, W15, W16, W17, W18, W19, W20, W21, W22, W23, W24, W25, W26, W28, W29, W30, W31, W33, W34, W37, W39, W40, W41, W43, W44, W45, W51, W52, W53, W58, W59, W60, W63, W64, W65, W68, W69, W71, W77, W78, W79, W80, W81, W82	46	19
	Total		**90**	**38**

Further details on the site visits and the fisheries appraisals for each watercourse are included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.4). Appendix 8-1 can be found in Volume C4 EIAR Appendices.

8.4.1.3 Importance of Aquatic Habitats & Species

As above, there are three major rivers which will be crossed by the UWF Grid Connection, all of which are within the Mulkear River sub-catchment of the River Shannon. At the crossing locations, the Newport (Mulkear) River and the Bilboa River are designated within the Lower River Shannon SAC. The Clare (Annagh) River crossing is located approximately 13 km upstream of the Lower River Shannon SAC designation on this watercourse. This designation terminates directly downstream of the impassable falls which creates a migratory barrier for Atlantic Salmon and Sea lamprey. Although these three rivers are not listed as Salmonid Waters under Schedule 1 of the S.I. No. 293/1988, all are designated within the Lower River Shannon SAC within the wider study area and support nationally important Atlantic salmon (within the passable reaches) and resident Brown trout populations. Furthermore, all three watercourses comprise internationally important habitat for additional water-dependant Annex II species. The Bilboa and the Mulkear Rivers are part of the Lower River Shannon SAC and are therefore of International Importance. The Clare River at the crossing point is evaluated as being of National Importance, taking account of the salmonid fisheries value (resident Brown trout); in addition to its connectivity to the Lower River Shannon downstream; and with cognisance of the water-dependant habitats and species it supports. Minor watercourses within the UWF Grid Connection study area which were identified as having fisheries potential are evaluated as being of local importance (higher value), whilst those watercourses and drains with no fisheries value are evaluated as being of local importance (lower value).

8.4.1.4 Sensitivity of Aquatic Habitats & Species

Aquatic ecological receptors, including fisheries, are dependent on prevailing good to high water quality conditions; this includes the chemical water quality character, as well as sediment and nutrient loadings within the affected streams. Both aquatic macroinvertebrates (Freshwater pearl mussel, White-clawed crayfish and pollution sensitive lotic communities generally) and fish communities are sensitive to suspended solids loading (turbidity), as well as the associated effects of siltation within the river channel. Siltation and turbidity have negative implications for fish and invertebrates due to physical damage and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels and mortality impacts for salmonid eggs (affecting recruitment) and invertebrate life stages within gravel substrates (interstitial spaces). Suspended solids may be mobilised downstream and affect reaches remote from the source of the suspended solids. Furthermore, fish populations and macroinvertebrate communities may be sensitive to vibration affecting the aquatic environment, arising during construction activities such as drilling.

8.4.1.5 Trends in the Baseline Environment (the 'Do-Nothing' scenario)

The UWF Grid Connection and the other elements of the Whole UWF Project are located in the Mulkear River catchment of the River Shannon, the Clodiagh (Tipperary) catchment and to a lesser degree the Multeen catchment of the River Suir. Both the Mulkear and Clodiagh river catchments were classified as 'catch and release' by IFI in 2017 (Salmon Angling Regulations: Management of the Wild Salmon Fishery 2017) for the conservation of Atlantic Salmon stocks, indicating the ongoing pressures on the salmon populations in these catchments. There is an ongoing and persistent decline in Atlantic Salmon stocks in Irish freshwaters overall, pertaining specifically to the European Sites which list this species as a qualifying interest (NPWS, 2013). Pressures and threats affecting the freshwater habitat of salmon correlate directly to those pressures affecting other aquatic ecological interests including lamprey species, aquatic invertebrates and other salmonids (siltation; channelization; drainage maintenance; invasive species and disease vectors; and direct/diffuse pollution from agriculture, forestry and direct discharges). Please refer to Chapter 11 – Water for details of trends relating to water quality and as such, also aquatic habitats and species, in summary the WFD status of watercourses within the Mulkear, Bilboa and Multeen catchments are evaluated as 'Not at Risk', while the WFD status of the Clodiagh is 'At Risk' due to morphological pressures arising from channelization.

8.4.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to Aquatic Habitats & Species, as identified above, will be the receiving environment at the time of construction, on the basis of the relative stability of the pertinent aquatic ecological receptors (identified in long-term trends) in the catchments under consideration herein. Identified trends will overlap the operational phase of the elements under consideration.

8.4.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

UWF Grid Connection is part of a whole project which comprises the following Other Elements; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Grid Connection is Element 1. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.

The Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in order to present the totality of the project.

NOTE: GREY Shading relates to additional information to facilitate the cumulative evaluations

8.4.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Aquatic Habitats & Species considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 8.4.2.2.1 below.

The evaluation of cumulative impacts to Aquatic Habitats & Species also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Aquatic Habitats & Species with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.3: Scoping of Other Projects or Activities (Section A2.3 .1 and Section A2.3. 8).

The results of this scoping exercise are that: Bunkimalta Windfarm and Newport Distributor Road (both consented) have been scoped in for evaluation of cumulative effects to Aquatic Habitats & Species.

8.4.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements and Other Projects or Activities.

The Cumulative Evaluation Study Area, comprises two different areas - one extent for cumulative evaluation of all of the Elements of the Whole UWF Project and a second extent for the cumulative evaluation of Other Projects or Activities, see Table 8-37.

Table 8-37: Cumulative Evaluation Study Area for Aquatic Habitats & Species

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 2: UWF Related Works	Watercourse Crossing Locations	As per Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Scheme, NRA, (2008)
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Other Projects or Activities: Bunkimalta Windfarm Newport Distributor Road	The regional Mulkear River catchment The regional Clodiagh River catchment	The location of the Whole UWF Project drains into both the Mulkear River catchment and the Clodiagh River catchment. Due to the vast scale of the catchments into which the Mulkear and Clodiagh rivers drain (River Shannon catchment and the River Suir catchment respectively), Neutral cumulative effects are likely in the broader River Shannon and River Suir catchments.

8.4.2.2.1 Potential for Impacts to Aquatic Habitats & Species

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Aquatic Habitats & Species. The results of this evaluation are included in Table 8-38.

The location of, and study area boundary associated with, the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure CE 8.4: Aquatic Habitats & Species within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-38: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects: The UWF Replacement Forestry is located within the Clodiagh (Tipperary) River sub-catchment of the River Suir regional catchment. One Class 1 stream flows through the UWF Replacement Forestry lands. Environmental protection measures which form part of the design of the UWF Replacement Forestry include planting by hand, no use of pesticide or fertilizer, no refuelling or storage of fuels onsite, a 10m water setback are, and the planting and management of the site in accordance with best practice. • Neutral habitat deterioration impacts arising from the UWF Replacement Forestry, as there is no requirement for instream works and no sources of significant sediment creation as planting will be carried out by hand. • Neutral disturbance or displacement effects, as there is no requirement for in-stream works, and due to the scale of the works with planting being carried out by hand without the use of machines, and low levels of maintenance associated with the growth stage. • There is no potential for habitat quality impacts, as the riparian strips/grassland adjacent to the existing watercourse will be maintained as part of the forestry layout as a water quality protection measure. • There is no potential for the planting works to spread invasive species, as there are no instream works required. • There is no potential for aquatic habitat degradation due to nitrogen deposition, as the new forestry will be a permanent native woodland, therefore no tree-felling/harvesting will be carried out. • There is no potential for acidification effects during the growth stage, as the UWF Replacement Forestry will be deciduous in nature. • There is no risk of pollution events as herbicide or fertilizers will not be used and the use of machinery will be minimal.

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	• There is no risk of aquatic habitat degradation (as a result of nitrogen deposition) as commercial tree felling will not be required – UWF Replacement Forestry will be a permanent native woodland.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: no potential for adverse effects: The UWF Other Activities are located in both the River Suir regional catchment and the River Shannon regional catchment. There are no watercourse crossing works required for the UWF Other Activities. • There is no potential for habitat effects as there are no instream works or sediment creating activities adjacent to watercourses required as a result of UWF Other Activities (including Overhead Line Activities, Haul Route Activities, and the Upperchurch Hen Harrier Scheme). • No potential for disturbance effects due to the small scale of activities and no activities within the riparian corridor of Class 1 or Class 2 watercourses. The Upperchurch Hen harrier Scheme will include planting of 1.4km of woody scrub species along riparian corridors and fencing of watercourse corridors to prevent access to the watercourses by livestock, which will enhance the quality of riparian habitats. • No potential for impacts to aquatic habitat quality arising from the spread of invasive species, as there are no instream works or activities adjacent to watercourses required as a result of UWF Other Activities. • No potential for impacts to aquatic habitats due to tree felling, as no tree felling of conifer plantations is required.
Other Projects or Activities	
Bunkimalta Windfarm Newport Distributor Road	Yes, included for the evaluation of cumulative effects relating to decreases in instream habitat quality. Excluded from evaluation of cumulative effects in relation to the following impacts- changes in flow regime, disturbance/displacement and riparian habitat degradation, as any cumulative effects will be Neutral.

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8.4.2.3 Cumulative Information: Baseline Characteristics – Context & Character

In respect of aquatic habitats and aquatic species, the existing environment comprises surface water bodies and their affected sub-catchment areas within the upper reaches of tributaries draining to the River Shannon and River Suir regional catchments.

8.4.2.3.1 Element 2: UWF Related Works

The majority of the footprint of the UWF Related Works is located within the River Suir regional catchment – mainly in the Clodiagh (Tipperary) River sub-catchment, with the remainder within the Turraheen River (Multeen East) and Owenbeg River sub-catchments. A small proportion of the footprint of the UWF Related Works is located in the Bilboa River sub-catchment of the River Shannon. UWF Related Works will involve 32 no. watercourse crossings. UWF Related Works WW23 and UWF Grid Connection W63 are crossing point of the same watercourse.

Table 8-39: Summary of Watercourses within the UWF Related Works Study Area

Class	Watercourse Description	Watercourse Crossing ID	Total No.	Total With In-Stream Works
Class 1	EPA mapped blue line, major river or stream (fisheries value)	WW19	1	1
Class 2	Headwater Stream Equivalent to EPA blue line but not mapped (fisheries value)	WW2, WW4, WW7, WW22, WW28,	5	4
Class 3	Sub-optimal, heavily vegetated with low or no flow during dry periods (low fisheries value)	WW14, WW18,	2	2
Class 4	Drain (no fisheries value)	WW1, WW3, WW5, WW6, WW8, WW9, WW10, WW11, WW12, WW13, WW15, WW16, WW17, WW20, WW21, WW23, WW24, WW25, WW26, WW27, WW29, WW30, WW31, WW32	24	18
	Total		**32**	**25**

Note: UWF Grid Connection W63 and UWF Related Works WW23 are both crossings of one watercourse at one location.

Watercourse crossing locations, watercourse classifications and the boundary of various sub-catchments are identified on Figure RW 8.4: Aquatic Habitats & Species within the UWF Related Works Study Area. Figure RW 8.4 is part of the EIA Report for the UWF Related Works, and is included in Volume F: Reference Documents with this planning application.

Further details on the site visits and the fisheries appraisals for each watercourse are included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.4). Appendix 8-1 can be found in Volume C4 EIAR Appendices.

8.4.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 8.4.2.2.1.

8.4.2.3.3 Element 4: Upperchurch Windfarm

The area of the Upperchurch Windfarm is predominantly situated in the River Suir regional catchment (Clodiagh (Tipperary) River and Multeen River sub-catchments). The remaining proportion of the footprint of the Upperchurch Windfarm is located in the Bilboa River sub-catchment of the River Shannon. As per the EIS 2013, the Upperchurch Windfarm involves 1 no. watercourse crossings, this watercourse is included in Table 8-39 as WW2 (Class 1).

8.4.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 8.4.2.2.1.

8.4.2.3.5 Other Projects or Activities: Bunkimalta Windfarm & Newport Distributor Road

Bunkimalta Windfarm is located in the River Shannon regional catchment area, with 5 turbines located in the Clare River catchment and the remaining 11 turbines located in the Newport River (Mulkear) catchment. The construction of the consented windfarm will involve both instream works and works in close proximity to watercourses.

Newport Distributor Road is located within the Newport River catchment, c.150m from the Newport River and also located upstream of the Lower River Shannon SAC. No instream works are planned as part of this road development.

8.4.3 PROJECT DESIGN MEASURES for Aquatic Habitats & Species

At the conception of the UWF Grid Connection, the design team evaluated the potential for significant impacts to the environment. Impacts will only take place where three components exist together; (1) the source of the impact (project), (2) the receptor of the impact (sensitive aspect) and (3) a pathway between the source and the sensitive aspect. The objective of mitigation measures is to avoid, prevent or reduce, one of the three components of an impact by choosing an alternative location, alternative design or an alternative process.

Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the development – these are the Project Design Environmental Protection Measures, which are shortened to 'Project Design Measures' in this EIA Report.

The development as evaluated in the EIA Report incorporates the Project Design Measures.

The Project Design Measures outlined in Table 8-40 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Aquatic Habitats & Species**.

Table 8-40: UWF Grid Connection Project Design Measures relevant to Aquatic Habitats & Species

PD ID	Project Design Environmental Protection Measure (PD)
PD01	All construction works will be carried out during daylight hours.
PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted
PD09	New permanent access roads will have a permanent surface water drainage network in place which will include check dams. These check dams will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD10	Only precast concrete culverts or structures will be used at watercourse crossing locations. No batching of wet cement will take place on-site.
PD11	Instream construction works will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the affected reach. Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margin to stabilise banks, add flood protection and provide riparian buffer.
PD12	A phased approach will be undertaken in relation to watercourse crossing works, earthworks, forestry felling and excavation dewatering, where these works occur within 50m of a Class 1 or Class 2 watercourse. The phased approach will only permit one of main potential sediment producing activities, listed above, to be carried out within 50m of a Class 1 or Class 2 watercourse, at any one time.
PD13	All excavated material will be removed for temporary or permanent storage at a suitable location more than 50m away from all other Class 1 and Class 2 watercourses.
PD14	Temporary silt control methods such as silt fencing or containment berms will be placed around all overburden storage areas.
PD15	Permanent overburden storage berms will be graded and seeded immediately after emplacement.
PD16	For works within 50m of a Class 1 or Class 2 watercourse, additional mitigation measures include double silt fencing, temporary drain blocking, placement of straw bale arrangements along preferential surface water flowpaths and, where necessary, the use of matting to prevent ground erosion and rutting.
PD17	Where dewatering of trenches or excavations is required, there will be no direct discharge of treated water into any watercourse or drain. Rather all pumped water will be treated prior to discharge using an infiltration trench or settlement pond or suitable water treatment train such as a Siltbuster, as appropriate.
PD18	There will be no refuelling of vehicles or plant permitted within 100m of a watercourse

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PD19	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound. All fuel will be stored in bunded, locked storage containers.
PD20	Overnight parking of plant and machinery will only be permitted at locations which are greater than 50m from watercourses and where there is an existing hard-core surface in place.
PD21	No refuelling of plant or equipment will be permitted within 100m of identified wells
PD22	In-stream works at Class 1 and Class 2 watercourses will only be undertaken during the IFI specified period (July, August and September) and will be carried out to best practice (IFI, 2016).
PD23	In-stream works will not be undertaken without isolation of flow within the watercourse, any fish within the isolated section will be removed using electrofishing and, following collection of biometrics, transferred immediately downstream of the crossing point and placed back in the water. The water will then be isolated from the works by over pumping, flume (pipe) or channel diversion methods.
PD24	All new permanent watercourse culverts will be sized to cope with a minimum 100-year flood event. All pipe culverts will be a minimum of 900mm in diameter regardless of the anticipated flood flow.
PD25	All new permanent culverts in Class 1 and Class 2 type watercourses will be bottomless or clear spanning.
PD29	Confirmatory surveys for active Otter holts and activity (particularly holts at which breeding females or cubs are present) will be carried out 150m upstream and downstream of watercourse crossing locations.
PD30	All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer/outside of 1 hours after sunrise or before sunset during winter.
PD31	If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken *while cubs are present in the holt* and NPWS will be notified immediately
PD32	No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work, such as digging by hand or scrub clearance will not take place within 15m of such holts, except under license.
PD33	The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any possibly invasive works and declared as 'out of bounds'. Fencing will be in accordance with Clause 303 of the NRA's Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt (NRA, 2006) and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
PD46	Mountphilips Substation will have a permanent surface water drainage network in place which will include check dams. These check dams will settle suspended solids in water runoff while also slowing down the rate of water run-off from these areas.
PD47	All Joint Bays will be located at least 25m from a Class 1 or Class 2 watercourse, with 35 no. of the total 38 no. located greater than 50m from a Class 1 or Class 2 watercourse.
PD48	Only precast concrete chambers will be used at joint bays locations. No batching of wet cement will take place on-site.
PD49	Lower River Shannon SAC: The route of the 110kV UGC is located along an existing farm track within the SAC boundary. Construction works will be confined to the existing track within the SAC boundary.
PD50	Lower River Shannon SAC: There will be no storage of overburden within the Lower River Shannon SAC
PD51	Lower River Shannon SAC: All excavated material will be removed for temporary or permanent storage at a suitable location more than 100m away from the Newport (Mulkear) River, Clare River and Bilboa River.
PD52	Lower River Shannon SAC: No in-streams works are proposed at the Newport (Mulkear) River and Bilboa River crossings (which are located within the SAC) and therefore there will be no placement of cement within the river channels. The 110kV UGC will be installed by horizontal directional drilling technique.
PD53	Lower River Shannon SAC: All runoff from the construction works areas associated with the horizontal directional drilling works at the Newport (Mulkear) River and Bilboa River (which are located within the Lower River Shannon SAC) and at the Clare River (which is located upstream of the SAC), will be directed

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	into a suitable water treatment train such as a Siltbuster and treated for sediment. This will also mean that in the unlikely event of an oil/fuel spill or leak, any contaminated water can be contained and removed off-site.
PD54	Lower River Shannon SAC: At the Newport (Mulkear) and Bilboa River crossings, drilling activities will be carried out at least 15m from the Lower River Shannon SAC boundary. Double silt fencing will be set up between the drilling rig and the SAC boundary – the 1st silt fence close to the rig and the 2nd silt fence close to the SAC boundary. No works or activities will be conducted on the SAC side of these fences. For the Clare River (which is not in an SAC) drilling activities will be carried out at least 15m away from the river bank. Double silt fencing will be set up as before and no works or activities will be conducted on the river side of these fences.
PD55	Lower River Shannon SAC: Drilling fluid returns will be contained within a sealed tank / sump, and pumped onto a skip for removal off-site to an appropriately licenced facility.
PD56	Lower River Shannon SAC: The drilling works at the Newport (Mulkear) River and Bilboa River will not be carried out during the months of May, June or July.
PD57	Lower River Shannon SAC: There will be no refuelling of vehicles or plant, no storage of fuels and no overnight parking permitted within the boundary of the Lower River Shannon SAC.
PD58	Lower River Shannon SAC: There will be no storage of fuels within 100m of the Newport (Mulkear) River, Clare River or Bilboa River.

Cumulative Information: Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the fundamental design of the UWF Related Works, UWF Replacement Forestry and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in Appendices 5.3, 5.4 and 5.5, in Volume C4: EIAR Appendices.

8.4.4 EVALUATION OF IMPACTS to Aquatic Habitats & Species

In this Section, the likely direct and indirect effects of the UWF Grid Connection are identified and evaluated. Then the likely cumulative effects of the UWF Grid Connection together with the Other Elements of the Whole UWF Project and Other Projects or Activities are identified and evaluated.

A conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) - Aquatic Habitats & Species.

As a result of the exercise, some impacts were included and some were excluded.

Table 8-41: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Decrease in instream aquatic habitat quality, (construction stage)	*Aquatic Habitat Degradation (as a result of increased nitrogen deposition) such as temporary oxygen shortages (construction stage)*
Changes to flow regime, (construction stage)	*Decommissioning Stage Effects*
Disturbance/displacement to fish and aquatic species, (construction stage)	
Riparian habitat degradation, (construction stage)	
Spread of aquatic invasive species, (construction stage)	

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 8.4.4.1 to 8.4.4.5.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, in Section 8.4.4.6.

8.4.4.1 Impact Evaluation Table: Decrease in instream aquatic habitat quality

Impact Description:	
Project Life Cycle Stage:	Construction stage

Impact Source: Instream works; Movement of soils and machinery; Excavation works; Forestry felling; Hydrocarbons; Reinstatement

Cumulative Impact Source: Instream works; Movement of soils and machinery; Excavation works; Forestry felling; Hydrocarbons; Reinstatement; Earthworks and Groundwork

Impact Pathway: Soils; Surface water, Runoff and surface water, Flowpaths

Impact Description: Aquatic habitat relates to the instream features supporting aquatic biodiversity (bed substrate, morphology, water quality, etc.). Watercourses are highly sensitive to change, containing sensitive aquatic ecological receptors including salmonids, lamprey species, and a diverse macroinvertebrate community. Instream works at some watercourses will require direct excavation of the banks and bed of the watercourse, which can change the physical character of the watercourse and has the potential to degrade the quality of the baseline habitat which supports the structure, function and diversity of aquatic species. Although erosion and deposition are natural process in watercourses[8], varying naturally throughout the year, additional sediment contributions entering the watercourse, such as from construction works adjacent to or upstream of individual watercourses, can have negative implications for fish and invertebrates due to physical damage and reduced feeding/foraging, as well as negative impacts due to compaction of spawning gravels and mortality impacts for salmonid eggs (affecting recruitment) and invertebrate life stages within gravel substrates (interstitial spaces). These impacts may be mobilised downstream and affect river reaches at a distance from the physical works. In addition, water quality effects due to contamination by fuels, oils or cementitious material has the potential to lead to direct toxicity events, or sub-lethal degradation of aquatic habitat quality.

Impact Quality: Negative

Evaluation the Subject Development Impact – Decrease in instream aquatic habitat quality

Element 1: UWF Grid Connection

General Impact Magnitude: Of the 90 No. watercourse crossings along the Grid Connection, 34 No. have been evaluated to have fisheries value. Of these 34 No. watercourses, 15 No. will be subject to instream works (the remaining crossings are over existing crossing structures which do not require any works and cables will be installed either under or over the structure).
The effect on the physical instream habitat i.e. watercourse channel morphology, substrate, and flow character due to instream works has been evaluated as a Slight to Moderate adverse impact on availability, diversity and quality of habitat supporting aquatic species. This in line with the impact magnitude evaluation presented for instream works in Chapter 11 Water (Moderate impact taking account of instream works).

Specifically in relation to the Clare River (see cumulative impacts with other Projects below): Approximately 7km of the 110kV UGC exists within the Clare River catchment. Effects on surface water are likely to arise mainly from trench excavation works and watercourse crossings in-stream works. There are 47 no. watercourse crossings (including haulage routes) within the Clare River catchment (W24-W49 and W67-W89).
Specifically in relation to the Newport River (see cumulative impacts with other Projects below): Approximately 8.7km of the 110kV UGC exists within the Newport River catchment (and Small River catchment) including the Mountphilips Substation site. Effects on surface water are likely to arise mainly from trench excavation, watercourse crossings in-stream works and overburden storage. There are 24 No. watercourse crossings (including haulage routes) within the Newport (and Small River) River catchment (W1-W23 and W66).

Significance of the Impact: Slight to moderate in the local context**, Slight** in the Clare River catchment**, Slight** in the Newport River catchment**.**

[8] EPA Ireland; Managing the Impact of Fine Sediment on River Ecosystems,

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Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (we refer to outline OCM's as provided in Appendix 5.1 of the EIA Report for UWF Grid Connection). This will be completed by over pumping, flume (pipe) or channel diversion methods;
- There will be no direct discharge of pumped water into the watercourse during the works (we refer to outline OCM's as provided in Appendix 5.1 of the EIA Report for UWF Grid Connection);
- The spatial extent of effects to the watercourse channel will occur within the footprint of the instream works,
- The frequency of such an event is once of for cables trenches with or without new permanent culverts and twice for temporary culverts (once for installation and once for removal),and;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat.
- Impacts to the watercourse channel are temporary and reversible with reinstatement. The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible.

Clare River catchment:

- The majority of the watercourse crossings (32 of 47 no.) within the catchment are drains (Class 3 and Class 4 Watercourse) and therefore the potential for downstream water quality effects is much less due to their low or absent flows;
- Watercourse crossings at Class 1 and Class 2 watercourses will only be completed between the IFI permitted season of July to September (Project Design Measure);
- It's likely only between 100 – 200m of the trench will be excavated in any day with only 1 – 2 watercourse crossings being completed in any one day (assumed 1 -2 work crews); and,
- The short-term, temporary nature of the works within the catchment;
- All effects will be brief to temporary in nature and reversible

Newport River catchment

- The majority of the watercourse crossings within the Small River catchment are drains (Class 4);
- The majority of the watercourse crossings within the Newport River catchment are streams (Class 1 and Class 2 Watercourse) and therefore works will only be completed between the IFI permitted season of May and September (Project Design Measure);
- It's likely only between 200 – 300m of the trench will be excavated in any day with only 2 – 3 watercourse crossings being completed in any one day (assumed 2 – 3 work crews);
- All effects will be brief to temporary in nature and reversible.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

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Impact Magnitude: There are 32 no. watercourse crossings required by the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works and in-stream works will be required at 25 no. of these locations. 26 no. of the total 32 no. crossings are located within the Clodiagh River catchment, 5 no. in the Owenbeg catchment and 1 no. in the Bilboa catchment. Of these crossings, which will be subject to instream works, a potential decrease in fisheries habitat quality is identified at 5 No. watercourse crossings evaluated as having fisheries value. The spatial extent of such effects will occur within the footprint of the instream works, and also downstream within the zone of sediment transport.

The effect on the physical instream habitat i.e. watercourse channel morphology, substrate, and flow character due to instream works has been evaluated as a Slight to Moderate adverse impact on availability, diversity and

quality of habitat supporting aquatic species. This in line with the impact magnitude evaluation presented for instream works in Chapter 11 Water (taking account of instream works).

Significance of the Impact: Imperceptible to Moderate in the local context

Rationale for Impact Evaluation:
- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required (5 No.) are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (we refer to outline OCM's as provided in Appendix 5.1 of the EIA Report for UWF Related Works). This will be completed by over pumping, flume (pipe) or channel diversion methods;
- There will be no direct discharge of pumped water into the watercourse during the works (we refer to outline OCM's as provided in Appendix 5.1 of the EIA Report for UWF Related Works);
- The spatial extent of effects to the watercourse channel is limited to the footprint of the instream works, and;
- The duration of the impact is limited to the specific works period within or adjacent to the aquatic habitat, and
- Impacts to the watercourse channel are temporary and reversible with reinstatement.
- The duration of any reductions in the quality of downstream habitats due to siltation are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary to short-term and not reversible.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.4.2.2.1.*

Element 4: Upperchurch Windfarm

Impact Magnitude: There is 1 no. watercourse crossing within the Upperchurch Windfarm Site, evaluated as having fisheries value (Class 1, WW2). This watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works. Baseline conditions indicated that the aquatic species were present year-round, and impacts were evaluated as being of high magnitude for aquatic species. However, it was identified that significant impacts were not probable/likely post-mitigation. The 2013 EIS concludes that water quality effects will not be significant

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:
- A clear-span bridge will be used where a natural stream (Class 1 watercourse) will be crossed and therefore no in-stream works are required;
- All effects were evaluated as reversible and temporary in the short-term and impacts were associated with construction phase works.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 8.4.2.2.1.*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Consented Bunkimalta Windfarm

Impact Magnitude: Clare River catchment: 5 no. of the 16 no. consented Bunkimalta Windfarm turbines are located within the Clare River catchment.
Newport River catchment: 11 no. of the 16 no. consented Bunkimalta Windfarm turbines are located within the Newport River catchment

Significance of the Impact: Not Significant residual effect

Rationale for Impact Evaluation: As per Bunkimalta WF EIS (2013)
- Construction activities will be at least a minimum of 50m where possible;
- A Sediment Control Plan will be put in place during the construction phase to control runoff.

Other Project: Newport Distributor Road

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Impact Magnitude: Newport River catchment: Localised work adjacent to the Newport River downstream of Newport town. Road development includes surface water drainage system and attenuation tanks, and will be connected into existing sewers.

Significance of the Impact: No impact

Rationale for Impact Evaluation:
- As per planning conditions surface water controls will be in place

Evaluation of Cumulative Impacts – Decrease in instream aquatic habitat quality

All Elements of the Whole UWF Project

Cumulative Impact Magnitude: A potential decrease in aquatic habitat quality is identified at **20 No**. watercourse crossings where instream works are required within watercourses evaluated as having fisheries value. The spatial extent of such effects will occur within the footprint of the instream works, dispersed between two regional catchments and within several local sub-catchments. Impact range is located downstream within the zone of sediment transport.

Significance of the Cumulative Impact: Imperceptible to moderate in the local context

Rationale for Cumulative Impact Evaluation:
- The watercourse crossing works required for the 110kV UGC are largely located within the River Shannon catchment while the watercourse crossings required for the Upperchurch Windfarm and UWF Related Works are largely located in the River Suir surface water catchment;
- The presence of sensitive salmonid fish habitat within the works area and protected Annex II (and Annex IV listed) species within the affected catchments downstream.
- The spatial extent of effects to watercourse channels will occur within the footprint of the instream works, and;
- The frequency and duration is limited to the specific works period within or adjacent to the aquatic habitat.
- Impacts at the works site are temporary; however, downstream siltation effects are short-term, not reversible.

All Elements of the Whole UWF Project with Other Projects or Activities

Cumulative Impact Magnitude:
In relation to cumulative effects within the Clare River catchment; Approximately 7km of the 110kV UGC exists within the Clare River catchment and 5 no. of the 16 no. consented Bunkimalta Windfarm turbines are located within the Clare River catchment.
In relation to cumulative effects within the Newport River catchment; Approximately 8.7km of the 110kV UGC exists within the Newport River catchment including the Mountphilips Substation site, along with 11 no. of the 16 no. consented Bunkimalta Windfarm turbines and the consented Newport Distributor Road.

Significance of the Cumulative Impact: Slight for the Clare River catchment, and Slight to Moderate for the Newport River catchment.

Rationale for Cumulative Impact Evaluation:

Clare River:
- The relatively small number of the Bunkimalta Windfarm turbines within the Clare River catchment;
- The relatively large surface water catchment area of the Clare River – 71km^2;
- The short-term temporary nature of the 110kV UGC works within the Clare River catchment.

Newport River
- The relatively small scale of the 110kV UGC works within the Newport River catchment (8.7km of temporary access roads);
- No watercourse crossings are proposed for the Newport Distributor Road;
- The large surface water catchment area of the Newport River and Small River catchment – 126km^2;
- The relatively large upstream distance of the Bunkimalta Windfarm site (~10km) from the 110kV works;
- The temporary and short-term nature of the proposed 110kV UGC works within the Newport River catchment;
- Sediment Control Plans will be in place at the Bunkimalta Windfarm

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8.4.4.2 Impact Evaluation Table: Changes to Flow Regime

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Sediment; Instream works; Machinery movement;
Cumulative Impact Source: Instream works; Machinery movement;
Impact Pathway: Surface water; Land cover

Impact Description: Watercourse morphology relates to the shape of a watercourse channel, its bed and banks and how erosion, transportation of water, sedimentation and the composition of riparian vegetation changes this shape over time. As per Section 11.2.4.1 of Chapter 11: Water, direct impacts are identified to channel morphology and geomorphology (bed and banks of watercourses) due to instream works and sediment deposition. Aquatic species, which are likely to be present in fishery value watercourses at instream construction works locations, are reliant on instream habitat heterogeneity (riffle/glide/pool structure); along with the availability of peak flow flushes (flood/spate); the provision of flows for upstream/downstream migration (impassable barriers); and avoidance of channel constriction during low flow. Any change in watercourse morphology which affects channel flow regimes can result in cross factor effects on aquatic ecological communities, which are likely to be present in fishery value watercourses at instream construction works locations, These communities are reliant on instream habitat heterogeneity (riffle/glide/pool structure); along with the availability of peak flow flushes (flood/spate); the provision of flows for upstream/downstream migration (impassable barriers); and avoidance of channel constriction during low flow.
Instream works are limited to the individual crossing points and include trenching works for underground cables, installation of temporary or permanent crossing structures and reinstatement works.

The reinstatement works will maintain the channel morphology, in line with IFI (2016) and will include site-specific bank stabilisation measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels where necessary; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles.
The creation of adverse flow conditions or habitat limitations due to changes to flow or morphology will be limited to the specific works period within or adjacent to the aquatic habitat.
Project Design Measures include the use of culverts at all new permanent watercourse crossings which will be a minimum of 900mm in diameter and will be bottomless or clear spanning on all Class 1 and Class 2 type watercourse and the use of reinstatement of the banks and beds at crossing locations. In addition in-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure).

Impact Quality: Negative

Evaluation the Subject Development Impact – Changes to Flow Regime
Element 1: UWF Grid Connection

Impact Magnitude:
Construction works will require crossings of 34 No. watercourses with fisheries value ((i.e. Class 1 or Class 2 watercourses); however, of these, instream works in watercourses with fisheries value will take place at 15 No. watercourse crossing locations, 9 of these crossings relate to temporary trenching works and/or the installation of a temporary crossing structure, while 6 No. relate to the installation of permanent crossing structures.

At the 9 no. crossing points, changes to the flow regime will be brief to temporary and for the duration of the immediate works. Any temporary alteration to flows or morphology will be reversible and will be subject to seasonal constraints during sensitive aquatic species life stages (Project Design Measure).

At the 6 no. new permanent crossing points, changes to the flow regime will be long-term and permanent; alteration to flow morphology will be subject to Project Design Measures including the reinstatement of watercourses at crossing locations.

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Sensitive Aspect

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are mostly small headwater streams;
- The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);
- The limited extent of direct instream works potentially affecting flow, and the sensitive crossing designs to be implemented following consultation with IFI.
- The brief to temporary duration and reversibility of any effects.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:

Construction works will take place in close proximity to 6 No. watercourses with fisheries value ((i.e. Class 1 or Class 2 watercourses). Instream works in watercourses with fisheries value will take place at 5 No. watercourse crossing locations, 3 of these crossings relate to temporary trenching works and/or the installation of a temporary crossing structure, while 2 No. relate to cable trenching and the installation of permanent crossing structures.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are mostly small headwater streams;
- The majority of the watercourses have been in some way altered by the existing landuse (i.e. forestry or agriculture);
- The limited extent of direct instream works potentially affecting flow, and the sensitive crossing designs to be implemented in consultation with IFI.
- The brief to temporary duration and reversibility of any effects.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.4.2.2.1.*

Element 4: Upperchurch Windfarm

Impact Magnitude:

Construction works will take place in close proximity to 1 No. watercourses with fisheries value. No instream works are required at this location and this watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- No instream works are required on the watercourse crossing within the Upperchurch Windfarm site
- Implementation of the Sediment & Erosion Control Plan

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 8.4.2.2.1.*

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Evaluation of Cumulative Impacts – Changes to Flow Regime
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: A potential decrease in aquatic habitat (via changes to flow regime) is identified at **20 No**. watercourse crossings where instream works are required within watercourses evaluated as having fisheries value. The spatial extent of such effects will occur within the footprint of the instream works, dispersed between two regional catchments and within several local sub-catchments.
Significance of the Cumulative Impact: Slight
Rationale for Cumulative Impact Evaluation: • Instream works potentially affecting the flow regime are required at a limited number of locations; the majority of which require temporary works and a smaller sub-set require permanent instream structures. • Implementation of Project Design Measures at all stream crossing and instream works locations to minimize effects • Implementation of the sensitive crossing designs to be implemented in consultation with IFI. Provision of reinstatement works including: site-specific bank stabilization measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels where necessary; and reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles.

Note: There is no cumulative evaluation of Other Projects or Activities included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 8.4.2.2.1).

8.4.4.3 Impact Evaluation Table: Disturbance or Displacement

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Instream works; Operating machinery; Excavation works; Noise and human disturbance; Drilling; Reinstatement

Cumulative Impact Source: Operating machinery; Excavation works; Noise and human disturbance; Reinstatement

Impact Pathway: Surface water; Direct contact; Ground and air vibrations

Impact Description: Instream works and machinery operation within or in close proximity to any watercourse has the potential to directly disturb or displace salmonid fish and aquatic species within fish-bearing streams, or sensitive aquatic receptors such as white-clawed crayfish. Fish are likely to mobilise outside of their territories due to human disturbance, but will return once the disturbance effect diminishes. Aquatic invertebrates are less sensitive to disturbance and displacement arising from human activity and are scoped out from evaluation of disturbance/displacement effects. The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of any instream works within watercourses which support anadromous Atlantic salmon and resident Brown trout populations – i.e. Class 1 or Class 2 watercourses. Disturbance or displacement effects will be brief to temporary in nature, lasting for the duration of works at or in close proximity to Class 1 or Class 2 watercourses.

Impact Quality: Negative

Evaluation the Subject Development Impact – Disturbance or Displacement

Element 1: UWF Grid Connection

Impact Magnitude:
Of the 90 No. watercourse crossings within the UWF Grid Connection construction works area boundary, 34 No. have been evaluated to have fisheries value.

Of these 34 No. watercourses, 15 No. will be subject to instream works and 3 no. will be subject to drilling activities, any fish present are likely to be affected for between 1 – 2 days at instream works locations and c.1 week at drilling locations. The frequency of these disturbance effects is once of for drilling activities, once for cables trenches with or without new permanent culverts and twice for temporary culverts (once for installation and once for removal).

The remaining crossings are over existing crossing structures which do not require any works and cables will be installed either under or over the structure, disturbance effects at this locations are Imperceptible.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September;
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);;
- There will be no direct discharge of pumped water into the watercourse during the works (we refer to outline OCM's as provided Appendix 5.1 of the EIA Report for UWF Grid Connection);
- The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of any instream works within watercourses which support anadromous Atlantic salmon and

resident Brown trout populations. Additional disturbance effects will occur at the three river crossings, where the 110kV UGC will be installed using drilling techniques, where disturbance effects within the watercourse channel will be limited to the spatial extent of drilling activities.

- The frequency of disturbance will be singular in the case of half of the locations
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
Of the 32 No. watercourse crossings within the UWF Related Works construction works area boundary, 6 No. have been evaluated to have fisheries value. Of these 6 No. watercourses, 5 No. will be subject to instream works (the remaining 1 no. crossing WW2 will use a clear span structure with no requirement for instream works). Any fish present are likely to be affected for between 1 – 2 days during instream works. The frequency of these disturbance effects is once for half of the locations (cables trenches with or without new permanent culverts) and twice for the remaining locations (temporary culverts (once for installation and once for removal)).

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure);
- The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure);
- The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure);
- There will be no direct discharge of pumped water into the watercourse during the works (Project Design Measure);
- The singular frequency of any disturbance events at the half of the locations, and;
- The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.4.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude: None:
1 No. watercourse with fisheries value occurs within the footprint of the Upperchurch Windfarm site. This watercourse will be crossed using a clear span bridge, which will avoid the requirement for instream works. Disturbance effects are limited to the construction works for the new bridge along with the subsequent use of the new bridge throughout the construction period.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The Upperchurch Windfarm impacts were evaluated as being of high magnitude for aquatic species; however, it was identified that significant impacts were not probable/likely post-mitigation. A clear-span bridge will be used where a natural stream (Class 1 watercourse) will be crossed and therefore no in-stream works are required; disturbance will be limited to the immediate works area.

Aquatic Habitats & Species

Sensitive Aspect

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 8.4.2.2.1*
Evaluation of Cumulative Impacts – Disturbance or Displacement
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: Direct disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the footprint of any instream works and directly upstream and downstream of all crossings, temporary and permanent instream works structures and bank-side works. The watercourse crossings are dispersed between two regional catchments and within several local sub-catchments. In total there are **20 No.** instream works locations where crossings of fish-bearing streams are required, all of which will be sensitive to disturbance. However, at the local level in the context of individual receptors, temporary displacement will be limited to the affected stretch of watercourse, without cumulative population-level impacts at a watercourse or catchment level. Additional disturbance effects within the watercourse channel will be limited to the spatial extent of drilling vibrations, trenching and ducting activities.
Significance of the Cumulative Impact: Slight
Rationale for Impact Evaluation: • In-stream works will only be undertaken during the IFI specified period (July – September) for the Class 1 and Class 2 watercourses to avoid sensitive salmonid instream migration and spawning periods (Project Design Measure); • The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September (Project Design Measure); • The in-stream works will not be undertaken without isolation of flow within the watercourse prior to the in-stream works commencing (Project Design Measure); • There will be no direct discharge of pumped water into the watercourse during the works (Project Design Measure); • The singular frequency of any disturbance events at the half of the locations, and; • The duration of any disturbance impacts are considered with regard to fish species, protected Annex II aquatic invertebrates, and macroinvertebrate communities which support fish populations; such effects are evaluated to be temporary and reversible.

Note: There is no cumulative evaluation of Other Projects or Activities included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 8.4.2.2.1).

Biodiversity

Topic

8.4.4.4 Impact Evaluation Table: Riparian habitat degradation

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Movement of soils and machinery; Excavation works; Forestry felling; Reinstatement
Cumulative Impact Source: Instream works; Movement of soils and machinery; Excavation works; Forestry felling; Reinstatement
Impact Pathway: Soils; Direct contact

Impact Description: The riparian corridor along a watercourse relates to the interface between the aquatic habitat, the bankside vegetation and terrestrial environment. An intact, semi-natural riparian zone has significant beneficial services in the protection of instream aquatic habitat quality, food/nutrient contributions, and temperature regulation. Existing riparian habitat quality within the study area is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works.

The removal of, or damage to, riparian vegetation during instream works or excavation/ground clearance works in close proximity to any watercourse has the potential to impact on the quality of riparian habitats which in turn can affect watercourse morphology, shading, bank stability, and nutrient and sediment loading and result in indirect effects on aquatic species.
Project design: following works at or in close proximity to watercourses (Class 1 or Class 2), reinstatement works will be carried out which will include site-specific bank stabilisation measures using boulder armour or willow/brush bank protection; reinstatement of bank slope and character; creation of compound channels where necessary; and replanting of riparian buffer zones with suitable native species to manage flood flows and buffer run-off.
Impact Quality: Negative

Evaluation the Subject Development Impact – Riparian habitat degradation

Element 1: UWF Grid Connection

Impact Magnitude: From a total of 90 No. watercourse crossings within the construction works area boundary associated with the UWF Grid Connection, riparian habitat will be affected at **34 No**. watercourse crossings identified as having fisheries value within the UWF Grid Connection construction works area boundary. The effect on the riparian and bankside habitat will be greatest at instream works locations (15 No.).
The duration of any loss of well-structured riparian habitat impacts is evaluated with regard to the direct aquatic habitat services provided by the riparian zone (bank stabilization and erosion control, shading and temperature regulation), as well as the indirect inputs such as habitat for invertebrate food for fish and aquatic biota, reduction in light for aquatic flora, flood control and buffering effects in relation to run-off. Riparian habitat impacts will reversible with reinstatement and will be temporary to short-term, limited to the construction phase and early operational stage until vegetation has re-established.

Significance of the Impact: Slight to Moderate

Rationale for Impact Evaluation:

- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations at watercourse crossing locations within minor watercourses;
- The general context of the watercourses affected comprises managed agricultural lands and open uplands with poorly-developed riparian habitat, where well-developed riparian habitat occurs it comprises willow species which regenerate quickly;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at stream crossing locations; alternatives to riparian clearance are not available.

Aquatic Habitats & Species

Sensitive Aspect

- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
Riparian habitat will be affected at **6 No**. watercourse crossings identified as having fisheries value, out of a total of 32 watercourse crossings within the construction works area boundary associated with the UWF Related Works.
The duration of any loss of well-structured riparian habitat impacts is evaluated with regard to the direct aquatic habitat services provided by the riparian zone (bank stabilization and erosion control, shading and temperature regulation), as well as the indirect inputs such as habitat for invertebrate food for fish and aquatic biota, reduction in light for aquatic flora, flood control and buffering effects in relation to run-off. Riparian habitat impacts will reversible with reinstatement and will be temporary to short-term, limited to the construction phase and early operational stage until vegetation has re-established.

Significance of the Impact: Slight to Moderate

Rationale for Impact Evaluation:
- Riparian habitat impacts that may affect aquatic ecology and fisheries receptors are limited to discrete locations at watercourse crossing locations within minor watercourses;
- The general context of the watercourses affected comprises managed agricultural lands and open uplands with poorly-developed riparian habitat, where well-developed riparian habitat occurs it comprises willow species which regenerate quickly;
- Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible;
- Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at stream crossing locations; alternatives to riparian clearance are not available.
- Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.4.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:
As per the 2013 EIS, **1 No**. watercourse with fisheries value will be crossed. The crossing method will use using a clear span bridge design, which will avoid the requirement for instream works; however, works within the riparian zone will be required.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:
- No requirement for instream works on fisheries value watercourses
- Limited scale of works within the riparian corridor at the 1 no. stream crossing
- All effects were evaluated as reversible and temporary in the short-term;
- Riparian habitats within the Upperchurch Windfarm which are directly affected by construction works were not identified as being of significant conservation value.

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 8.4.2.2.1*

Biodiversity

Topic

Evaluation of Cumulative Impacts – Riparian habitat degradation
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: Riparian habitat will be affected at **40 No**. watercourse crossings identified as having fisheries value (one watercourse, WW2 associated with both the UWF Related Works and the Upperchurch Windfarm). The effect on the riparian and bankside habitat with implications for the structure and function of the habitat services with regard to aquatic ecological receptors has been evaluated as a Slight to Moderate adverse. This in line with the impact magnitude evaluation presented for instream works in Chapter 11 Water. The spatial extent of such effects will occur within the footprint of the instream works, with the potential for direct impacts at the approach to watercourse crossing works areas.
Significance of the Cumulative Impact: Slight to Moderate
Rationale for Cumulative Impact Evaluation: • The watercourse crossing works required for the 110kV UGC are largely located within the River Shannon catchment while the watercourse crossings required for the Upperchurch Windfarm and UWF Related Works are largely located in the River Suir surface water catchment; • The limited extent of instream works, within defined works areas will reduce the potential spatial area. • The Class 1 and Class 2 watercourses where in-stream works are required are largely small headwater streams and therefore are likely to have relatively low flows during July to September; • Existing riparian habitat quality within the works areas is subject to afforestation and agricultural management, including clearance works, drainage maintenance and channelization works. • Riparian habitat impacts will be limited to the construction phase, reversible, temporary and short-term and in line with baseline conditions. Bank works are required at stream crossing locations; alternatives to riparian clearance are not available • The duration of the impact is evaluated with regard to the aquatic habitat services and buffering effects provided by riparian habitats at each discrete works location. Such impacts are limited to the specific works location and do not interact with riparian habitat communities within the watercourse as a whole, or at a catchment level, in view of cumulative or synergistic project effects. Riparian habitat impacts are once-off, restricted to the period of works within or adjacent to the aquatic habitat and are thus not subject to sequential project effects. • Riparian habitat impacts are to be managed with project reinstatement measures (Project Design Measures) and is therefore reversible; • Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.

Note: There is no cumulative evaluation of Other Projects or Activities included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 8.4.2.2.1).

8.4.4.5 Impact Evaluation Table: Spread of Aquatic Invasive Species

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Instream works; Excavation works
Cumulative Impact Source: Instream works; Excavation works
Impact Pathway: Surface water; Movement of soils and machinery

Impact Description: Invasive aquatic species include non-native, invasive flora and also fish and invertebrate fauna. Aquatic invasive species may be introduced to unaffected catchments or spread within infected watercourses during the course of instream works or transported via excavation material by site machinery. Aquatic invasive species have the potential for significant ecosystem disturbance, disrupting the predator/prey balance or affecting significant habitat disruption within aquatic systems. The spread of aquatic invasive species is not restricted in extent to the footprint of construction/instream works, but can be transported both upstream and downstream within a watercourse, potentially extending throughout the catchment.

Impact Quality: Negative

Evaluation the Subject Development Impact – Spread of Aquatic Invasive Species

Element 1: UWF Grid Connection

Impact Magnitude:
There is the potential for introduction of non-native, invasive aquatic species at all **90 No**. watercourse crossings associated with the grid connection works.

Significance of the Impact: Slight to Moderate

Rationale for Impact Evaluation:

- The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, spread of aquatic invasive species is evaluated as non-reversible.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
There is the potential for introduction of non-native, invasive aquatic species at all **32 No**. watercourse crossings associated with the UWF Related Works.

Significance of the Impact: Slight to Moderate

Rationale for Impact Evaluation:

- The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication.
- In this respect, the spread of aquatic invasive species is evaluated as non-reversible.

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.4.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:
There is the potential for introduction of non-native, invasive aquatic species at the **1 No**. watercourse crossing associated with the Upperchurch Windfarm works.

Significance of the Impact: Slight to Moderate
Rationale for Impact Evaluation: • The Upperchurch Windfarm impacts were evaluated as being of high magnitude for aquatic species, in the absence of mitigation. However, it was identified that significant impacts were not probable/likely. • Baseline conditions indicated that the aquatic species were present year-round and impacts were associated with construction phase works. • All effects were evaluated as reversible and temporary in the short-term; however, in the case of potential spread of aquatic invasive species, there is the potential for long-term, irreversible impacts
Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 8.4.2.2.1*
Evaluation of Cumulative Impacts – Spread of Aquatic Invasive Species
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: There is the potential for introduction of non-native, invasive aquatic species at the **121 No**. stream crossing associated with the Upperchurch Windfarm works (1 no. occur on both the UWF Related Works and the Upperchurch Windfarm and 1 no. occurs on both the UWF Related Works and the UWF Grid).
Significance of the Cumulative Impact: Slight to moderate
Rationale for Cumulative Impact Evaluation: • The spread of aquatic invasive species is not restricted in extent to the footprint of the works, but can be transported both upstream and downstream within a watercourse. There is the potential for catchment-wide impacts once an introduction has occurred. The incidence of a single, once-off introduction can have lasting, long-term ecosystem effects which can persist beyond any control measures for eradication. • In this respect, the spread of aquatic invasive species are evaluated as non-reversible

Note: There is no cumulative evaluation of Other Projects or Activities included in the table above, because all of the Other Projects or Activities were evaluated as excluded from this particular impact table (see Section 8.4.2.2.1).

8.4.4.6 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-42 below.

Table 8-42: Description and Rationale for Excluded Impacts to Aquatic Habitats & Species

Key: 1: UWF Grid Connection; 2: UWF Related Works; 3: UWF Replacement Forestry; 4: Upperchurch Windfarm; 5: UWF Other Activities

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Storage of Brash	1,2,4	Nitrogen Deposition	Aquatic Habitat Degradation (as a result of increased nitrogen deposition) such as temporary oxygen shortages.	Rationale for Excluding: The scale of tree-felling is insufficient to result in additive nitrogen deposition effects – any effects will be Neutral.
Operational Stage				
Rationale for Excluding: Access routes and permanent watercourse crossing structures will be in place. Operational Works will be minimal, with no works to watercourse crossing structures expected.				
Decommissioning Stage				
Rationale for Excluding: UWF Related Works, Upperchurch Windfarm - Access routes and permanent watercourse crossing structures will be in place. Works will be subject to best practice management measures. UWF Grid Connection will not be decommissioned.				

8.4.5 Mitigation Measures for Impacts to Aquatic Habitats & Species

Mitigation measures were incorporated into the project design including the Project Design Measures. No additional mitigation measures are required as **no significant adverse impacts** are concluded by the topic authors as likely to occur to Aquatic Habitats & Species as a consequence of the UWF Grid Connection.

8.4.6 Evaluation of Residual Impacts to Aquatic Habitats & Species

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Aquatic Habitats & Species above (Section 8.4.4) – i.e. **no significant adverse impacts**..

8.4.7 Application of Best Practice and the EMP for Aquatic Habitats & Species

Best Practice Measures (BPM), although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

The following Best Practice Measures have been developed, for the protection of **Aquatic Habitats & Species,** by the authors of this topic chapter, using industry best practice:

GC-BPM-01	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used
GC-BPM-02	Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used
GC-BPM-03	Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used
GC-BPM-04	Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert
GC-BPM-05	Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse
GC-BPM-06	Surface Water Quality Protection Measures During Tree Felling Works
GC-BPM-07	Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds
GC-BPM-08	Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals
GC-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk
GC-BPM-10	Surface Water Quality Protection Measures During Temporary Storage of Overburden along the Whole UWF Project areas
GC-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden along the Whole UWF Project areas
GC-BPM-16	Monitoring of non-native invasive plant species
GC-BPM-17	Best practice measures for the removal of vegetation during construction
GC-BPM-19	Disturbance to and/or displacement of nesting Common Kingfisher (*Alcedo atthis*).

GC-BPM-22	Management of general non-native invasive species
GC-BPM-33	Surface Water Quality Protection Measures For Site Runoff during the Mountphilips Substation Construction Works
GC-BPM-34	Surface Water Quality Protection Measures During Direction Drilling at the Newport (Mulkear) River, Bilboa River and Clare River watercourse crossings.

These Best Practice Measures are included in full at the end of this topic chapter, and also form part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.4.7.1 Surface Water Management Plan

Water quality and the existing drainage regime will be managed under a Surface Water Management Plan (SWMP) which will be implemented by the appointed Contractor during the construction stage of the UWF Grid Connection.

The Surface Water Management Plan will provide the water management framework for construction works and will ensure that work is carried out with minimal impact on the surface water environment and in accordance with the Project Design and Best Practice Measures and environmental commitments made in this EIA Report. The Surface Water Management Plan is part of the Environmental Management Plan for UWF Grid Connection, and accompanies this planning application as Volume D.

8.4.7.2 Invasive Species Management Plan

In addition to the Best Practice Measures relating to Invasive Species, an Invasive Species Management Plan has been developed to prevent the introduction and/or spread of invasive species.

The Invasive Species Management Plan includes monitoring and biosecurity measures which will inform the actions required to effectively respond to any incursions and to control existing invasive species populations. The Invasive Species Management Plan also forms part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.4.8 Summary of Impacts to Aquatic Habitats & Species

A summary of the Impact to Aquatic Habitats & Species is presented in Table 8-43.

Table 8-43: Summary of the impacts to Aquatic Habitats & Species

Impact to Aquatic Habitats & Species	**Decrease in instream aquatic habitat quality**	**Changes to flow regime**	**Disturbance or displacement**	**Riparian habitat degradation**	**Spread of aquatic invasive species**
Evaluation Impact Table	*Section 8.4.4.1*	*Section 8.4.4.2*	*Section 8.4.4.3*	*Section 8.4.4.4*	*Section 8.4.4.5*
Project Life-Cycle Stage	Construction	Construction	Construction	Construction	Construction
UWF Grid Connection	**Slight to Slight-Moderate**	**Slight**	**Slight**	**Slight to Moderate**	**Slight to Moderate**
Element 2: UWF Related Works	Imperceptible to Moderate	Slight	Slight	Slight to Moderate	Slight to Moderate
Element 3: UWF Replacement Forestry	No Potential for Impacts - Evaluated as Excluded, see Section 8.4.2.2.1				
Element 4: Upperchurch Windfarm	Imperceptible	Slight	Imperceptible	Imperceptible	Slight to Moderate
Element 5: UWF Other Activities	No Potential for Impacts - Evaluated as Excluded, see Section 8.4.2.2.1				
Cumulative Impacts:					
All Elements of the Whole UWF Project	**Imperceptible to Moderate**	**Slight**	**Slight**	**Slight to Moderate**	**Slight to Moderate**
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities Bunkimalta Windfarm, Newport Distributor Road	**Slight to Slight-Moderate**	**N/A - evaluated as excluded, See Section 8.4.2.2.1**			

The greyed out boxes in the above summary table relate to the cumulative information for the Other Elements of the Whole UWF Project, which are included to show the totality of the project.

Aquatic Habitats & Species

Sensitive Aspect

Biodiversity

Topic

8.5 Sensitive Aspect No.4: Terrestrial Habitats

This Section provides a description and evaluation of the Sensitive Aspect - Terrestrial Habitats.

8.5.1 BASELINE CHARACTERISTICS of Terrestrial Habitats

8.5.1.1 STUDY AREA for Terrestrial Habitats

The study area for Terrestrial Habitats in relation to the UWF Grid Connection is described in Table 8-44 and illustrated on Figure GC 8.5: Terrestrial Habitats within the UWF Grid Connection Study Area - Overview map and Maps 1 – 5 (Volume C3 EIAR Figures).

Table 8-44: UWF Grid Connection Study Area for Terrestrial Habitats

Study Area for Terrestrial Habitats	Justification for the Study Area Extents
Construction works area boundary plus 50m in all directions	Professional judgement and as per Best Practice (CIEEM, 2016)

8.5.1.2 Baseline Context and Character of Terrestrial Habitats in the UWF Related Works Study Area

Terrestrial Habitats within the UWF Grid Connection Study Area comprise a mosaic of agricultural grassland, commercial forestry plantations, peatlands, hedgerows, wet grassland, private roads and public roads. For the most part the landscape is dominated by the Slievefelim to Silvermine Mountain upland area with habitats recorded reflective of this.

Twenty habitat area types (including four types of habitat mosaic) comprising 407.5Ha were recorded along the survey corridor. The dominant habitats present are improved agricultural grassland (GA1) and conifer plantation (WD4) which together make up 74.8% of all habitats present. Wet grassland (GS4), scrub (WS1) and buildings and artificial surfaces (BL3) make up the majority of the remaining habitats (16.9%). Further detail is provided in Appendix 8-1, Section A8-1.2.4.6.

Fourteen Linear habitat feature types including upland/eroding (FW1) and lowland/depositing rivers (FW2), Stone Walls/Earthen Banks (BL1/BL2), Hedgerows (WL1) and Tree lines (WL2) were also recorded. Further detail is provided in Appendix 8-1, Section A8-1.2.4.6.

Habitats of Local Importance (Higher Value) include buildings and artificial surfaces (BL3) (based on importance to bats), mixed broadleaf woodland (WD1) (based on importance to birds/mammals), mixed broadleaf/conifer woodland (WD2) (based on importance to birds and mammals), hedgerows (WL1) (level of maturity and value to birds and mammals), tree lines (WL2) (local importance to birds and mammals), riparian Woodland (WN5) (Importance to local diversity) and scrub (WS1) (importance to local diversity). Upland Blanket Bog (PB2) of County Importance is present within the study area at Bleanbeg and at Laghile.

The total length of linear hedgerow and treelines (or mosaics of both) present within the study area comprises 13.6km.

Respective areas of each habitat type (evaluated as of Local Importance (Higher Value) or above) are illustrated in Figure GC 8.5: Terrestrial Habitats within the UWF Grid Connection Study Area and presented in full in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.3.1.2), Appendix 8-1 can be found in Volume C4 EIAR Appendices,

No Flora Protection Order (FPO) species are present within the construction area boundary; however, Bog Rosemary was identified c. 120 m north of the construction area boundary at Bleanbeg.

Non-native invasive plant species listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) are herein described.

The greater area surrounding the UWF Grid Connection includes Giant Hogweed (*Heracleum mantegazzianum*, and Rhododendron (*Rhododendron ponticum*) at a number of locations such as at Bleanbeg Bog. Neither of these species occur within construction works areas or in close proximity (</=7m).

Japanese knotweed or Himalayan knotweed infestations were recorded at 5 locations during habitat assessments on the UWF Grid Connection. All infestations are located at distances greater than 7 metres of the construction works area boundary.

'Medium impact' non-native invasive plant species (Kelly *et al.,* 2013, O' Flynn *et al.*, 2014) recorded included Sycamore (*Acer pseudoplanatus*), Butterfly bush (*Buddleja davidii*) and Himalayan honeysuckle (*Leycesteria Formosa*).

Respective locations of non-native invasive plant species are illustrated in Figure GC 8.5: Terrestrial Habitats within the UWF Grid Connection Study Area, with further, detailed mapping provided in Appendix A8, Section A8-1.6.

8.5.1.3 Importance of Terrestrial Habitats

Habitats of international conservation importance are located at two locations where the UWF Grid Connection passes though the boundary of the Lower River Shannon SAC. These rivers and riparian habitats support habitats and species listed on Annex I and II, respectively, of the EU Habitats Directive 92/43/EEC which are listed as qualifying interests for the Lower River Shannon SAC.

Aquatic habitats of National Importance include the Clare River, east of Bealaclave as it is hydrologically connected to the Lower River Shannon SAC and Clare Glen SAC.

Wet heath (HH3) habitat at Baurnadomeeny was assessed to correspond with EU Habitats Directive 92/43/EEC Annex I habitat 'Northern Atlantic wet heaths with *Erica tetralix* (4010)' and is of National Importance.

Upland blanket bog (PB2) habitat at Bleanbeg and Laghile corresponds to EU Habitats Directive 92/43/EEC Annex I habitat to 'Blanket bogs (priority if active)' and is of National Importance. In addition, the bog at Bleanbeg has been designated to be of National importance for peatland habitats under Natural Heritage Area (Bleanbeg Bog NHA 002450) Order 2005 (S.I. No. 497 of 2005).

A range of Terrestrial Habitats have been identified as being of Local Importance (Higher Value) due to their importance for local biodiversity and supporting bats, birds and mammal species. These habitats include buildings and artificial surfaces (BL3), mixed broadleaf woodland (WD1), mixed broadleaf/conifer woodland (WD2), hedgerows (WL1), tree lines (WL2), riparian Woodland (WN5) and scrub (WS1).

Due to their presence within an SPA designated for Hen Harrier, a number of habitats serve an important role in supporting the structure and function of the SPA. This primarily includes suitable breeding and roosting habitat. See Sensitive Aspect Hen Harrier Section 8.6 for further information.

8.5.1.4 Sensitivity of Terrestrial Habitats

Terrestrial Habitats are sensitive to direct land take, pollution, and environmental changes resulting from modification such as increased drainage. Groundwater dependant habitats such as bog and peatland habitats

may be sensitive to changes in groundwater regimes or changes in ground water quality. The diversity of habitats is particularly sensitive to encroachment from invasive species which may out-compete local native species. Habitats are also sensitive to Human activities such as burning and recreational use.

8.5.1.5 Trends in the Baseline Environment (the 'Do-Nothing' scenario)

The present survey forms a baseline classification of habitats on or near the subject development. No previous habitat information at a suitable scale is available from which trends can be identified or changes evaluated.

Reporting on trends with regard to protected habitats and species under the EU Habitats Directive is provided to the EU under Article 17 of said directive. Overall trends for some Annex quality habitats present within the receiving environment such as Wet Heath are included therein and evaluated nationally (stable in the case of Wet Heath for example). Availability of trends in respect of locally important habitats is limited (Browne, 2007). We would note that the onsite Wet Heath was subject to cattle grazing at the time of the windfarm EIS (2013), and this is still the case. Likewise, in respect of Upland Blanket Bog, the windfarm EIS has previously identified degradation from peat extraction, land reclamation, conifer planting, grazing and drainage. The latter 2 pressures are still present and therefore represent an ongoing trend.

As such, a scenario in which the Subject Development does not take place would result in a continuation of current trends relating to habitats within the study area.

8.5.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to Terrestrial Habitats, as identified above, will be the receiving environment at the time of construction and during the operational phase.

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8.5.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

UWF Grid Connection is part of a whole project which comprises the following Other Elements; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Grid Connection is Element 1. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.

The Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in order to present the totality of the project.

NOTE: GREY Shading relates to additional information to facilitate the cumulative evaluations

8.5.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Terrestrial Habitats considered all of the Other Elements of the Whole UWF Project. **A description of these Other Elements** is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 8.5.2.2.1 below.

The evaluation of cumulative impacts to Terrestrial Habitats also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Terrestrial Habitats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.3: Scoping of Other Projects or Activities (Section A2.3 .1 and Section A2.3. 8).

The results of this scoping exercise are that: it is evaluated that no Other Projects or Activities are likely to cause cumulative effects with either the UWF Grid Connection or the Other Elements of the Whole UWF Project, and therefore no Other Projects or Activities are scoped in for evaluation of cumulative effects to Terrestrial Habitats.

8.5.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements which are described in Table 8-45.

Table 8-45: Cumulative Evaluation Study Area for Terrestrial Habitats

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 2: UWF Related Works	construction works area boundary/afforestation lands plus 50m in all directions	Professional judgement and as per Best Practice (CIEEM, 2016)
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

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Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Other Projects or Activities	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

8.5.2.2.1 Potential for Impacts to Terrestrial Habitats

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect Terrestrial Habitats. The results of this evaluation are included in Table 8-46.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure CE 8.5: Terrestrial Habitats within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-46: Results of the Evaluation of the Other Elements of the Whole UWF Project

Cumulative Project	Results of the evaluation of the Other Elements
Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Evaluated as excluded: Neutral effect/No potential for effects: Seven habitat types comprising 11.6Ha were recorded. The dominant habitats present are improved agricultural grassland (GA1), Wet Grassland (GS4) and conifer plantation (WD4) which together make up 10.4Ha or 89% of all habitats present. Scrub (WS1) and built land and artificial surfaces (BL3) make up the majority of the remaining habitats (9%). Linear habitats are primarily composed of spoil and bare ground (ED2), tree lines (WL2), hedgerows (WL1) and earth banks (BL2). The total area of linear hedgerow and treelines (or mosaics of both), comprises 134m. No non-native invasive plant species were recorded. Terrestrial Habitats of Local Importance, Higher Value are broadleaf woodland (WD1) and Scrub (WS1). Linear hedgerow and tree lines (or mosaics of both) are evaluated as of Local Importance, Higher Value. • Neutral habitat loss as no permanent land take will be required of Terrestrial Habitats evaluated as of Local Importance (Higher Value) or greater, • No potential for hedgerow severance impacts as zero hedgerow is to be removed, • No potential for loss of High Nature Value trees, as no mature trees will be removed, • No potential for cross factor habitat degradation effects, as effects to Local Surface Water Bodies will not be greater than imperceptible, and no likely effects to Local Groundwater Bodies is expected. • No direct loss of Flora Protection Order species, as none were recorded at the site, • No fragmentation is expected from UWF Replacement Forestry with positive effects likely to accrue, • No likely spread of invasive species as none recorded within the afforestation site. Notwithstanding this point a comprehensive Invasive Species Management Plan has been developed and will be implemented by all personnel at the UWF Replacement Forestry site during its planting and growth stages.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Included for the evaluation of cumulative effects

8.5.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.5.2.3.1 Element 2: UWF Related Works

Terrestrial Habitats within the UWF Related Works Study Area comprise a mosaic of agricultural grassland, commercial forestry plantations, hedgerows, wet grassland, private roads and public roads.
Twenty-two habitat types (including six types of habitat mosaic) comprising 190.5Ha were recorded. The dominant habitats present are improved agricultural grassland (GA1) and conifer plantation (WD4) and Wet Grassland (GS4) which together make up 168Ha or 88% of all habitats present. Scrub (WS1), built land and artificial surfaces (BL3), Wet Heath (HH3) and Upland Blanket Bog (PB2) make up the most of the remaining habitats (7.3%). Linear habitats are primarily composed of Buildings and Artificial Surfaces (BL3), earth banks (BL2), and Eroding/Upland Rivers (FW1).

Respective areas of each habitat type (evaluated as of Local Importance (Higher Value) or above) are presented in full in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.3.1.2), Appendix 8-1 can be found in Volume C4 EIAR Appendices, and illustrated in Figure RW 8.5: Terrestrial Habitats within the UWF Related Works Study Area. Figure RW 8.5 is part of the EIA Report for the UWF Related Works, and is included in Volume F: Reference Documents with this planning application.
No Flora Protection Order (FPO) species are present within the construction area boundary.
Non-native invasive plant species listed on the Third Schedule subject to restrictions under Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477/2011) are herein described.

Japanese knotweed or Himalayan knotweed infestations were recorded at 1 location during habitat assessments on the UWF Related Works. The infestation is located at a distance greater than 7 metres of the construction works area boundary.

8.5.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – Element evaluated as excluded. See Section 8.5.2.2.1.

8.5.2.3.3 Element 4: Upperchurch Windfarm

The terrestrial habitats present in the Upperchurch Windfarm have been previously described in the 2013 EIS and 2013 RFI and include 13 distinct classifications and 3 types of habitat mosaic. Habitats are broadly similar to that described elsewhere with the addition of upland blanket bog (PB2), acid grassland (GS3) and neutral grassland (GS1) in addition to the aforementioned mosaics.

Total length of linear hedgerow/treeline/field boundary within the Upperchurch Windfarm study area is 25km, with grass dominated banks described as the dominant type of field boundary.

Within the 2013 EIS, a single (roadside) record of Japanese Knotweed was recorded within the study area for the Upperchurch Windfarm.

8.5.2.3.4 Element 5: UWF Other Activities

Haul Route Activity Locations

Fourteen habitat types comprising 36.4Ha were recorded. The dominant habitats present are improved agricultural grassland (GA1), Built Land and Artificial Surfaces (BL3), Mixed Broadleaf Woodland (WD1) and Dry Meadows and Grassy Verges (GS2) which together make up 30.2Ha or 83.2% of all habitats present. Scrub (WS1), Wet Grassland (GS4) and Amenity Grassland (GA2) make up the majority of the remaining habitats (11.3%). Linear habitats are primarily composed of spoil and bare ground (ED2), Dry Meadows and Grassy Verges (GS2), Hedgerows (WL1), Tree lines (WL2), Tree lines (WL2), Hedgerows (WL1) and Earth Banks (BL2).

The total area of linear hedgerow and treelines (or mosaics of both) present comprises 2,031m.
Japanese knotweed was recorded c.15m from the haul route location HA15 on the R503 east of Ballycahill. This was the only record of non-native invasive plant species associated with the UWF Other Activities survey corridor. The infestation is located at a distance greater than 7 metres (c.15m) to the activity location.

Upperchurch Hen Harrier Scheme Area

A total of 128 Hectares of land has been put forward as alternative habitat for the Upperchurch Hen Harrier Scheme. The habitat types are a mixture of wet grassland (GS4) and improved grassland (GA1), with some smaller areas of willow scrub. We refer to the consented Upperchurch Windfarm Ecological Management Plan (2013) for further information in this regard (contained in Volume F: Reference Documents).

Overhead Line Activities

A total of 18 habitats were recorded within a 50-metre buffer of the Overhead Line Activities. The majority of the study area was composed of improved agricultural grassland. See Appendix A8-1.2.4.6 Table 56 for further detail.

8.5.2.3.5 Other Projects or Activities:

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 8.5.2.1.

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8.5.2.4 Cumulative Information Baseline Characteristics - Importance of Terrestrial Habitats

8.5.2.4.1 UWF Related Works:

Upland/Eroding Streams habitats present are evaluated as of National Importance based on connectivity to the Clodiagh (Tipperary) and Multeen River sub-catchments. Upland Blanket Bog (PB2) of County Importance is present. Terrestrial Habitats of Local Importance Higher Value are Wet Grassland (GS4), Scrub and Immature Woodland (WS1/2), Wet Heath (HH3), Dry-humid Acid Grassland (GS3), Dry Siliceous Heath (HH1) and Cutover Bog (PB4).

Linear hedgerow and treelines (or mosaics of both), are evaluated as of Local Importance, Higher Value.

8.5.2.4.2 Upperchurch Windfarm

Upland Blanket Bog (PB3) of County Importance is described in the Upperchurch Windfarm EIS. Sixteen habitat types are present which are of Local Importance, Higher Value. All remaining habitats are of lesser importance.

8.5.2.4.3 UWF Other Activities

Haul Route Activity Locations

Habitats of Local Importance, Higher Value present within the previously identified study area (including areas within 50m of the public road network) are Eroding/Upland Rivers (FW1), Mixed Broadleaf woodland (WD1), Hedgerows (WL2) and Scrub (WS1). Linear hedgerow and treelines (or mosaics of both) present are of Local Importance, Higher Value.

Overhead Line Activities

Habitats of Local Importance (Higher Value) present at or within 50m of pole/structure locations includes Wet Grassland (GS4), Oak-ash-hazel Woodland (WN2), Riparian woodland (WN5), Wet willow-alder-ash woodland (WN6), Mixed Broadleaf/Conifer Woodland (WD2), Broadleaved Woodland WD1/Wet Grassland (GS4) mosaic, Cutover Bog (PB4), Hedgerows (WL1), and Treelines (WL2). The Newport (Mulkear) River, present as Depositing/Lowland Rivers (FW2) between structures is evaluated as of International Importance, based on its status as a cSAC.

8.5.2.5 Cumulative Information Baseline Characteristics – Trends in the Baseline Environment

UWF Other Activities: We would note that the enhancement proposed as part of the Upperchurch Hen Harrier Scheme would have a beneficial effect on habitats present over the operational phase of the project and represents a positive trend in respect of habitat conservation.

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8.5.2.6 Cumulative Information Baseline Characteristics – Receiving Environment

UWF Other Activities: The implementation of the Upperchurch Hen Harrier scheme will produce an upward trend in respect of habitat diversity and preservation.

8.5.3 PROJECT DESIGN MEASURES for Terrestrial Habitats

At the conception of the UWF Grid Connection, the design team evaluated the potential for significant impacts to the environment. Impacts will only take place where three components exist together; (1) the source of the impact (project), (2) the receptor of the impact (sensitive aspect) and (3) a pathway between the source and the sensitive aspect. The objective of mitigation measures is to avoid, prevent or reduce, one of the three components of an impact by choosing an alternative location, alternative design or an alternative process.

Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the development – these are the Project Design Environmental Protection Measures, which are shortened to 'Project Design Measures' in this EIA Report.

The development as evaluated in the EIA Report incorporates the Project Design Measures.

The Project Design Measures outlined in Table 8-47 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Terrestrial Habitats**.

Table 8-47: UWF Grid Connection Project Design Measures relevant to Terrestrial Habitats

PD ID	Project Design Environmental Protection Measure (PD)
PD02	Flag-men will be used at temporary site entrances rather than creating sightlines by the removal of roadside boundaries. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a in a safe and efficient manner.
PD05	Land reinstatement will not be carried out during very wet weather or when the soil is waterlogged.
PD06	If any compaction has occurred along the construction works area, these areas will be ploughed with a sub-soiler to loosen the subsoil layer
PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted
PD11	Instream construction works will be followed by site-specific reinstatement measures to ensure the restoration of flow character and morphology within the affected reach. Measures will include: bank stabilisation using boulder armour or willow/brush bank protection; reinstatement of bank slope and character, creation of compound channels where necessary; reinstatement of instream flow features such as boulder substrates, pool / riffle sequences, or spawning cobbles; and planting along the riparian margin to stabilise banks, add flood protection and provide riparian buffer.
PD19	The main fuel stocks for, and chemical wastes arising from, construction activities will be stored in a designated location, away from main traffic activity, within the temporary compound. All fuel will be stored in bunded, locked storage containers.
PD62	Slievefelim to Silvermine Mountain SPA: All new permanent access roads within the SPA will be 'concealed access roads' which will be created immediately following construction works by covering the hardcore surface of the new road with a vegetated layer using the following method - firstly a geotextile material is laid on the road, covered in a layer of load bearing root-zone mix of peat and stone and then covered in turn by interlocking rigid geocells. The geocells and roadside berms (where present) will be planted with a mix of mature native Irish or Scottish heathers and grasses, with the mix depending on location. Where heather is being planted a depth of at least 150mm of peat will be provided. These 'concealed access roads' will provide a load bearing surface for occasional maintenance vehicles. Within the SPA, the establishment of the Concealed Access Roads will be overseen by a competent peatland ecologist and a hen harrier expert.

Cumulative Information: Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the fundamental design of the UWF Related Works, and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in Appendices 5.3 and 5.5, in Volume C4: EIAR Appendices.

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8.5.4 EVALUATION OF IMPACTS to Terrestrial Habitats

In this Section, the likely direct and indirect effects of the UWF Grid Connection are identified and evaluated. Then the likely cumulative effects of the UWF Grid Connection together with the Other Elements of the Whole UWF Project and Other Projects or Activities are identified and evaluated.

A conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) - Terrestrial Habitats.

As a result of the exercise, some impacts were included and some were excluded.

Table 8-48: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Reduction in Terrestrial Habitats (construction stage)	*Habitat degradation (construction stage)*
Hedgerow Severance (construction stage)	*Direct loss of Flora Protection Order species (construction stage)*
Loss of High Nature Value Trees (construction stage)	*Landscape level Habitat fragmentation (construction stage)*
	Introduction or spread of invasive species (construction stage)
	Introduction or spread of invasive species (operational stage)
	Introduction or spread of invasive species (decommissioning stage)

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 8.5.4.1 to 8.5.4.3.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, in Section 8.5.4.4.

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8.5.4.1 Impact Evaluation Table: Reduction in Terrestrial Habitats

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Excavation Works
Cumulative Impact Source: Excavation works
Impact Pathway: Land Cover

Impact Description: Land take during the construction stage may cause a direct reduction in habitats present. Whilst the majority of land use change is temporary in nature with immediate re-instatement for works such as cable trenching and temporary berms, land use change for project infrastructure such as permanent roads, permanent berms and other features may reduce the respective area of some higher value habitats or habitats which are important from a Biodiversity perspective.

Some land use change associated with the project (and which overlaps the SPA) will be offset by the provision of concealed geocell roadways, which will be mainly be planted with vegetation (heathers or grass or a combination of both) to match the previously existing habitat. An example of this as part of Project Design, concealed geocell roadways will be constructed at Castlewaller on the 110kV UGC, and these will be replanted with native Irish or Scottish heather (propagated in Ireland or Scotland); this land cover change is considered a positive effect on Biodiversity. Project Design Measures such as the use of flagmen at entrances has also reduced land cover change. Permanent storage berms (8 in total), mainly located along the verges of roadways or forestry tracks will be re-instated immediately with native grasses or native heather as appropriate. All re-instatement will be overseen by the Project Ecologist. As per Best Practice all habitats described and evaluated herein are those evaluated as of Local Importance (Higher Value) and above - we note that no habitats evaluated as of County, National, or International Importance are affected by permanent land use change.

Impact Quality: Negative

Evaluation of Subject Development Impact – Reduction in Terrestrial Habitats

Element 1: UWF Grid Connection

Impact Magnitude:
Permanent habitat loss will comprise 0.51Ha, limited to 4 no. habitat types (Wet Grassland (0.3Ha), Wet Grassland/Scrub mosaic (.04Ha), Deciduous woodland (.09Ha) and Scrub (.11Ha)) with an importance evaluation of Local Importance (Higher Value). The magnitude of change represents 5.6% of the total habitat within the study area, and 0.6%, 2.7%, 1.6% and 0.7% respectively of the habitats described.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The low sensitivity of the habitats for which change will occur (context), and;
- The extent of Habitat Loss, with none of the individual habitat changes representing more than 2.7% of the respective habitat present, which is;
- Only a minor shift away from baseline conditions, notwithstanding;
- The permanent duration, and;
- Low reversibility with permanent land use change likely

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude: Permanent habitat loss will comprise 0.07Ha, which will be limited to 2 no. habitat types (Wet Grassland (0.7Ha)) and Scrub (.004Ha)) The magnitude of change represents 0.64% of the total habitat within the study area and 0.5% and 0.01% respectively of the habitats described.

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Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • The low sensitivity of the habitats for which change will occur (context), and; • The extent of Habitat Loss, with none of the individual habitat changes representing more than 1% of the respective habitat present, which is; • Only a minor shift away from baseline conditions, notwithstanding; • The long term duration, and; • Low reversibility with permanent land use change likely.
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.5.2.2.1*
Element 4: Upperchurch Windfarm
Impact Magnitude: "In terms of the habitat loss arising from the construction of roads, foundations and hardstandings, this was determined as 9.65Ha, primarily in the improved agricultural grass land and conifer plantations."
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • "In relation to the details submitted, I consider that the potential impact on habitats on the site is not therefore significant. The impacts largely occur on areas with a long history of human intervention through farming and forestry cultivation. I also consider that subject to the mitigation measures as outlined that the Whole UWF Project is not likely to result in significant impacts and effects on any designated sites."
Element 5: UWF Other Activities
Impact Magnitude: None
Significance of the Impact: Neutral Impact
Rationale for Impact Evaluation: • No permanent land use change is proposed of Terrestrial Habitats evaluated as of Local Importance (Higher Value) or greater.
Evaluation of Cumulative Impacts – Reduction in Terrestrial Habitats
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: Habitat loss in respect of the UWF Grid Connection, the UWF Related Works, UWF Replacement Forestry and UWF Other Activities will be limited to 4 no. habitat types with an importance evaluation of Local Importance (Higher Value). The total magnitude of habitat loss is 0.58Ha, primarily associated with the UWF Grid Connection. Habitat loss from equivalent sources has already been described as not significant for the Upperchurch Windfarm.
Significance of the Cumulative Impact: Not Significant
Rationale for Cumulative Impact Evaluation: • The overall extent of Habitat Loss, and; • Changes from baseline conditions are very slight-minor, notwithstanding; • The long term to permanent duration, and; • Low reversibility with permanent land use change likely.

Topic: **Biodiversity**

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Terrestrial Habitats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.5.2.1).

8.5.4.2 Impact Evaluation Table: Hedgerow Severance

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Excavation Works
Cumulative Impact Source: Excavation Works
Impact Pathway: Land cover

Impact Description: Construction stage works will cause both temporary and permanent severance of existing field boundaries. This is primarily to facilitate the linear nature of project elements such as the UWF Grid Connection and cabling as part of UWF Related Works. Any temporary hedgerow loss, such as at field boundary crossings and at entrances, will be immediately re-instated once works are complete with like for like vegetation and therefore Neutral effects are considered likely. Project Design Measures such as the use of flagmen at entrances has reduced the extent of field boundaries to be removed, even if only temporarily. Permanent severance if of sufficient magnitude may affect habitat connectivity. As per Best Practice all habitats described and evaluated herein are those evaluated as of Local Importance (Higher Value) and above - we note that no hedgerows or field boundaries were evaluated as of County, National, or International Importance. This is reflective of the landscape present with many field boundaries comprising earthen banks, or lower value hedgerows.

The Upperchurch Hen Harrier Scheme is to incorporate significant planting of hedgerows (2.8km), and additional Hedgerows will be planted as part of the UWF Grid Connection (700m of new hedgerow), UWF Related Works (370m of new hedgerow) and Upperchurch Windfarm (360m as mitigation). Additionally bat mitigation measures as part of Project Design will involve enhancement of hedgerow severance locations by the further planting of like for like trees on either side of crossings.

Impact Quality: Negative and positive

Evaluation of Subject Development Impact – Hedgerow Severance

Element 1: UWF Grid Connection

Impact Magnitude:
Permanent Habitat loss is limited to 45m of permanent hedgerow removal from 9 no. locations each of 5m in length. 700m of new hedgerow will be planted.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The extent of severance, with;
- No individual severed sections are sufficient in magnitude to result in fragmentation effects, and;
- A significant contrast with baseline conditions is not expected, when considered with proposed new planting;
- The permanent duration, and;
- Low reversibility with land use change likely

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
Habitat loss is limited to 170m of hedgerow comprising primarily earthen banks (only 1 mature tree and 3 immature trees are to be removed.

Significance of the Impact: Not Significant

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Rationale for Impact Evaluation:
- The extent of severance, with;
- No individual severed sections evaluated as sufficient in magnitude to result in fragmentation effects, and;
- A significant contrast with baseline conditions is not expected, notwithstanding;
- The long term duration, and;
- Low reversibility with land use change likely

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.5.2.2.1.*

Element 4: Upperchurch Windfarm

Impact Magnitude:
As per the windfarm EIS, 980m of hedgerow will be removed. 980m of hedgerow will be replanted to mitigate this loss.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:
- "However the extent is relatively low particularly as there is an abundance of this habitat and many of the hedgerows dividing fields have very little cover within the region. Therefore, it is near certain that the impact on this habitat will not be significant."

Element 5: UWF Other Activities

Impact Magnitude:
The Upperchurch Hen Harrier scheme activities will include improvement planting with suitable trees and shrub species along existing field boundary hedgerows, and planting of 2.8km of new hedgerows with native trees and shrubs. Ongoing farming practices will also be restricted to preclude further hedgerow removal. No hedgerow loss is associated with Overhead Line activities under consideration.

Significance of the Impact: **Significant (positive)**

Rationale for Impact Evaluation:
- The extent of new hedgerow to be planted, and;
- The long-term duration equivalent to the lifetime of the project

Evaluation of Cumulative Impacts – Hedgerow Severance

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:
Permanent hedgerow loss will be limited to total of 1045m within the Whole UWF Project study area. Temporary hedgerow/field boundary removal relates to a total of 710m (585m within the UWF Grid Connection study area and 145m within the UWF Related Works Study Area, 20m of which occur at the same locations) much of which comprises earthen banks.

In total 3800m of new hedgerow will be planted within the Whole UWF Project study area.
Habitat loss of Hedgerow has already been described as not significant for the Upperchurch Windfarm.

Significance of the Cumulative Impact: Not Significant

Rationale for Cumulative Impact Evaluation:
- The extent of Habitat Loss overall, with limited removal of trees and;
- Individual severance locations will not result in any corridor fragmentation, and;
- A significant contrast with baseline conditions is not predicted, additionally;

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• Significant positive effects from Hedgerow enhancement and planting of 2.8km of new hedgerows will occur as a result of the Upperchurch Hen Harrier Scheme, over the lifetime of the project, notwithstanding; • The long-term duration, and; • Low reversibility with land use change likely

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Terrestrial Habitats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.5.2.1).

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8.5.4.3 Impact Evaluation Table: Loss of High Nature Value Trees

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Excavation Works
Cumulative Impact Source: Excavation Works
Impact Pathway: Land cover

Impact Description: Habitats including mature trees such as hedgerows, deciduous woodland and scrub are herein evaluated for loss of mature trees of Biodiversity value. Construction stage works will cause both temporary and permanent loss of existing field boundaries, and other habitats which may contain or include mature trees of Biodiversity Value. Permanent loss of mature trees may affect connectivity / result in fragmentation and have secondary effects on other Biodiversity receptors which utilise mature trees for breeding or resting. Project Design Measures such as the use of flagmen at entrances has reduced the extent of trees to be removed. Trees evaluated herein are of Local Importance (Higher Value) in accordance with their respective habitat classification.

We note that the Upperchurch Hen Harrier Scheme is to incorporate significant planting of trees, in addition the UWF Replacement Forestry will comprise deciduous trees in its entirety. Further instatement of trees will occur at hedgerows evaluated as 'Bat Crossing' locations.

Impact Quality: Negative and positive

Evaluation of Subject Development Impact – Loss of High Nature Value Trees

Element 1: UWF Grid Connection

Impact Magnitude:
Tree loss is limited to 26 no. mature trees and 4 immature trees.
25 of the 26 mature trees will be lost from a single plantation of beech.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The low magnitude of Loss overall, and;
- Will not result in any corridor fragmentation, and;
- A significant contrast with baseline conditions is not predicted, notwithstanding;
- The permanent duration, and;
- Low reversibility with permanent loss likely.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
Tree loss is limited to 1 no. mature tree and 3 immature trees- primarily from hedgerow crossing locations.

Significance of the Impact: **Not Significant**

Rationale for Impact Evaluation:

- The extent of Loss is low overall, and;
- Will not result in any corridor fragmentation, and;
- A significant contrast with baseline conditions is not predicted, notwithstanding;
- The long term duration, and;
- Low reversibility with permanent loss likely

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Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.5.2.2.1*
Element 4: Upperchurch Windfarm
Impact Magnitude: Tree loss is Medium and will be limited to 24 no. mature trees - primarily from hedgerow crossing locations and site entrances.
Significance of the Impact: **Not Significant**
Rationale for Impact Evaluation: • The low magnitude of loss, which; • Will not result in any corridor fragmentation, and; • A significant contrast with baseline conditions is not predicted, notwithstanding; • The long-term duration, and; • Low reversibility with permanent loss likely
Element 5: UWF Other Activities
Impact Magnitude: Neutral Effect for Haul Route Activity locations or Monitoring Activity locations as no permanent removal of trees is proposed in respect of these works. The Upperchurch Hen Harrier scheme does include the planting of 2.2 Ha of tree and shrub species in scrub areas, improvement planting with suitable trees and shrub species along existing field boundary hedgerows, and planting of 2.8km of new hedgerows with native trees and shrubs. In addition, 1.4km of woody scrub species will be planted along riparian corridors. No trees will be removed to facilitate Overhead Line Activities as described.
Significance of the Impact: Moderate (positive)
Rationale for Impact Evaluation: • The extent of replanting of trees, and; • A significant contrast with baseline conditions is predicted. • The long-term duration, and; • Low reversibility.
Evaluation of Cumulative Impacts – Loss of High Nature Value Trees
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: Tree loss is limited to 51 no. mature trees and 7 immature trees. The Upperchurch Hen Harrier scheme does include the planting of 2.2 Ha of tree and shrub species in scrub areas, improvement planting with suitable trees and shrub species along existing field boundary hedgerows, and planting of 2.8km of new hedgerows with native trees and shrubs. In addition, 1.4km of woody scrub species will be planted along riparian corridors.
Cumulative Whole Project Impact Evaluation: Moderate (positive)
Rationale for Cumulative Impact Evaluation: • The extent of replanting of trees, and; • The duration which is long term and over the lifetime of the project, and; • A significant contrast with baseline conditions is predicted, with; • Limited reversibility

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Terrestrial Habitats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.5.2.1).

8.5.4.4 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-49 below.

Table 8-49: Description and Rationale for Excluded Impacts to Terrestrial Habitats

Key: 1: UWF Grid Connection; 2: UWF Related Works; 3: UWF Replacement Forestry; 4: Upperchurch Windfarm; 5: UWF Other Activities

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Movement of soils and machinery	1,2,4,5	Ground-water	Habitat degradation	Rationale for Excluding; No significant adverse impacts to Local Groundwater Bodies are likely to occur as a consequence of the development of the individual Elements or the implementation of all of the Individual Project Elements as the Whole UWF Project (refer Chapter 11 Water). Cross-factor effects by virtue of same are accordingly excluded from further evaluation.
Movement of soils and machinery	1,2,4,5	Surface Water	Habitat degradation	Rationale for Excluding; No significant adverse impacts to Local Surface Water Bodies are likely to occur as a consequence of the development of the individual Elements or the implementation of all of the Individual Project Elements as the Whole UWF Project (refer Chapter 11 Water). Cross-factor effects by virtue of same are accordingly excluded from further evaluation.
Excavation works	1,2,4,5	Soils	Direct loss of Flora Protection Order species	Rationale for Excluding; None were recorded within the Construction Works Boundaries.
Excavation works	1,2, 4,5	Landcover	Landscape level Habitat fragmentation	Rationale for Excluding: Neutral Landscape level effect is predicted. Permanent entrances to 1 will be re-instated; hedgerow crossings for 1 are narrowed to 5m to avoid/reduce fragmentation effects, Minimal trees are to be removed for element 2 which correlates with Upperchurch windfarm roads 4.5. Upperchurch Hen Harrier Scheme will increase connectedness through planting of hedgerows/trees. No habitat removal is required for Overhead Line Activities.
Movement of soils and machinery	1,2,4,5	Soils	Introduction or spread of invasive species	Rationale for Excluding: All pertinent locations of Invasive Species are >7metres from any works areas. Notwithstanding this point a comprehensive Invasive Species Management Plan has been developed, and will be implemented by the Contractor to ensure that none of the identified Invasive Species infestations poses a risk to the environment. The Invasive Species Management Plan can be found in Volume D: Environmental Management Plan.

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Operational Stage				
Movement of soils and machinery	1,2,4,5	Soils	Introduction or spread of invasive species	Rationale for Excluding: All pertinent locations of Invasive Species are >7metres from any works areas. Notwithstanding this point a comprehensive Invasive Species Management Plan has been developed, and will be implemented by the Contractor to ensure that none of the identified Invasive Species infestations poses a risk to the environment. The Invasive Species Management Plan can be found in Volume D: Environmental Management Plan.
Decommissioning Stage				
Movement of soils and machinery	1,2,4,5	Soils	Introduction or spread of invasive species	Rationale for Excluding: All pertinent locations of Invasive Species are >7metres from any decommissioning works areas. Notwithstanding this point a comprehensive Invasive Species Management Plan has been developed, and will be implemented by the decommissioning Contractor to ensure that none of the identified Invasive Species infestations poses a risk to the environment. The Invasive Species Management Plan can be found in Volume D: Environmental Management Plan.

8.5.5 Mitigation Measures for Impacts to Terrestrial Habitats

Mitigation measures were incorporated into the UWF Grid Connection project design including the Project Design Measures. No additional mitigation measures are required as **no significant adverse impacts** are concluded by the topic authors as likely to occur to Terrestrial Habitats as a consequence of the UWF Grid Connection.

8.5.6 Evaluation of Residual Impacts to Terrestrial Habitats

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Terrestrial Habitats above (Section 8.5.4) – i.e. **no significant adverse impacts**.

8.5.7 Application of Best Practice and the EMP for Terrestrial Habitats

Best Practice Measures (BPM), although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

The following Best Practice Measures have been developed, for the protection of **Terrestrial Habitats,** by the authors of this topic chapter, using industry best practice:

GC-BPM-16	Monitoring of non-native invasive plant species
GC-BPM-17	Best practice measures for the removal of vegetation during construction
GC-BPM-18	Best practice for the protection and preservation of tree roots during the construction phase

These Best Practice Measures are included in full at the end of this topic chapter, and also form part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.5.7.1 Invasive Species Management Plan

In addition to the Best Practice Measures relating to Invasive Species, an Invasive Species Management Plan has been developed to prevent the introduction and/or spread of the invasive species.

The Invasive Species Management Plan includes monitoring and biosecurity measures which will inform the actions required to effectively respond to any incursions and to control existing invasive species populations. The Invasive Species Management Plan also forms part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.5.8 Summary of Impacts to Terrestrial Habitats

A summary of the Impact to Terrestrial Habitats is presented in Table 8-50.

Table 8-50: Summary of the impacts to Terrestrial Habitats

Impact to Terrestrial Habitats:	**Reduction in Terrestrial Habitats**	**Hedgerow Severance**	**Loss of High Nature Value Trees**
Evaluation Impact Table	*Section 8.5.4.1*	*Section 8.5.4.2*	*Section 8.5.4.3*
Project Life-Cycle Stage	Construction	Construction	Construction
UWF Grid Connection	**Not Significant**	**Not Significant**	**Moderate (positive)**
Element 2: UWF Related Works	Not Significant	Not Significant	Not Significant
Element 3: UWF Replacement Forestry	Neutral Impact/No Potential for Impact - Evaluated as Excluded, see Section 8.5.2.2.1.		
Element 4: Upperchurch Windfarm	Not Significant	Not Significant	Not Significant
Element 5: UWF Other Activities	Neutral	**Significant (positive)**	Moderate (positive)
Cumulative Impact:			
All Elements of the Whole UWF Project	**Not Significant**	**Not Significant**	**Moderate (positive)**

The greyed out boxes in the above summary table relate to the cumulative information for the Other Elements of the Whole UWF Project, which are included to show the totality of the project.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Terrestrial Habitats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.5.2.1).

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8.6 Sensitive Aspect No.5: Hen Harrier

This Section provides a description and evaluation of the Sensitive Aspect - Hen Harrier.

8.6.1 BASELINE CHARACTERISTICS of Hen Harrier

8.6.1.1 STUDY AREA for Hen Harrier

The study area for Hen Harrier in relation to the UWF Grid Connection is described in Table 8-51 and illustrated on Figure GC 8.6: Hen Harrier within the UWF Grid Connection Study Area - Overview map and Maps 1 – 2 (Volume C3 EIAR Figures).

Table 8-51: UWF Grid Connection Study Area for Hen Harrier

Study Area for Hen Harrier	Justification for the Study Area Extents
2km from the construction works area boundary in all directions	As per SNH (2014) guidance

8.6.1.2 Baseline Context and Character of Hen Harrier in the UWF Grid Connection Study Area

Breeding Context

The 2km study area for the UWF Grid Connection comprises a range of habitats typical of the Slieve Felim to Silvermine Mountains SPA and includes forestry at differing age classes, open moorland and bog, in addition to rough grazing and improved agricultural lands. In general, and as expected given the overlap with a European Site designated for Hen Harrier, habitats within the 2km study area are considered of high quality for the species. In this regard however, it should be noted that no *currently suitable breeding habitat* overlaps the UWF Grid Connection construction works area.

Note: Following scoping and formal consultation with NPWS as described, it was established that, based on likely sensitivities, and source-pathways linkages in respect of disturbance and displacement, the primary objective of Hen Harrier surveys should be to identify all Hen Harrier breeding and winter roosting sites in *suitable* habitat within a 2km radius of the works (2km being the radius stipulated by SNH guidance)- with an emphasis on establishing the locations of any previously unknown nesting territories, given the information available on known and historical nest sites. This is further defined in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.3.3).

Breeding season surveys following Best Practice (Hardey *et al.,* 2014) confirmed 3 no. Hen Harrier breeding attempts within 2km of the UWF Grid Connection in 2016. A further nesting attempt was confirmed at 2.15km from the UWF Grid Connection. Of the four breeding attempts described, 3 successfully fledged young. The distance from the UWF Grid Connection (construction area boundary) in respect of each nest location was 154m, 500m, 903m, and 2.15km respectively. Habitat types in which nests were located comprised Heath and Bog (1nests) and pre-thicket (pre-canopy closure) forestry (3 nests).

In 2017, one nesting attempt was confirmed ~500m from the UWF Grid Connection. A second nest was located 680m distant. In both instances, the nesting territory corresponded to a similar territory from the previous year (2016) which is typical of year to year fidelity shown by this species. Both nesting attempts described successfully fledged young in 2017. Habitat types in which nests were located comprised Heath and Bog (further details on see Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.3 Table 25). Appendix 8-1 can be found in Volume C4 EIAR Appendices.

Also in 2017 two additional breeding attempts were unconfirmed but are considered likely based on records of pairs in territorial display within ~2km. For the avoidance of doubt these are considered as valid nesting attempts for the purpose of the current appraisal however the outcome of the breeding attempt is classified as unsuccessful (only territorial pairs/activity observed). All nesting attempt locations in 2017 were again within the SPA and in similar locations to 2016.

Wintering Context

Hen Harrier winter roost surveys were undertaken to Best Practice (SNH) in the 2km hinterland of the UWF Grid Connection between September 2016 and February 2017, and also during the period September to February 2018, during which 3 no. winter roosts were identified – all within the SPA. One of these was situated within 500m of the UWF Grid Connection construction area boundaries and found to be utilised during both survey winters. The remaining 2 no. roosts were within 1km and 2km respectively of the UWF Grid Connection construction area boundaries and were more variable in their usage, used less frequently and only during the winter period of 2016/17. Roosting habitats in all instances comprised upland heath and bog, which is typical as birds mainly roost on the ground. Habitat types are described in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.3 Table 26).

Based on studies conducted for the current appraisal the roost population of the UWF Grid Connection study area is estimated as 0-5 birds (based on a maximum of 5 birds recorded concurrently across all roosts on any given day, from 2 winter seasons of effort). This has the potential to increase or decrease dependant on inter-annual variation, weather or other factors. The maximum count of 5 birds at any individual roost (comprising 4 adult males and one female) was only recorded on a single occasion, in January 2018.

Further information on surveys and results are included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.3) and maps illustrating UWF Grid Connection with high sensitivity in respect of breeding Hen Harrier are provided in Figure GC 8.6: Hen Harrier within the UWF Grid Connection Study Area (the exact locations of Hen Harrier nesting attempts or communal roosting locations are not publically provided due to the sensitivity of this species to persecution/disturbance, as agreed in consultation with NPWS).

Character

The harriers (genus *Circus)* are all fairly large hawks with long, broad wings, long tails and legs and slim bodies (Watson 1977). In Ireland the Hen Harrier *Circus cyaneus* is confined largely to heather moorland and young forestry plantations, where they nest on the ground. They are found mainly in Counties Laois, Tipperary, Cork, Clare, Limerick, Galway, Monaghan, Cavan, Leitrim, Donegal and Kerry. The current national breeding population is estimated at 108-157 breeding pairs (Ruddock *et al.,* 2016). The most recent estimate of the national wintering population, from Irelands Article 12 submission to the EU, is 269-349 individuals. Foraging habitat preferences are generally biased towards moorland, grassland mosaics and pre-thicket forest habitats which support larger numbers of prey species. Hen Harrier wintering grounds are typically lowland sites below 100m. During winter, Hen Harriers gather at communal or solitary roost sites. In Ireland the majority of these roost sites are located in reed beds, heather/bog and rank/rough grassland but also fen, bracken, gorse or saltmarsh. Approximately 20% of known roosting sites in Ireland occur within close proximity to core nesting areas. In 2014, approximately 96 confirmed solitary and communal roosts were known in Ireland.

8.6.1.3 Importance of Hen Harrier

Hen Harrier is listed on Annex I of the EU Birds Directive 2009/147/EC. In 2007, six Special Protection Areas (including the Slieve Felim to Silvermines Mountains SPA) were designated across the country with breeding populations of Hen Harrier as the sole Special Conservation Interest to ensure the conservation of the species. The breeding population of Hen Harrier is Amber listed on the most recent Birds of Conservation

Concern in Ireland 2014 – 2019 (Colhoun and Cummins, 2013). No areas are designated solely in respect of wintering populations. Both breeding and wintering Hen Harrier present are evaluated as Internationally Important and assigned a sensitivity rating of Very High (equivalent to NRA International Importance) for the purpose of evaluation, as per Table 8-3.

8.6.1.4 Sensitivity of Hen Harrier

Hen Harriers are known to be sensitive to disturbance (Masden 2010, Pearce-Higgins *et al.,* 2012). The effects of significant disturbance to Hen Harrier may be nest desertion, reduced incubation periods (resulting in embryo mortality), or additional stress on adult bird's due to their propensity to alarm at intruders. Some or all of these effects may result in longer term abandonment of (traditionally held) nesting areas, with resultant local and/or population level effects. Whilst raptors in general may accept short infrequent disturbance events proximal to nests, and may even be highly tolerant of certain sources of disturbance, sudden changes during critical periods such as the start of the breeding season may provoke a higher level of response (Petty, 1998) with consequent effects on breeding success and local reproductive rates.

Research on the spatial ecology of Hen Harriers has shown that foraging females spend most of their time within 1km of the nest, while males hunt mostly within 2km of the nest (Arroyo *et al.,* 2009, Irwin *et al.,* 2012, Arroyo *et al.,* 2014). Therefore, landscape and habitat changes within 1km of the nest may impact on both male and female foraging; while changes up to 2km from the nest are more likely to affect males only (Arroyo *et al.,* 2014). Foraging habitat loss therefore, especially within 2km of nesting attempts may have negative effects on breeding success.

Hen Harriers are positively sensitive to the creation of or sympathetic management of foraging and nesting habitat within their traditional range (Forrest *et al.,* 2011).

8.6.1.5 Trends in the Baseline Environment (the 'Do-Nothing' scenario)

Four national surveys have been undertaken to assess the conservation status of Hen Harrier in Ireland (Norriss *et al.,* 2002; Barton *et al.,* 2006; Ruddock *et al.,* 2012; Ruddock *et al.,* 2016). The most recent survey recorded 108 to 157 breeding pairs (Ruddock *et al.,* 2016). This was lower than the breeding population estimate for 2010 of 128 to 172 breeding pairs (Ruddock *et al.,* 2012), similar to the estimate of breeding pairs in 2005 of 132 to 153 (Barton *et al.,* 2006) and slightly higher than the results of the first national survey which estimated 102 to 129 breeding pairs (Norriss *et al.,* 2002).

The Slievefelim to Silvermines Mountains SPA was one of only two SPAs to record an increase in breeding territories between 2005 and 2015. The remaining four SPAs designated for the conservation of Hen Harrier all showed reductions in the number of breeding territories recorded from 2005 to 2015 (Ruddock *et al.,* 2016).

8.6.1.6 Receiving Environment (the Baseline + Trends)

At a national level, 5-year interval trends show that the Hen Harrier population appears to be in decline, however the population in Slievefelim to Silvermines Mountains SPA is at least stable or on the increase. Changes in the supporting habitat, such as the maturation of 2nd rotation forestry (selected for nesting) or land management changes to further nesting and foraging habitat, are unlikely to produce a declining trend by the time the subject development is under construction. It is assumed in this report that the baseline environment in relation to Hen Harrier, as identified above, will be the receiving environment at the time of construction. Longer term trends have been identified with respect to Forestry, such as a declining trend in the amount of foraging habitat available, and are likely to overlap the operation phase. The following is cited directly from the document titled "Hen Harrier Conservation and the Forestry Sector in Ireland", published by NPWS in 2015:

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"Forests less than 15 years old constitute to varying degrees a potential foraging resource for Hen Harriers. In line with the forecasted reduction in the extent of the forest nesting resource, indicative future estimates of the extent of the potential *forest foraging* resource within the SPA network shows an acute declining trend over the next 10 years[9]"(emphasis added). This negative trend is also applicable to the Slieve Felim to Silvermines Mountains SPA.

In relation to forest nesting habitat, it is projected for the period 2012 – 2025 that all SPAs will undergo an acute reduction in the extent of forest that is of use to the Hen Harrier as a nesting resource. The overall decline is estimated to be 42% for this period when only 11% of the entire forest estate in the SPA network will constitute a potential nesting resource for forest nesting Hen Harrier. The projected decline of this resource varies between the SPAs from approximately 24% (Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA) to 82% in Slieve Beagh SPA. Accordingly, it will likely be after 2035 before the net estimated usable forest nesting habitat will exceed present levels. Within the Slieve Felim to Silvermines SPA the estimated extent of forest within the SPA that is potentially usable as Hen Harrier nesting habitat is expected to decline from 23% (in 2012) to 11% within the period 2012-2025 and thereafter increase up to 44% by the year 2045.

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[9] NPWS.2015. Hen Harrier Conservation and the Forestry Sector in Ireland.

8.6.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

UWF Grid Connection is part of a whole project which comprises the following Other Elements; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Grid Connection is Element 1. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.

The Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in order to present the totality of the project.

NOTE: GREY Shading relates to additional information to facilitate the cumulative evaluations

8.6.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Hen Harrier considered all of the Other Elements of the Whole UWF Project. **A description of these Other Elements** is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 8.6.2.2.1 below.

The evaluation of cumulative impacts to Hen Harrier also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects with either the UWF Grid Connection or with any of the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of these Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.3: Scoping of Other Projects or Activities (Section A2.3 .1 and Section A2.3. 8).

The results of this scoping exercise are that: Bunkimalta Windfarm, Castlewaller Windfarm (both consented) and the activities: Forestry, Agriculture and Turf-Cutting have been scoped in for evaluation of cumulative effects to Hen Harrier.

8.6.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 8-52.

Table 8-52: Cumulative Evaluation Study Area for Hen Harrier

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 2: UWF Related Works	Construction works area boundary or afforestation lands or activity location (plus 50m in all directions)	Published literature (e.g. Pearce-Higgins *at al.* 2009), and; Professional Judgement
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities: Bunkimalta Windfarm Castlewaller Windfarm Forestry Agriculture Turf-Cutting	The boundary of the Slievefelim to Silvermines SPA plus 5km in addition to the footprint of all Elements of the Whole UWF Project plus 2km.	Research on the spatial ecology of Hen Harriers has shown that foraging females spend most of their time within 1km of the nest, while males hunt mostly within 2km of the nest (Arroyo *et al.,* 2009, Irwin *et al.,* 2012, Arroyo *et al.,* 2014).

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
		Therefore, landscape and habitat changes within 1km of the nest may impact on both male and female foraging, while changes up to 2km from the nest are more likely to affect males only (Arroyo *et al.,* 2014). SNH (2014) also recommend a 2km study area extent from a proposal site within which data should be collected. A 5km area around the SPA in conjunction with a 2km area around the various elements of the Whole UWF Project will ensure all likely effects are evaluated in the context of the Species and the SPA

8.6.2.2.1 Potential for Impacts to Hen Harrier

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Hen Harrier. The results of this evaluation are included in Table 8-53.

The location of, and study area boundary associated with, the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure CE 8.6: Hen Harrier within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-53: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Included for the evaluation of cumulative effects (with the exception of Haul Route Activities HA 1 to HA20, which are evaluated as excluded as these activities do not have potential to act as a source for impacts on Hen Harriers due again to their location on public roads and have been scoped out accordingly).
Other Project or Activity	
Other Projects or Activities: Bunkimalta Windfarm Castlewaller Windfarm Forestry Agriculture Turf-Cutting	Yes, included for the evaluation of cumulative effects

8.6.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.6.2.3.1 Element 2: UWF Related Works

The location of the UWF Related Works includes habitat which may be used occasionally by foraging Hen Harrier as already established in the 2013 EIS for the Upperchurch Windfarm. No suitable breeding habitat is present. Similarly habitats may be utilised for foraging during the winter months, however no suitable winter roost habitat is present.

8.6.2.3.2 Element 3: UWF Replacement Forestry

The Replacement Forestry location comprises primarily improved agricultural grassland, which is of low attractiveness for foraging Hen Harrier. No breeding or winter roost habitat is present.

8.6.2.3.3 Element 4: Upperchurch Windfarm

The Upperchurch Windfarm is the subject of a Hen Harrier Management Plan as part of the 2014 Grant of Permission, this Hen Harrier Management Plan is described in the 2013 RFI and sets out to enhance and promote habitat on lands close to the windfarm site to benefit foraging Hen Harrier. The Hen Harrier Management Plan is evaluated in this application as part of the UWF Other Activities and referred to as the 'Upperchurch Hen Harrier Scheme'.

With regard to the Upperchurch Windfarm Hen Harrier were not recorded as breeding within the study area for the 2013 EIS and the habitat was evaluated as sub-optimal for nesting. The Upperchurch Windfarm is outside the Slievefelim to Silvermines Mountains SPA. Foraging at low frequency during the summer months has been described in the 2013 EIS. Similarly habitats may be utilised for foraging during the winter months, however no suitable winter roost habitat is present.

8.6.2.3.4 Element 5: UWF Other Activities

The Upperchurch Hen Harrier Scheme is located in Knockcurraghbola Commons, Coumnageeha, Foilnaman, Knockmaroe and Grousehall townlands on agricultural lands between the Slievefelim to Silvermines SPA and the Upperchurch Windfarm.

Haul Route Activities are also located outside the SPA. By their nature these locations are located on existing public roadways and roadside verges and do not comprise or include foraging or breeding habitat for Hen Harrier. Similarly, habitats are not suitable for foraging during the winter months, and no suitable winter roost habitat is present. Those locations in closest proximity to the already consented Upperchurch Windfarm (HA21-23) whilst unsuitable in themselves do occur adjacent to lands as part of the Consented Windfarm where foraging at low frequency has been recorded. Similarly Monitoring Activities during the construction of the Windfarm will take place on lands which may be utilized for foraging albeit at low frequency.

Suitable foraging habitat for Hen Harrier is present at locations of wet grassland along the route of the over-head line relating to Overhead Line Activities; in addition suitable foraging habitat is present at Shower Bog adjacent to the overhead line.

8.6.2.3.5 Other Projects or Activities

Both the consented Bunkimalta Windfarm and the consented Castlewaller Windfarm are located within the Slievefelim to Silvermines SPA, c.2.5km to the north of the UWF Grid Connection (Bunkimalta Windfarm), and in the area of the UWF Grid Connection respectively (Castlewaller Windfarm). Both of these windfarms are located within areas containing suitable foraging and nesting Hen Harrier habitat and in close proximity to known historical and more recent nesting attempts. Both developments are or will be subject to significant management plans in respect of Hen Harrier.

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Forestry is widespread within the SPA (approximately half of the site is afforested, including both first and second rotation plantations and clear fell areas) and is consequently listed as one of the most important activities with high effect on the SPA (High negative rank).

Agriculture (hill farming) constitutes roughly one half of the land use within the SPA, and is mainly based on the usage of rough grassland. Grazing is a medium ranked activity both in terms of negative and positive impacts on the SPA.

Turf-Cutting or Peat Extraction, both mechanically and by hand is also a medium ranked negative pressure on the SPA.

Biodiversity

Topic

8.6.3 PROJECT DESIGN MEASURES for Hen Harrier

At the conception of the UWF Grid Connection, the design team evaluated the potential for significant impacts to the environment. Impacts will only take place where three components exist together; (1) the source of the impact (project), (2) the receptor of the impact (sensitive aspect) and (3) a pathway between the source and the sensitive aspect. The objective of mitigation measures is to avoid, prevent or reduce, one of the three components of an impact by choosing an alternative location, alternative design or an alternative process. Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the development – these are the Project Design Environmental Protection Measures, which are shortened to 'Project Design Measures' in this EIA Report.

The development as evaluated in the EIA Report incorporates the Project Design Measures.

The Project Design Measures outlined in Table 8-54 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Hen Harrier**.

Table 8-54: UWF Grid Connection Project Design Measures relevant to Hen Harrier

PD ID	Project Design Environmental Protection Measure (PD)
PD26	If works are programmed to begin in the Hen Harrier breeding season (March to August) confirmatory hen harrier breeding surveys will be completed, before such works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary. These surveys will be completed prior to the start-up of all construction activities, until construction is complete and for 3 years thereafter. No construction works will take place within 500m of an active hen harrier breeding attempt or active nesting activity, during the breeding season (March to August).
PD27	During the hen harrier roosting season (October to February inclusive), construction works within 1000m of a roost will be limited to the period between one hour after sunrise to one hour before sunset.
PD28	Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season *i.e.* not during the period of March to August inclusive where possible. This includes hedgerow and scrub removal in addition to hedgerow trimming.
PD62	Slievefelim to Silvermine Mountain SPA: All new permanent access roads within the SPA will be 'concealed access roads' which will be created immediately following construction works by covering the hardcore surface of the new road with a vegetated layer using the following method - firstly a geotextile material is laid on the road, covered in a layer of load bearing root-zone mix of peat and stone and then covered in turn by interlocking rigid geocells. The geocells and roadside berms (where present) will be planted with a mix of mature native Irish or Scottish heathers and grasses, with the mix depending on location. Where heather is being planted a depth of at least 150mm of peat will be provided. These 'concealed access roads' will provide a load bearing surface for occasional maintenance vehicles. Within the SPA, the establishment of the Concealed Access Roads will be overseen by a competent peatland ecologist and a hen harrier expert.
PD63	Slievefelim to Silvermine Mountain SPA: All temporary storage berm locations will be re-instated to the biodiversity value of the underlying habitat. Permanent berms will be immediately re-seeded with native heather and upland grass species. Harvester crossing points will be covered with topsoil and reseeded immediately as will any other temporary land-use change locations. Within the SPA, this reinstatement will be overseen by a competent peatland ecologist and a hen harrier expert, outside the SPA this reinstatement will be overseen by the Project Ecologist.
PD64	Slievefelim to Silvermine Mountain SPA: Annual visual inspections of the lands over the 110kV UGC and the testing/inspection/planned maintenance at Joint Bays, will be scheduled outside of the hen harrier breeding season, on those parts of the 110kV UGC which occurs within the boundary of the Slievefelim to Silvermines SPA.

Cumulative Information: Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the fundamental design of the UWF Related Works, UWF Replacement Forestry and into the consented design

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of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in Appendices 5.3, 5.4 and 5.5 in Volume C4: EIAR Appendices.

8.6.4 EVALUATION OF IMPACTS to Hen Harrier

In this Section, the likely direct and indirect effects of the UWF Grid Connection are identified and evaluated. Then the likely cumulative effects of the UWF Grid Connection together with the Other Elements of the Whole UWF Project and Other Projects or Activities are identified and evaluated.

A conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) - Hen Harrier.

As a result of the exercise, some impacts were included and some were excluded.

Table 8-55: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Reduction in or loss of Suitable Foraging Habitat (construction/operational stages)	*Reduction in Prey Item Species (construction stage)*
	Reduction in or Loss of Suitable Nesting Habitat, (construction stage)
	Mortality of Hen Harrier in or at Nest Sites, (construction stage)
	Reduction in or Loss of Winter Roosts, (construction stage)
	Mortality of Winter Roosting Hen Harrier, (construction stage)
	Disturbance/Displacement of Nesting or Roosting Hen Harrier, (construction stage)
	Additive mortality/disturbance, (construction stage)
	Disturbance/displacement, (construction stage)
	Disturbance/displacement, (construction stage)

The source-pathway-receptor links for the impact included are described in the Impact Evaluation Table in the **following Section 8.6.4.1**.

The source-pathway-receptor links and the rationale for impacts excluded are described in the section directly after the Impact Evaluation Table in Section 8.6.4.2.

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8.6.4.1 Impact Evaluation Table: Reduction in or Loss of Suitable Foraging Habitat

Impact Description	
Project Life Cycle Stage:	Construction/Operational stage

Impact Source: provision of new permanent access roads and substation compound

Cumulative Impact Source: provision of windfarm access roads, turbine hardstanding areas and substation compounds; Land cover change from Agricultural Practices such as drainage, Direct habitat loss through peat extraction of intact bog, and habitat loss through forest maturation.

Impact Pathway: Land cover

Impact Description: Hen Harrier is a very high sensitivity receptor of International Importance. Land take or land use/cover change of foraging habitats such as grassland, scrub, bog and forestry during the construction stage may cause secondary effects for this Annex I species and SPA qualifying interest. Loss of foraging habitat at key periods of the breeding cycle can have knock on effects on breeding success of identified pairs nesting nearby, in particular where it occurs within 2km of a nest location. The spatial extent of habitat loss will be limited to roads, berms and other permanent features but also the width of the clear fell corridor at Castlewaller and along the UWF Grid Connection cable route. Temporary land use change for works such as cable trenching will be reinstated immediately following construction and therefore effects from this will be Neutral (equivalent to no effect or effects that are imperceptible), as will the loss of 45m of hedgerow from 9 no. locations. Temporary storage berms, (n=22) are located for along the UGC route; a project design measure is in place to ensure these are immediately re-instated to their previous condition. Permanent berms will be immediately re-seeded with heather. Harvester crossing points will be covered with topsoil and reseeded immediately as will any other temporary land-use change locations. Reinstatement will be overseen by the project Ecologist.

Any impact is negated by the provision of concealed geocell roadways, planted with grass or heather, for all new permanent roads within the SPA. Felled commercial forestry at Castlewaller (1 ha) will be replaced within 1ha of deciduous woodland as part of the UWF Replacement Forestry element. The felled area at Castlewaller will contain a concealed geocell roadway, which, along with the remainder of the corridor at that location, will be planted with native mature heather and grasses (Irish or Scottish sourced). Planting of geocell with mature plants along with a suitable grass nurse species will take place prior to construction, to avoid any time delay in the provision of habitat at source.

Impact Quality: Negative, positive and neutral (varies per project)

Evaluation of Subject Development Impact – Reduction in or Loss of Suitable Foraging Habitat

Element 1: UWF Grid Connection

Impact Magnitude:

Total permanent land take of foraging habitat is confined to improved agricultural grassland (2.47Ha); Wet Grassland (0.27Ha); Wet Grassland/Scrub mosaic (0.04Ha); Mature or closed canopy conifer plantation (2.14Ha), deciduous woodland (0.09Ha) and Scrub (0.11Ha) and totals 5.12Ha (2.44Ha of which is within the SPA). For the avoidance of doubt the calculation of permanent land take is based on all new permanent access roads, permanent berms (including overburden storage berms and notwithstanding seeding will take place immediately) and forestry felling (notwithstanding not all this habitat is suitable).

A proportion of the land take above, located within the boundary of the SPA, will be covered with concealed access road roads, planted with either native grass species or heather as appropriate to match the surrounding habitat- so as to avoid effects on the SPA itself. This comprises improved agricultural grassland (0.08Ha); Wet Grassland (0.09Ha); and Mature or closed canopy conifer plantation (0.4Ha at Castlewaller) and totals 0.6Ha. Permanent Berms (0.434Ha) within the SPA will be immediately reinstated as will all remaining locations comprising 0.855Ha.

As permanent habitat loss/exclusion is avoided within the SPA through this mitigation at source as part of project design, the net permanent loss is (5.12Ha -1.98Ha) which is 3.14Ha, in total from the study area.

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Sensitive Aspect: Hen Harrier

Significance of the Impact: Moderate (negative)

Rationale for Impact Evaluation:

- The very high sensitivity rating of the species (context), and;
- The magnitude of effect, on the sensitive aspect Hen Harrier, following Percival *et al*. is evaluated as 'Low' (1-5% of habitat lost), equivalent to a minor shift away from baseline conditions however with the underlying character and composition remaining similar to pre-development circumstances;
- The permanent duration of permanent habitat loss, and ;
- The reversibility of effects with the use of concealed access road roads at source within the SPA, and the further instatement of foraging habitat.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:

Total permanent land take of foraging habitat is confined to improved agricultural grassland (0.12Ha); Wet Grassland (0.07Ha), upland blanket bog/Conifer mosaic (0.01Ha), Mature or closed canopy conifer plantation (0.28Ha) and scrub (0.004Ha) and totals 0.48Ha, and represent 0.28% of the available foraging habitat within the study area.

Note: Within the Related Works, HW7 is the only location where the construction works boundary overlaps the Hen Harrier SPA, comprising 0.027Ha of scrub adjoining an existing yard at this location. All other UWF Related Works lands are located outside the SPA. No land use change will take place at this location, in line with the precautionary principle, to avoid effects on habitats possibly suitable for Hen Harrier.

Significance of the Impact: Slight (negative)

Rationale for Impact Evaluation:

- The very high sensitivity rating of the species (context), and;
- The extent of permanent habitat loss, evaluated as a very slight change from baseline condition, and;
- The long term duration of permanent habitat loss, and;
- The reversibility of the impact with the replanting and management of lands for the use of Hen Harrier at over the lifetime of the Project Element;

Element 3: UWF Replacement Forestry

Impact Magnitude:

Available foraging habitat for Hen Harrier currently within the land folio boundary comprises improved agricultural grassland (3.54Ha); Wet Grassland (0.44Ha) and Scrub (0.01Ha); in total 3.99Ha. This entire area will undergo landuse change to UWF Replacement Forestry (deciduous forestry) to be managed specifically for the use of Hen Harrier, including the incorporation of 'tried and tested' management measures which facilitate Hen Harrier foraging and usage.

Significance of the Impact: **Very Significant (positive)**

Rationale for Impact Evaluation:

- The demonstrated sensitivity of Hen Harriers to positive management (context), and;
- The extent of lands to be managed for Hen Harrier, and;
- The permanent duration, and;
- The Non-reversibility with lands to remain post decommissioning.

Element 4: Upperchurch Windfarm

Impact Magnitude: As per the 2013 RFI the magnitude of foraging habitat loss was calculated as 95Ha (actual loss plus effective loss through displacement effects). For completeness, given that the estimate of total displacement was based on 2017 as the construction year, an upwardly revised total estimate of 98.11Ha has been extrapolated from data provided in the RFI (Table 7 of the UWF Ecological Management Plan). This figure

corresponds with 2019 as the construction year – however it is still less than the 128Ha of lands to be provided as additional favourable foraging areas under the Upperchurch Hen Harrier Scheme (evaluated other 'UWF Other Activities') but acknowledged herein as the conditioned mitigation in respect of effects via displacement/effective habitat loss

Significance of the Impact: Neutral Residual Impact

Rationale for Impact Evaluation:
- The effective loss of 98.11Ha of habitat constitutes an effect of medium magnitude (5-20% of available habitat lost);
- The implementation of the Upperchurch Hen Harrier Scheme, as conditioned;
- Very High sensitivity of the species, and;
- Long term duration.

Element 5: UWF Other Activities

Impact Magnitude: Haul Route Activities will not result in loss of foraging habitat. Monitoring Activities will not result in a loss of Hen Harrier foraging habitat. Overhead Line Activities will not result in loss of foraging habitat. The Upperchurch Hen Harrier Scheme will result in 2.2Ha of trees, 1.4km of riparian habitat and 2.8km of new hedgerow being enhanced or created during initial activities. In total 128Ha of agricultural lands will be managed for the benefit of Hen Harrier, outside the turbine 250m buffer and the footprint of the development; as per the EMP. The net gain to Hen Harrier is 128Ha-98.11Ha which is 28.9Ha. The magnitude of this gain (an increase of 30% on the effective lands loss plus management of 128Ha) is evaluated as High as it constitutes a major alteration to the baseline features present.

Significance of the Impact: **Very Significant (positive)**

Rationale for Impact Evaluation:
- The demonstrated sensitivity of Hen Harriers to positive management (context), and;
- The extent of lands to be managed for Hen Harrier, and;
- The long term duration, and;
- Low reversibility.

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Consented Castlewaller Windfarm

Impact Magnitude: Effective Habitat Loss of Hen Harrier habitat within 250m of each turbine location, where harriers use second rotation aged 3-9 years-estimated at 47.9Ha.[10] However, it was also proposed to manage 47.9Ha of clear felled woodland for the lifetime of the windfarm for the benefit of Hen Harrier.

Significance of the Impact: Neutral residual effect

Rationale for Impact Evaluation:
- The impact is evaluated as neutral given the effective habitat loss is exactly equivalent to the area of clear felled woodland to be managed for the benefit of Hen Harrier, over the lifetime of the wind farm.

Other Project: Consented Bunkimalta Windfarm

Impact Magnitude: The Bunkimalta Windfarm SHMP acknowledges that Hen Harriers may show avoidance around 250m of each turbine. A total area of 162.76 hectares must be replaced by mitigation measures. DAHG cites this figure also.
As the residual effects presented in the Windfarm EIS were subject to substantive discussion subsequent to decision, we do not cite these; rather we cite the relevant text from the inspectors Report. The comments below

[10] Castlewaller Woodland Partnership (2007). Response to RFI from North Tipperary County Council prepared by Fehily Timoney and Company

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refer to the loss of foraging habitat within the context of Conservation Objectives for the (Hen Harrier) SPA, as cited in the Inspectors Report for Bunkimalta Wind Farm:
Pg. 34
"In summary therefore, I conclude that the relevant matter is that there is a total mitigatory habitat of 164.3 hectares which compares favourably with the 162.76 hectares lost. Subject to the Board being satisfied that the management of the 137.3 hectares of perpetual open canopy forest under the SHMP will provide suitable Hen Harrier habitat then the Board can be satisfied that the development would be in accordance with the conservation objective for the SPA." and;
Pg.41
"Based on the available information, which includes best scientific evidence and which is adequate for the purposes of Appropriate Assessment; I consider that the development would not result in net loss of Hen Harrier habitat. Therefore, I conclude that the Board can be satisfied that the development would not significantly affect the integrity of the SPA having regard to its Conservation Objective"

Significance of the Impact: Neutral residual effect

Rationale for Impact Evaluation:
• Based on an evaluation of "no net loss"

Activity: Forestry/Agriculture

Impact Magnitude: Hen Harrier in Ireland makes extensive use of both first and second rotation pre-thicket forest habitat during the breeding period. However, by its successional nature forests inevitably matures and become less suitable (Avery & Leslie, 1990; Madders, 2000; 2003; O'Donoghue, 2004).

The following is cited directly from the document titled "Hen Harrier Conservation and the Forestry Sector in Ireland", published by NPWS in 2015:
"Forests less than 15 years old constitute to varying degrees a potential foraging resource for Hen Harriers. In line with the forecasted reduction in the extent of the forest nesting resource, indicative future estimates of the extent of the potential national *forest foraging* resource within the SPA network shows an acute declining trend over the next 10 years[11]"(emphasis added). This negative trend is also applicable to the Slieve Felim to Silvermines Mountains SPA.

It is likely that some sites within the 'wider countryside' areas supporting breeding Hen Harrier that have been afforested will also experience forestry related changes both due to the maturation of existing forest habitat and the conversion of currently useful habitat (e.g. scrub, low intensity managed farmland) to a less stable state.
In relation to Agriculture, in the absence of available information on trends it is evaluated as Neutral.

Significance of the Impact: **Significant (negative)**

Rationale for Impact Evaluation:
• precautionary basis

Other Project: Turf-cutting

Impact Magnitude: Habitats possibly subject to Peat Extraction such as Upland Blanket Bog (335Ha or 1.61% of the SPA) and Cutover Bog (507Ha or 2.42% of the SPA) occur within the SPA. Peat extraction by hand or through mechanical means is ranked as a medium level pressure in respect of Hen Harrier within the SPA[12].
Some of these habitats where they overlap the SPA are further protected through the provision of NHA's wherein further turf cutting of intact areas is unlawful, or SAC's wherein Conservation Objectives to protect Qualifying Interest bog are set out.
In closer proximity to the Development, turf extraction forms part of the current baseline environment at Bleanbeg Bog but is limited to existing banks and further cutting of intact (uncut) areas, in addition to land take from other activities such as infrastructure, material removal etc. is, as already described unlawful[13]

Significance of the Impact: Neutral

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[11] NPWS.2015. Hen Harrier Conservation and the Forestry Sector in Ireland.
[12] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004165.pdf
[13] http://www.irishstatutebook.ie/eli/2005/si/497/made/en/print

Rationale for Impact Evaluation:

- Restrictions on further turf cutting in intact areas/protected areas, and;
- The limited extent of lands subject to turbary (rights to cut turf) within the Hen Harrier SPA overall (4%), and;
- The reversibility of any effect, (in the context of Hen Harrier) with birds expected to continue to utilize re-vegetating cutover bog *for foraging.*

Evaluation of Cumulative Impacts – Reduction in or Loss of Suitable Foraging Habitat

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:

Both positive and negative quality effects occur with regard to Hen Harrier foraging Habitat loss across the Whole UWF Project. The negative effects of Upperchurch Windfarm, which is evaluated herein within the context of effective displacement based on a revised construction date (as per the Windfarm RFI); is effectively mitigated by the activities consented under the Upperchurch Hen Harrier Scheme, which as intended results in a net gain through design to Hen Harrier both in area and quality of habitat. Remaining negative effects primarily stem from the UWF Grid Connection; however the provision and management of UWF Replacement Forestry specifically for Hen Harrier, outside but adjacent to the SPA also contributes to a net gain overall to Hen Harrier of over 30.26Ha of actively managed foraging habitat.

Significance of the Cumulative Impact: Significant (positive)

Rationale for Cumulative Impact Evaluation:

- The demonstrated sensitivity of Hen Harriers to positive management (context), and;
- The extent of lands to be managed for Hen Harrier overall, and;
- The long term to permanent duration, given that UWF Replacement Forestry will not be decommissioned, and;
- The reversibility of negative effects with the application of the Upperchurch Hen Harrier Scheme and other measures as described.

All Elements of the Whole UWF Project with Other Projects or Activities

Cumulative Impact Magnitude:

The magnitude of foraging habitat loss resulting from the Whole UWF Project, Castlewaller Wind Farm and Bunkimalta Wind Farm is 312.39Ha. As 344.19Ha of land is additionally subject to management directly for the benefit of Hen Harrier, a net gain of 31.8Ha of foraging habitat will accrue. If Castlewaller WF and Bunkimalta are excluded from consideration, on the assumption that they may not be constructed or the mitigating effects from their respective management plans are merely neutralising effects, then the cumulative effect is in the order of the Whole UWF Project only, which is still a gain in actively managed Hen Harrier habitat of 30.26Ha, with no permanent exclusion of Hen Harrier from lands within the SPA portions of the development. A significant negative effect rating is utilised for predicted reductions in forestry based foraging habitat in the next 10 years, with the effects of peat extraction on foraging habitat evaluated as neutral.

Significance of the Cumulative Impact: Neutral

Rationale for Cumulative Impact Evaluation:

- The net gain in terms of lands managed specifically for the use of Hen Harrier, and;
- Extent of lands to be managed in total, notwithstanding,
- The medium-term duration of a negative trend in respect of reductions in forestry based foraging habitat

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8.6.4.2 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-56 below.

Table 8-56: Description and Rationale for Excluded Impacts to Hen Harrier

Key: 1: UWF Grid Connection; 2: UWF Related Works; 3: UWF Replacement Forestry; 4: Upperchurch Windfarm; 5: UWF Other Activities

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage/Planting Stage				
Land Take	1,2,3,4,5	Land cover	Reduction in Prey Item Species	Evaluated as Excluded: Neutral effects Neutral population level effects on prey item bird species are predicted, either from additive mortality or habitat loss. Neutral effect on the availability of small mammals as a result of habitat loss or additive mortality is expected. Therefore, Neutral secondary effects via a reduction in the availability of prey items as a result of project elements are likely.
Land Take	1,2,3,4,5	Land cover	Reduction in or Loss of Suitable Nesting Habitat	Evaluated as Excluded: No nesting habitat (i.e. suitable bog, pre-thicket forestry) overlaps the construction works area. All new permanent roads within the SPA will be concealed access road under a layer of rigid geocells, which will be planted with grass and heather species (Project Design).
Forestry Felling	1,2,3,4,5	Contact	Mortality of Hen Harrier in or at Nest Sites	Evaluated as Excluded as no works will take place within 500m of a nest March - August as part of Project Design.
Land Take	1,2,3,4,5	Land cover	Reduction in or Loss of Winter Roosts	Evaluated as Excluded: No winter roosts overlap works areas no land take is proposed as part of UWF Other Activities.
Land Take	1,2,3,4,5	Contact	Mortality of Winter Roosting Hen Harrier	Evaluated as Excluded as winter roosts are located outside the construction works areas. Measures to avoid disturbance to winter roosting harriers as part of Project Design will also prevent mortality.
Noise and human activity	1,2,3,4 5	Visibility	Disturbance/Displacement of Nesting or Roosting Hen Harrier	Evaluated as Excluded as no works will take place within 500m of an active breeding attempt as part of Project Design; Construction works within 1000m of a winter roost will be limited to the period between one hour after sunrise to one hour before sunset during the months of October to February inclusive, also as part of Project Design.
Operational Stage/ Growth Stage				
Landuse Change, Telecom Relay Pole, new permanent access roads	1,2,3,4,5	Land cover, collision	Additive mortality/disturbance	Evaluated as Excluded: No potential for impacts. There will be no increase in accessibility. All new roads will have gates which will be locked on landholder boundaries. No potential for cumulative impacts with Upperchurch Windfarm.

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				Upperchurch Windfarm: As per the 2014 ABP Inspectors Report no significant residual impact to Hen Harrier is expected to occur. There would be no potential for cumulative impacts with other project elements, as follows: UWF Grid Connection: no likely impact with the Mountphilips Substation, all other parts are either underground or at ground level (i.e. new roads). UWF Related Works: no likely impact with the Telecom Relay Pole, due to the immobility of this structure and no precedent in the literature for this structure as a collision risk (akin to telegraph pole). UWF Replacement Forestry: no potential for effects due to the absence of moving structures.
Noise and human activity	1,2,3,4,5	Air and Visibility	Disturbance/displacement	Evaluated as Excluded: No potential for impacts/Neutral effect; UWF Grid Connection and UWF Related Works (HW7): - Avoidance of annual inspections and Planned Maintenance works or activities within the SPA during the breeding season is built into design. UWF Grid Connection: Any unscheduled repair work, which may need to take place during the breeding season, will occur very infrequently, if at all, and where Unscheduled Repairs do occur, works will take place at joint bay locations using small 4 – 5 man crews and a small number of machines (excavator, cable pulling machine), these works if they do occur will take c.2weeks to complete. Due to the infrequent, reversible, and temporary duration, and location of any works from permanent roads, it is considered that disturbance/displacement effects to hen harriers will be Neutral during unplanned repairs, should they occur at all. UWF Replacement Forestry: Evaluated as Excluded: All works will be done by hand and equivalent to typical farming activities, therefore the magnitude of any noise or visual intrusion will be Negligible and any disturbance or displacement effects are likely to be Neutral via. UWF Other Activities: Evaluated as Excluded: Element 4: HA1-HA20. These are excluded from further evaluation as works involve street furniture removal or activities on public roads with no significant source of noise or intrusion.
Decommissioning Stage				
Noise and human activity	5 (HA1-HA20)	Visibility	Disturbance /displacement	Evaluated as Excluded: UWF Grid Connection – will not be decommissioned. Neutral effect. UWF Replacement Forestry – permanent, will not be felled. Neutral effect.

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				Upperchurch Windfarm and UWF Related Works - Works will take place from hardcore areas, small number of machines required and brief duration of use (2 to 3 days) at each turbine location. UWF Other Activities: –Haul Route Activities: Neutral effect as any activities will involve street furniture removal or activities on public roads with no significant source of noise or intrusion. No requirement for activities associated with the remaining UWF Other Activities.

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8.6.5 Mitigation Measures for Impacts to Hen Harrier

Mitigation measures were incorporated into the UWF Grid Connection project design including the Project Design Measures. No additional mitigation measures are required as **no significant adverse impacts** are concluded by the topic authors as likely to occur to Hen Harrier as a consequence of the UWF Grid Connection.

8.6.6 Evaluation of Residual Impacts to Hen Harrier

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table for Hen Harrier above (Section 8.6.4.1) – i.e. **no significant adverse impacts**.

8.6.7 Application of Best Practice and the EMP for Hen Harrier

Best Practice Measures (BPM), although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

The following Best Practice Measures have been developed, for the protection of **Hen Harrier,** by the authors of this topic chapter, using industry best practice:

GC-BPM-12	Monitoring of nesting and roosting Hen Harrier (*Circus cyaneus*)
GC-BPM-17	Best practice measures for the removal of vegetation during construction

These Best Practice Measures are included in full at the end of this topic chapter, and also form part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

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8.6.8 Summary of Impacts to Hen Harrier

A summary of the Impact to Hen Harrier is presented in Table 8-57.

Table 8-57: Summary of the impacts to Hen Harrier

Impact to Hen Harrier:	**Reduction in or Loss of Suitable Foraging Habitat**
Evaluation Impact Table	*Section 8.6.4.1*
Project Life-Cycle Stage	Construction/Operation
UWF Grid Connection	**Moderate (negative)**
Element 2: UWF Related Works	Slight (negative)
Element 3: UWF Replacement Forestry	**Very Significant (positive)**
Element 4: Upperchurch Windfarm	Neutral residual effect
Element 5: UWF Other Activities	**Very significant (positive)**
Cumulative Impact:	
All Elements of the Whole UWF Project	**Significant (positive)**
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities: Bunkimalta Windfarm Castlewaller Windfarm Forestry, Agriculture, Turf-Cutting	**Neutral**

The greyed out boxes in the above summary table relate to the cumulative information for the Other Elements of the Whole UWF Project, which are included to show the totality of the project.

Topic: **Biodiversity**

8.7 Sensitive Aspect No.6: General Bird Species

This Section provides a description and evaluation of the Sensitive Aspect - General Bird Species.

8.7.1 BASELINE CHARACTERISTICS of General Bird Species

8.7.1.1 STUDY AREA for General Bird Species

The study area for General Bird Species in relation to the UWF Grid Connection is described in Table 8-58 and illustrated on Figure GC 8.7: General Bird Species within the UWF Grid Connection Study Area - Overview map and Maps 1 – 2 (Volume C3 EIAR Figures).

Table 8-58: UWF Grid Connection Study Area for General Bird Species

Study Area for General Bird Species	Justification for the Study Area Extents
construction works area boundary plus 500m to 2km area from the boundary as pertinent	Professional judgement and as per Best Practice (CIEEM, 2016,NRA, 2008, Lusby et al.,2010,SNH 2014)

8.7.1.2 Baseline Context and Character of General Bird Species in the UWF Grid Connection Study Area

The receiving environment in the UWF Grid Connection Study Area supports a wide variety of general bird species of open countryside and farmland, in addition to more specialist upland species. Some of these are afforded a higher conservation status due to their scarcity and for example, presence on Annex I of the Habitats Directive. Some species, such as Golden Plover are only present during the winter months within which they disperse widely over suitable habitat, whilst other sedentary species are present throughout the year and retain smaller more localised territories for foraging and breeding.

Detail is provided herein in respect of General Birds (both breeding and winter season) but also specific species evaluated as requiring further consideration. The requirement for further evaluation is based on a sensitivity rating as defined in Table 8-3, derived from survey results and the process of scoping. It infers a known sensitivity to effects from sources such as included within the current development, but is also reflective of the conservation status (locally/nationally/internationally) of the species within the study area overall.

Further detail on all species recorded is included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.7), Appendix 8-1 can be found in Volume C4 EIAR Appendices. Maps of transect locations for breeding and winter bird transects are illustrated in Figure GC 8.7: General Bird Species within the UWF Grid Connection Study Area, maps of Golden Plover observations are also included in Figure GC 8.7.

General Breeding Birds

Breeding Bird surveys of the UWF Grid Connection represent a sample of habitats present within the receiving environment across 2 no. breeding seasons one each in 2016 and 2017.

A species list comprising 58 species was compiled. Many of these species are typically representative of the land use present, and have strong associations with the type of activities present e.g. hill farming in respect of the quality of habitat present. The most abundant species are typical birds of open countryside and hedgerows such as Wren, Rook, Chaffinch, Robin, Barn Swallow, Meadow Pipit and Blackbird. Typical migrant species recorded included Swift, Cuckoo, Barn Swallow, House Martin, and Grasshopper Warbler. All of the above breed and forage in the receiving environment within suitable habitat. In general the receiving environment would be quiet with many species unlikely to undergo significant disturbance other than from day to day farming activities, and occasionally forestry operations.

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One 'Red-Listed' species (Meadow Pipit *Anthus pratensis* a species which favours rough pastures and uplands but is currently declining), 14 Amber and 41 Green listed species were recorded. Observations of raptors from transect locations, included single sightings of Sparrowhawk (*Accipiter nisus*) across both years and an observation of Hen Harrier in 2016.

For complete detail of breeding birds across transects and seasons, in addition to conservation importance please see Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.7). Maps of transect locations are illustrated in Figure GC 8.7.

General Wintering Birds

Wintering bird transects of the UWF Grid Connection undertaken in 2016/17 and again in 2017/18 recorded 34 species of birds within or in close proximity to the construction works area boundary. The species assemblage included 3 Red listed species (Golden Plover, Meadow Pipit and Grey Wagtail), 8 Amber listed (Kestrel, Common Snipe, Robin, Stonechat, and Mistle thrush, Goldcrest, Starling and House Sparrow) and 19 Green listed species. Rook, Robin and Chaffinch were the three commonest species. The importance and sensitivity of all of the above species are provided in Section A8-1.2.4.7 (Appendix 8.1).

Meadow Pipit

Meadow Pipit is a very widespread species in Ireland, found in bogs, uplands and areas of scrub and pasture, with an estimated population of 500,000 to 1, 000, 000 pairs. Birds are ground nesting and typically feed on invertebrates such as crane flies, mayflies and spiders.

Of the general breeding bird species recorded, populations of the red-listed Meadow Pipit present have been evaluated as of County Importance and assigned a sensitivity rating of Medium for evaluation.

Baseline results suggest that wet heath habitat such as present at Baurnadomeeny along the UWF Grid Connection supports the highest densities.

This species is generally faithful sedentary in the summer but upland birds do move to lowland areas in the winter months.

Golden Plover

Golden Plover breed in heather moors, blanket bogs & acidic grasslands. Their breeding distribution is limited to the uplands of northwest counties in Ireland and they do not breed within the study area. Throughout the winter, Golden Plovers are regularly found in large, densely-packed flocks, and in a variety of habitats, both coastal and inland. Their distribution is widespread in Ireland.

In inland areas, small numbers of birds are often widespread in suitable wintering habitat within a local area but often coalesce to form larger aggregations. Preferred winter habitats are typically low growing crops (winter cereal), ploughed land and grassland where birds feed nocturnally on invertebrates such as earthworms and beetles. The Irish wintering population, comprising mainly birds from Iceland, is estimated at c.100, 000 individuals nationally. Golden Plover was recorded on 2 occasions from winter transects at Knocknabansha and Baurnadomeeny. In each instance flock size was low (less than 7 individuals).

Biodiversity

Topic

Further, incidental sightings (n=12) of Golden Plover outside the UWF Grid Connection construction works boundary over the wintering period 2016/17 are also described. The average flock size recorded was 29 (range 2-200), with the peak observation of 200 birds in the townland of Fiddane, to the north of the route corridor at Castlewaller, on 14/3/2017. It is clear that birds may utilise suitable habitats in proximity to the route corridor in low numbers (excluding the observation of 200 birds the average flock size observed is 12 birds), with increased aggregations occasionally over higher ground as is characteristic of the species in winter.

Golden Plover, as an Annex I, Red Listed species are assigned a sensitivity rating of High.

Red Grouse

The Red Grouse is a sub-species of Willow Grouse. It is resident in the west and north of Britain and in Ireland. In Ireland, it is a widespread breeding bird but nowhere is it numerous. Found on mountains, moorland and lowland blanket bogs and raised bogs, where it is associated with heather, which it requires for food, shelter and nesting.

Four individual calling male Red Grouse (Red-listed) were present in March 2017 on Bleanbeg Bog, in proximity to the UWF Grid Connection. Locations of Red Grouse observations are included in Figure GC 8.7. The presence of this species has been previously described at Bleanbeg (Bleanbeg Bog NHA Site Synopsis). This species is dependent on heather dominated habitats such as (upland and lowland) blanket bog and raised bog and is unlikely to occur outside of same.

Red Grouse are evaluated as of County Importance and assigned a sensitivity rating of medium.

Merlin

Merlin is the smallest species of falcon. It is a rare breeding bird in Ireland. It nests on the ground on moorland, mountain and blanket bog. Also nests in woodland, isolated trees, and has taken to nesting in forestry plantations adjacent to moorland. More Merlin's are found in the west of the country but they are scattered across the midlands and the Wicklow Mountains also hold good numbers.

Merlin (Amber-listed) surveys to Best Practice in 2017 at Bleanbeg bog, in proximity to the UWF Grid Connection found no evidence to support breeding despite the location being scoped in for breeding status evaluation. Further detail with regard to Merlin surveys is included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.7). There were 2 records of single birds during the winter period 2016/17 from VP surveys of the UWF Grid Connection.

Wintering Merlin records are not indicative of breeding as during the winter month's resident Merlin leave breeding sites and move to low-lying areas, in addition numbers in Ireland are swollen by immigrants. Merlin in the density recorded are evaluated as of Local Importance (low value) and assigned a sensitivity rating of Negligible.

Curlew

Curlews can nest in a range of habitats in Ireland, from wet grasslands such as the River Shannon Callows to marginal hill land. They favour damp pastures grazed lightly by cattle, with a scattering of rush tussocks for nesting in and some wet areas to provide insects for their chicks to feed on. Huge changes in the uplands, such as the destruction of peat bogs, afforestation, more intensive management of farmland and the abandonment of some lands, leading to encroachment by scrub, gorse and dense rushes, have all affected Curlew breeding habitat.

Curlew was recorded at Bleanbeg bog, in proximity to the UWF Grid Connection, in May 2017. On 30/5/17, a male and female were recorded in activity indicating a breeding attempt. The observation location is outside the nearest point of the construction works boundary at a distance of approximately 400m, but conservatively within the threshold established in the literature for disturbance related effects (800m) during the breeding season - albeit with regard to higher magnitude source stimuli established for wind farm construction.

Breeding Curlew is evaluated as of National Importance and assigned a sensitivity rating of High.

Kingfisher

Kingfishers breed in tunnels dug in vertical banks along streams and rivers. They are a very sedentary species, and rarely move from their territories. However, some may move to lakes and coasts during extended spells of poor weather. They are widespread in Ireland and found on streams, rivers and canals.

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With regard to the UWF Grid Connection watercourses a distance band of 300m upstream and downstream of all watercourse crossing locations including the Newport (Mulkear), Clare and Bilboa Rivers were checked for Kingfisher nest holes. No nest holes or evidence of nesting were identified in the study area. No individuals were observed.

Kingfishers are Amber listed in Ireland. A sensitivity rating of low is applied.

8.7.1.3 Importance of General Bird Species

All wild bird species are protected by legislation under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000.

Merlin, Hen Harrier and Golden Plover are listed on Annex I of the EU Birds Directive 2009/147/EC whilst Red Grouse is listed on Annex II. Curlew is now classified on the IUCN Red List as 'near threatened'.

8.7.1.4 Sensitivity of General Bird Species

General breeding birds are sensitive to habitat loss and disturbance/displacement from noise and/or visual intrusion. Wintering birds are similarly sensitive.

Golden Plover are sensitive to changes in land cover or land use of suitable foraging or roosting habitat such as improved agricultural grassland, wet grassland or grassland mosaics, and upland blanket bog, where land cover/use change may cause reductions in foraging success, increased exposure to predation through displacement to less viable feeding areas, and also reduction in survival rates of wintering birds. Wintering Golden Plover are also sensitive to disturbance or displacement effects due to noise, visual intrusion, and anthropogenic sources.

Meadow Pipit are also sensitive to changes in land cover or landuse which results in a decrease of suitable nesting habitat (improved agricultural grassland, wet grassland or grassland mosaics, and upland blanket bog), these changes can effect breeding numbers, foraging success, and increased exposure to predation through displacement to less viable feeding areas, and local population level declines.

Breeding waders such as Curlew are sensitive to habitat loss or fragmentation through afforestation, habitat loss from peat extraction, ground based predation, destruction from agricultural machinery and abiotic variables such as flooding.

Bird species are sensitive to suitable landscaping/reinstatement from which positive effects may accrue.

8.7.1.5 Trends in the Baseline Environment (the 'Do-Nothing' scenario)

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In trend analyses on General Breeding Birds undertaken on 53 species within the most recent Countryside Bird Survey report (Crowe *et al.,* 2014) some 20 species showed increasing trends over the 16-year period since 1998, while 17 species remained relatively stable.

The most recently published Atlas (Balmer *et al.,* 2013) has shown that the species with the largest winter range are still the Hooded Crow, Wren, Robin and Blackbird. In Ireland the Atlas found that 74% of species had increased their winter range.

The abundance and diversity of the bird species within the baseline environment is evaluated as following the general trend of species populations throughout Ireland as described in published literature such as cited above. Given this, a scenario in which the subject development does not take place would result in a continuation of current trends relating to general bird species within the study area.

8.7.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to general bird species, as identified above, will be the receiving environment at the time of construction as no noticeable change is expected to occur within the relatively short time period prior to commencement of construction. Identified longer terms trends, such as declines in breeding Curlew is likely to overlap the operational phase, as are trends in respect of general breeding birds and wintering birds, identified in publications such as the 2013 Atlas.

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8.7.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

UWF Grid Connection is part of a whole project which comprises the following Other Elements; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Grid Connection is Element 1. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.

The Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in order to present the totality of the project.

NOTE: GREY Shading relates to additional information to facilitate the cumulative evaluations

8.7.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to General Bird Species considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 8.7.2.2.1 below.

The evaluation of cumulative impacts to General Bird Species also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to General Bird Species with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.3: Scoping of Other Projects or Activities (Section A2.3 .1 and Section A2.3. 8).

The results of this scoping exercise are that: Bunkimalta Windfarm has been scoped in for evaluation of cumulative effects to General Bird Species.

8.7.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements and Other Projects or Activities. The Cumulative Evaluation Study Area, comprises two different areas - one extent for cumulative evaluation of all of the Elements of the Whole UWF Project and a second extent for cumulative evaluation of Other Projects or Activities, see Table 8-59.

Table 8-59: Cumulative Evaluation Study Area for General Bird Species

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 2: UWF Related Works	50m area around and incorporating the construction works areas, afforestation lands, activity locations	Professional judgement and as per Best Practice (CIEEM, 2016,NRA, 2008, Lusby et al.,2010,SNH 2014)
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities: Bunkimalta Windfarm	1km from construction works areas and activity locations	General birds, due to their naturally smaller home ranges are unlikely to be cumulatively affected outside this distance.

Topic **Biodiversity**

8.7.2.2.1 Potential for Impacts to General Bird Species

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Project to cause cumulative effects to the Sensitive Aspect General Bird Species. The results of this evaluation are included in Table 8-60.

The location of, and study area boundary associated with, the Other Elements and Other Project which are included for cumulative evaluation is illustrated on Figure CE 8.7: General Bird Species within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-60: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Included for the evaluation of cumulative effects
Other Project or Activity	
Other Project: Bunkimalta Windfarm	Yes, included for the evaluation of cumulative effects

8.7.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.7.2.3.1 Element 2: UWF Related Works

All the species recorded the UWF Related Works EIA Report 2017 surveys are typical of the habitats present.

General Breeding Birds

Given the overlap between Upperchurch Windfarm and UWF Related Works locations we refer to the species described within the EIS for Upperchurch Windfarm. As per the EIS 2013, surveys of breeding birds to inform the baseline evaluation of Upperchurch Windfarm recorded 37 species in total across 'summer transects' and vantage point surveys. All the species recorded are typical of the habitats present. Species recorded include Skylark, Kestrel, Peregrine Falcon, Stonechat and Crossbill. Additional species recorded on Upperchurch Windfarm, were Raven, Peregrine Falcon (Annex I), Sand Martin, Crossbill and Reed Bunting. Of these is it considered that Peregrine and Sand Martin do not nest within the study area as there is no suitable nesting habitat present. Many of the remaining species are typically representative of the land use present, and have strong associations with the type of activities present e.g. hill farming in respect of the quality of habitat present.

All of the above breed and forage in the receiving environment within suitable habitat. In general the receiving environment would be quiet with many species unlikely to undergo significant disturbance other than from day to day farming activities, and occasionally forestry operations.

General Wintering Birds

Studies for the 2013 EIS on Upperchurch Windfarm (which overlaps the locations of UWF Related Works) recorded a typical assemblage of wintering species (n=24). Of these one Red listed (Meadow pipit), 7 Amber (Skylark, Robin, Hen Harrier, Kestrel, Starling, Mistle thrush, Goldcrest and Linnet) and 15 Green listed species

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were present. In the interest of clarity, we note that the BOCCI status presented herein is the more current Cummins and Colhoun (2013) evaluation, published subsequent to the Upperchurch Windfarm EIS.

Meadow Pipit

This is a very widespread species in Ireland, found in bogs, uplands and areas of scrub and pasture, with an estimated population of 500,000 to 1, 000, 000 pairs. Birds are ground nesting and typically feed on invertebrates such as crane flies, mayflies and spiders. This species is generally faithful sedentary in the summer but upland birds do move to lowland areas in the winter months. Meadow Pipit is present within the study area for UWF Related Works in suitable habitat (rough grassland and bog and mosaics of same). Meadow Pipit present have been evaluated as of County Importance and assigned a sensitivity rating of Medium for evaluation.

Golden Plover

Golden Plover were not recorded from the locations of the UWF Related Works, during any site visits and none were observed during studies to inform Upperchurch Windfarm 2013 EIS. Wintering Golden Plover are evaluated as Nationally Important and assigned a sensitivity rating of High.

Red Grouse

Optimal habitat for Red Grouse is not found within the locations of the UWF Related Works. No Red Grouse were recorded in studies to inform Upperchurch Windfarm. Although Upland Blanket Bog is present within the 50m habitat survey buffer it is sub-optimal for the species, and no evidence was recorded during e.g. habitat walkovers. Red Grouse are evaluated as of County Importance and assigned a sensitivity rating of medium.

Merlin

Merlin was not observed during studies to inform Upperchurch Windfarm 2013 EIS. None were recorded during site visits to inform the current evaluation. Merlin in the density recorded are evaluated as of Local Importance (low value) and assigned a sensitivity rating of Negligible.

Curlew

Curlew was not recorded from the locations of the UWF Related Works during any site visits and none were observed during studies to inform the (overlapping) Upperchurch Windfarm EIS (2013). Breeding Curlew is evaluated as of National Importance and assigned a sensitivity rating of High.

Kingfisher

Kingfisher was not recorded during studies to inform Upperchurch Windfarm EIS. None were recorded in surveys to inform the current appraisal, including watercourse evaluations. Kingfishers are Amber listed in Ireland. A sensitivity rating of low is applied.

Biodiversity

Topic

8.7.2.3.2 Element 3: UWF Replacement Forestry

General Birds

Species recorded on site (during habitat surveys) included Wren, Robin, Meadow Pipit, House Martin, Blackbird, Stonechat, Hooded Crow, Chaffinch, Rook, Magpie and Woodpigeon. The importance and sensitivity of all of the above species are provided in Section A8-1.2.4.7 of Appendix 8.1.

General Wintering Birds

Resident species recorded during current studies will also be present during the winter months.

Meadow Pipit

Meadow Pipits are present and were recorded during habitat surveys to inform the current evaluation. Meadow Pipit present have been evaluated as of County Importance and assigned a sensitivity rating of Medium for evaluation.

Golden Plover

Golden Plover were not recorded from the locations of the UWF Replacement Forestry during any site visits and none were observed during studies to inform the adjacent Upperchurch Windfarm 2013 EIS. Wintering Golden Plover are evaluated as Nationally Important and assigned a sensitivity rating of High.

Red Grouse

Habitat for Red Grouse is not found within the locations of UWF Replacement Forestry.

Merlin

Merlin was not recorded from the locations of the UWF Replacement Forestry during any site visits and none were observed during studies to inform the adjacent Upperchurch Windfarm 2013 EIS. No breeding habitat is present. Merlin are evaluated as of Local Importance (low value) and assigned a sensitivity rating of Negligible

Curlew

Curlew was not recorded from the locations of the UWF Replacement Forestry during any site visits and none were observed during studies to inform the adjacent Upperchurch Windfarm EIS. No breeding habitat is present for this species.

Kingfisher

Kingfisher was not recorded during any site visits to inform the current evaluation. Kingfisher was not recorded during studies to inform the adjacent Upperchurch Windfarm EIS. The watercourse which is present within the landholding is not suitable for breeding Kingfisher.

8.7.2.3.3 Element 4: Upperchurch Windfarm

All the species recorded during 2012 surveys for the Upperchurch Windfarm EIS are typical of the habitats present.

General Breeding Birds

As per the EIS 2013, surveys of breeding birds to inform the baseline evaluation of Upperchurch Windfarm recorded 37 species in total across 'summer transects' and vantage point surveys . All the species recorded are typical of the habitats present. Species recorded include Skylark, Kestrel, Peregrine Falcon, Stonechat and Crossbill. Additional species recorded on Upperchurch Windfarm, to that recorded at UWF Grid Connection locations, were Raven, Peregrine Falcon (Annex I), Sand Martin, Crossbill and Reed Bunting. Of these is it considered that Peregrine and Sand Martin do not nest on site as there is no suitable nesting habitat present at Upperchurch Windfarm.

General Wintering Birds

Studies on Upperchurch Windfarm (2013) recorded a typical assemblage of wintering species (n=24). Of these one Red listed (Meadow pipit), 7 Amber (Skylark, Robin, Hen Harrier, Kestrel, Starling, Mistle thrush, Goldcrest and Linnet) and 15 Green listed species were present. In the interest of clarity we note that the BOCCI status presented herein is the more current Cummins and Colhoun (2013) evaluation, published subsequent to the Upperchurch Windfarm EIS.

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Meadow Pipit

Meadow Pipit is present in suitable habitat. Meadow Pipit present have been evaluated as of County Importance and assigned a sensitivity rating of Medium for evaluation.

Golden Plover

Golden Plover were not observed during studies on Upperchurch Windfarm. Wintering Golden Plover are evaluated as Nationally Important and assigned a sensitivity rating of High.

Red Grouse

No Red Grouse were recorded in studies on Upperchurch Windfarm.

Merlin

Merlin was not observed during studies on Upperchurch Windfarm.

Curlew

No Curlew was observed during studies to inform the Upperchurch Windfarm EIS.

Kingfisher

Kingfisher was not recorded during studies to inform the Upperchurch Windfarm EIS.

8.7.2.3.4 Element 5: UWF Other Activities

Haul Route Activity Locations

General bird species of Hedgerows are present. Resident Bird species described in respect of breeding are likely to be present during the winter months also. Meadow Pipit may be present in suitable fields adjacent to activity locations however habitats such as roadside verges do not comprise breeding habitat. Meadow Pipit present have been evaluated as of County Importance and assigned a sensitivity rating of Medium for evaluation. Golden Plover were not recorded from the locations of the Activity locations during any site visits. The locations do not comprise suitable habitat for this species. Habitat for Red Grouse is not found at the locations of UWF Other Activities. Merlin may occasionally perch in roadside trees during the winter months, however the locations of activities do not comprise breeding or foraging habitat for this species.

Overhead Line Activity Locations

Bird species present during a site walkover (January 2018) to inform the current evaluation are described in Appendix 8-1 Section A8-1.2.4.7. Twenty three species were recorded, including 6 Amber listed species (Gold-crest, Stonechat, Starling, Common Snipe, Robin and House Sparrow).

8.7.2.3.5 Other Projects or Activities

Bunkimalta Windfarm**:** Thirty three species were recorded from breeding bird surveys of the Bunkimalta Windfarm site in 2009. Peregrine, a further Annex I species, has a traditional territory on Keeper Hill and occasional flight paths over the Bunkimalta site were recorded. Red grouse, a Red Data Book species, occurs above the western boundary of the Bunkimalta site on Keeper Hill and on the bog at Knockane.

Some of the other bird species which occur within the study area and in the areas that adjoin the development, such as kestrel, skylark and grasshopper warbler, are Amber listed species (i.e. of Medium conservation concern).

Topic **Biodiversity**

8.7.3 PROJECT DESIGN MEASURES for General Bird Species

At the conception of the UWF Grid Connection, the design team evaluated the potential for significant impacts to the environment. Impacts will only take place where three components exist together; (1) the source of the impact (project), (2) the receptor of the impact (sensitive aspect) and (3) a pathway between the source and the sensitive aspect. The objective of mitigation measures is to avoid, prevent or reduce, one of the three components of an impact by choosing an alternative location, alternative design or an alternative process.

Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the development – these are the Project Design Environmental Protection Measures, which are shortened to 'Project Design Measures' in this EIA Report.

The development as evaluated in the EIA Report incorporates the Project Design Measures.

The Project Design Measures outlined in Table 8-61 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **General Bird Species**.

Table 8-61: UWF Grid Connection Project Design Measures relevant to General Bird Species

PD ID	Project Design Environmental Protection Measure (PD)
PD02	Flag-men will be used at temporary site entrances rather than creating sightlines by the removal of roadside boundaries. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a in a safe and efficient manner.
PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted
PD28	Hedgerow removal and clearance of any other breeding bird vegetation will take place outside of the bird breeding season *i.e.* not during the period of March to August inclusive where possible. This includes hedgerow and scrub removal in addition to hedgerow trimming.
PD59	Bleanbeg Bog NHA: The route within Bleanbeg Bog NHA is along an existing forestry track. There will be no excavation of blanket bog
PD62	Slievefelim to Silvermine Mountain SPA: All new permanent access roads within the SPA will be 'concealed access roads' which will be created immediately following construction works by covering the hardcore surface of the new road with a vegetated layer using the following method - firstly a geotextile material is laid on the road, covered in a layer of load bearing root-zone mix of peat and stone and then covered in turn by interlocking rigid geocells. The geocells and roadside berms (where present) will be planted with a mix of mature native Irish or Scottish heathers and grasses, with the mix depending on location. Where heather is being planted a depth of at least 150mm of peat will be provided. These 'concealed access roads' will provide a load bearing surface for occasional maintenance vehicles. Within the SPA, the establishment of the Concealed Access Roads will be overseen by a competent peatland ecologist and a hen harrier expert.
PD65	No construction works will take place within 800m of an active curlew nest, or active nesting attempt, within the breeding season (March to August).

Cumulative Information: Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the fundamental design of the UWF Related Works and UWF Other Activities and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in Appendices 5.3, 5.5 and 5.6, in Volume C4: EIAR Appendices.

8.7.4 EVALUATION OF IMPACTS to General Bird Species

In this Section, the likely direct and indirect effects of the UWF Grid Connection are identified and evaluated. Then the likely cumulative effects of the UWF Grid Connection together with the Other Elements of the Whole UWF Project and Other Projects or Activities are identified and evaluated.

A conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) - General Bird Species.

As a result of the exercise, some impacts were included and some were excluded.

Table 8-62: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Golden Plover: Habitat Loss (construction stage)	*Habitat Loss – Merlin, Red Grouse, Eurasian Curlew, (construction stage)*
Golden Plover: Disturbance/Displacement (construction stage)	*Disturbance / Displacement: General Birds, Kingfisher, Red Grouse, Merlin, Meadow Pipit, Eurasian Curlew, (construction stage)*
Meadow Pipit: Habitat Loss (construction stage)	*Physical injury or destruction of nests/chicks, (construction stage)*
General Birds: Habitat Enhancement (construction stage)	*Disturbance / Displacement, (operational stage)*
	Disturbance / Displacement, (decommissioning stage)

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 8.7.4.1 to 8.7.4.4.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, in Section 8.7.4.5.

8.7.4.1 Impact Evaluation Table: Golden Plover - Habitat Loss

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction Works; Excavation; Movement of Soils and Machinery
Cumulative Impact Source: Construction Works; Excavation; Movement of Soils and Machinery, afforestation
Impact Pathway: Land Take

Impact Description: As an Annex I species Golden Plover is a High Sensitivity receptor. Land use change of suitable foraging or roosting habitat such as improved agricultural grassland, wet grassland or grassland mosaics, and upland blanket bog, where construction works areas overlap may cause reductions in foraging success, increased exposure to predation through displacement to less viable feeding areas, and also reduction in survival rates of wintering birds. No breeding Golden Plover will be affected as all works are outside the Irish breeding range. In addition numbers of birds recorded and therefore potentially affected are low within the context of the Irish wintering population. Temporary land use change for works such as cable trenching will be reinstated immediately following construction and therefore effects will be Neutral.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Golden Plover: Habitat Loss

Element 1: UWF Grid Connection

Impact Magnitude:
Permanent land use change will comprise 2.77Ha of suitable foraging or roosting habitat, in the form of grassland or grassland mosaic. The scale of habitat loss represents 1.4% of available, suitable Golden Plover habitat (198Ha comprising grassland/grassland mosaics/upland blanket bog and cutaway bog) within the study area boundary.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The high sensitivity rating of the species, based on conservation status, and;
- The extent of habitat loss (1.4% of available suitable habitat) is low (i.e. within 1-5% of available habitat) and represents a minor shift away from baseline conditions;
- The permanent duration, and;
- Low reversibility

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
Permanent land use change will comprise 0.2Ha of suitable foraging or roosting habitat for wintering Golden Plover as improved agricultural grassland (0.12ha) and wet grassland (0.07ha). The scale of habitat loss represents 0.16% of available suitable Golden Plover habitat (120Ha – comprising improved agricultural grassland, grassland mosaics, upland blanket bog and cutaway bog) within the study area boundary.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The extent of habitat loss (0.2Ha), is negligible(i.e. <1% of available habitat) and represents a very slight change from baseline conditions;
- The availability of suitable foraging and roosting habitat (at minimum 119.8Ha) in the greater area, notwith-standing;

General Bird Species

Sensitive Aspect

• The long term duration, and; • Low reversibility with permanent land use change likely.
Element 3: UWF Replacement Forestry
Impact Magnitude: Permanent land use change of 3.98Ha of suitable foraging or roosting grassland habitat to deciduous woodland will occur. This represents 37% of the available habitats within the UWF Replacement Forestry study area (10.7Ha).
Significance of the Impact: Slight
Rationale for Impact Evaluation: • The extent of suitable habitat to be affected (3.98Ha or 37% of that available within the study area); • The permanent duration, and; • Low reversibility with land use change likely
Element 4: Upperchurch Windfarm
Impact Magnitude: None
Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • No Golden Plover were recorded during winter bird studies of the Upperchurch Windfarm
Element 5: UWF Other Activities
Impact Magnitude: None
Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • No suitable habitat is present for roosting or foraging Golden Plover, and • Golden Plover are not known to utilize roadside verges/roundabouts for foraging or roosting, and; • Golden Plover were not recorded within the locations for the Upperchurch Hen Harrier Scheme; • Monitoring does not include land take or land use changes
Cumulative Information: Individual Evaluations of Other Projects or Activities
Other Project: Consented Bunkimalta Windfarm
Impact Magnitude: None
Significance of the Impact: Neutral Impact
Rationale for Impact Evaluation: • No Golden Plover Recorded in Baseline Studies to inform EIS.
Evaluation of Cumulative Impacts – Golden Plover: Habitat Loss
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: Instances of landuse use change in respect of suitable foraging or roosting habitat will occur from works associated with the UWF Grid Connection (2.77Ha), UWF Related Works (0.2Ha), and UWF Replacement Forestry (3.99Ha).
Significance of the Cumulative Impact: Slight

Biodiversity

Topic

Rationale for Cumulative Impact Evaluation:

- The high sensitivity rating of the species, counterbalanced with;
- The low numbers of birds recorded, within the context of the Irish wintering population (c.100, 000).
- The extent of habitat loss overall, and;
- The permanent duration, and;
- Low reversibility

All Elements of the Whole UWF Project with Other Projects or Activities

Cumulative Impact Magnitude: None

Significance of the Cumulative Impact: No Cumulative Impact

Rationale for Impact Evaluation:

- Neutral effects caused by Bunkimalta Windfarm.

8.7.4.2 Impact Evaluation Table: Golden Plover - Disturbance/Displacement

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: During Construction Noise and Visual and Intrusion
Cumulative Impact Source: During Construction Noise and Visual and Intrusion
Impact Pathway: Air

Impact Description: As an Annex I species Golden Plover is a High Sensitivity receptor. Disturbance to/displacement of wintering Golden Plover due to noise, visual intrusion, anthropogenic sources may occur during the period October to March when the highest proportion of birds are present within the receiving environment.

As works will only be conducted during daylight hours as part of Project Design, disturbance to birds foraging at night (when most foraging takes place) is avoided. Displacement during daylight hours, if of sufficient duration and from high value foraging areas may result in effective habitat loss with consequent effects on feeding success, winter survival and breeding capacity; dependant on numbers of birds affected and availability of alternative habitat. No breeding Golden Plover will be directly affected as all works are outside the Irish breeding range.

Sources of disturbance are likely; however the degree of avoidance/response may also vary from individual to individual and as flock size varies may be limited in spatial extent. The duration of disturbance events are assumed to be brief given the linear nature of most of the works – however as birds may range over wide areas there is the potential for sequential effects i.e. from multiple concurrent sources. In this instance birds displaced from one location may experience a second disturbance stimulus from e.g. another work crew.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Golden Plover: Disturbance/Displacement

Element 1: UWF Grid Connection

Impact Magnitude:
Populations of wintering Golden Plover may experience disturbance related events, if feeding/roosting during daylight hours within locations comprising grassland, grassland mosaics or bog habitats. Sequential effects may occur along the UWF Grid Connection should multiple sources of disturbance occur simultaneously in grassland, grassland mosaics or bog habitats.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The low numbers of birds recorded (avg. flock size 12 birds, excluding the one instance of a flock of 200 recorded in 2017), within the context of the Irish wintering population (c.100, 000), and;
- Activities such as cable trenching will not contrast significantly from baseline activities such as farming related works, and;
- The duration of individual disturbance events will be brief, and;
- Reversible once works finish, with birds expected to return, and;
- Any response is not expected to be permanent, based on studies of the species with regard to the construction of wind farms (Pearce-Higgins et al., study, published in 2012) and therefore unlikely to alter long term wintering trends;

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 2: UWF Related Works
Impact Magnitude: 120ha of suitable habitat for wintering Golden Plover occurs within the study area for UWF Related Works. However no birds have been recorded utilising these locations in studies described herein. The magnitude of any disturbance is therefore negligible.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • No birds were recorded in baseline studies for the Upperchurch Windfarm, which overlaps the works locations for UWF Related Works, therefore; • The probability of disturbance is significantly reduced (to an evaluation as low), notwithstanding suitable habitat is present.
Element 3: UWF Replacement Forestry
Impact Magnitude: Negligible
Significance of the Impact: Neutral Impact
Rationale for Impact Evaluation: • All planting will be done by hand and will not contrast to baseline agricultural activities.
Element 4: Upperchurch Windfarm
Impact Magnitude: None
Significance of the Impact: Neutral Impact
Rationale for Impact Evaluation: • No Golden Plover were recorded in studies to inform the EIS for the Upperchurch Windfarm
Element 5: UWF Other Activities
Impact Magnitude: None
Impact Evaluation**:** Neutral impact
Rationale for Impact Evaluation: • The Haul Route Activity locations do not include suitable habitat to attract Golden Plover, and; • Activities will not contrast from baseline activities already present, such as farming related works and road maintenance. • Overhead Line Activities will be similar to existing maintenance which is undertaken; will occur during daylight hours and will not result in any contrast from the existing environment.
Cumulative Information: Individual Evaluations of Other Projects or Activities
Other Project: Consented Bunkimalta Windfarm
Impact Magnitude: None
Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • No Golden Plover Recorded in Baseline Studies to inform EIS.

Evaluation of Cumulative Impacts – Golden Plover: Disturbance/Displacement
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: There is no potential for likely cumulative whole project effects, as Golden Plover were only recorded within the UWF Grid Connection Study Area. Therefore the whole project effect is in the order of the UWF Grid Connection, evaluated above.
Significance of the Cumulative Impact: Not Significant
Rationale for Cumulative Impact Evaluation: • The low numbers of birds recorded , within the context of the Irish wintering population (c.100, 000), and; • Activities such as cable trenching will not contrast significantly from baseline activities such as farming related works, even if multiple instances occur simultaneously, and; • The duration of individual disturbance events (including sequential) will be brief, limited to daylight hours and; • Reversible once works finish, with birds expected to return, and; • Any response is not expected to be permanent, based on studies of the species with regard to the construction of wind farms (Pearce-Higgins et al., study, published in 2012) and therefore unlikely to alter long term wintering trends;
All Elements of the Whole UWF Project with Other Projects or Activities
Cumulative Impact Magnitude: None
Significance of the Cumulative Impact: No Cumulative Impact
Rationale for Impact Evaluation: • Neutral effects caused by Bunkimalta Windfarm.

8.7.4.3 Impact Evaluation Table: Meadow Pipit – Habitat Loss

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction Works; Excavation; Movement of Soils and Machinery
Cumulative Impact Source: Construction Works; Excavation; Movement of Soils and Machinery, Afforestation
Impact Pathway: Land Cover

Impact Description: As a red listed species Meadow Pipit is assigned a medium sensitivity rating. Land use change of suitable nesting habitat (improved agricultural grassland, wet grassland or grassland mosaics, and upland blanket bog), where construction works areas overlap may cause reductions in breeding numbers, foraging success, increased exposure to predation through displacement to less viable feeding areas, and local population level declines. Temporary land use change for works such as cable trenching will be reinstated immediately following construction and therefore effects will be Neutral.

Any impact is negated by the provision of concealed geocell roadways, planted with grass or heather, for all permanent roads within the SPA. Felled commercial forestry at Castlewaller (total area 1 ha) will be replaced by a concealed geocell roadway, which, along with the remainder of the corridor at that location, will be planted with heather (Irish or Scottish) – which will in turn benefit Meadow Pipit through the provision of nesting and foraging habitat.

Meadow Pipit will also benefit from enhancement measures for Hen Harrier as part of the Upperchurch Hen Harrier scheme, wherein the management prescription has been specifically designed to benefit species such as Meadow Pipit, which are an important prey item for Hen Harrier.

Impact Quality: Negative and positive

Evaluation of the Subject Development Impact – Meadow Pipit: Habitat Loss

Element 1: UWF Grid Connection

Impact Magnitude:
Construction works will result in land use change of 2.77Ha of suitable breeding habitat for Meadow Pipit in the form of grassland and grassland mosaic. The total land use change comprises 1.38% of available habitat within the Study area boundary (201Ha – comprising improved agricultural grassland, wet grassland, grassland mosaics, and heath).

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The medium sensitivity of the species, based on conservation status, and;
- The extent of suitable habitat to be affected (2.77Ha), evaluated as low (i.e. 1-5% of available habitat),
- Comprises a minor shift away from baseline conditions, notwithstanding;
- The permanent duration, and;
- Low reversibility.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
Construction Works will include land take of 0.2Ha of suitable breeding habitat for Meadow Pipit in the form of grassland and grassland mosaic. The scale of habitat loss is 0.15% of available habitat within the Study area boundary (123Ha – where suitable habitats for Meadow Pipit include grassland, grassland mosaics, dry heath, upland blanket bog and cutaway bog).

General Bird Species

Sensitive Aspect

Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • The medium sensitivity of the species, based on conservation status, and; • The extent of suitable habitat to be affected (0.2Ha), evaluated as negligible (<1% of available habitat lost), which ; • Comprises a minor shift away from baseline conditions, notwithstanding; • The long-term duration (15-60 years), and; • Low reversibility with permanent land use change likely
Element 3: UWF Replacement Forestry
Impact Magnitude: Construction Works will include permanent land use change of 3.98Ha of suitable breeding habitat (improved agricultural grassland (3.54ha) and wet grassland (0.44ha)) for Meadow Pipit. The scale of habitat loss represents 37% of available habitats (10.68Ha) within the UWF Replacement Forestry study area but is offset by the retention of suitable Meadow Pipit habitat within woodland rides to be established for foraging Hen Harrier.
Significance of the Impact: Slight
Rationale for Impact Evaluation: • The medium sensitivity of the species, based on conservation status, and; • The majority of land use change is from improved agricultural grassland, which is sub-optimal for Meadow Pipit, and; • Offset by the retention of rides (i.e. Meadow Pipit habitat) within the deciduous woodland to be planted, not-withstanding; • The extent of habitat subject to change, evaluated as high (20-80% of habitat lost), which; • Comprises a major alteration to the baseline conditions; • The permanent duration, and; • Low reversibility with land use change likely
Element 4: Upperchurch Windfarm
Impact Magnitude: Construction Works will include land use change of 7.81Ha of suitable breeding habitat for Meadow Pipit in the form of grassland, grassland mosaic, and bog habitat. The scale of land use change is 2.39% of available habitat within the Study area boundary (128Ha).
Significance of the Impact: Slight
Rationale for Impact Evaluation: • The medium sensitivity of the species, based on conservation status, and; • The extent of habitat to be lost, is low (i.e. 1-5% of available habitat),which; • Comprises a minor shift away from baseline conditions, notwithstanding; • The long-term duration (15-60 years), and; • Low reversibility with permanent land use change likely
Element 5: UWF Other Activities
Impact Magnitude: The sensitive management of 128Ha of lands for Hen Harrier as part of the Upperchurch Hen Harrier Scheme will also increase the suitable habitat present for Meadow Pipit. No habitat loss of suitable breeding habitat is associated with other locations such as Haul route activities and Overhead Line Activities.
Significance of the Impact: Moderate (positive)

Biodiversity

Topic

Rationale for Impact Evaluation:
- The medium sensitivity of the species, based on conservation status, and;
- The extent of lands to be sympathetically managed, evaluated as high (i.e. 20-80% of the 128Ha included in the Upperchurch Hen Harrier Scheme of habitat present), which;
- Comprises a major alteration to baseline features, and
- The long term duration, over the lifetime of the project, and;
- Low reversibility.

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Consented Bunkimalta Windfarm

Impact Magnitude:
During the construction period, the clearance of habitats will affect a range of passerine species that nest and feed within the forests. The significance of this impact can be minimised by clearance taking place outside of the main nesting season. All species which currently occur on site are expected to retain a presence within the site after the construction period (as similar habitats will still occur). Further, there may be beneficial effects for some species as recent research by Pearce-Higgins *et al.,* (2012) suggests potential positive effects of wind farm construction on skylarks, meadow pipits and stonechats. Such effects may result from vegetation disturbance during construction creating greater openness in the sward structure, known to benefit these species. It is noted that the Species and Habitat Management Plan will also be of value for a range of small birds for both nesting and foraging purposes[14].

Significance of the Impact: No significant effects

Rationale for Impact Evaluation:
Inspectors report[15]: "I conclude that the development would not give rise to significant residual ecological impacts."

Evaluation of Cumulative Impacts – Meadow Pipit: Habitat Loss

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:
Instances of land use change in respect of suitable breeding habitat will occur from works associated with the UWF Grid Connection (2.77Ha), UWF Related Works (0.2Ha), UWF Replacement Forestry (3.99Ha) and the Upperchurch Windfarm (7.81Ha). Land Use change within the UWF Grid Connection (where it overlaps the SPA) is offset by the instatement of concealed access road roads, and outside the SPA - the Upperchurch Hen Harrier Scheme (UWF Other Activities) measures will also enhance Meadow Pipit habitat.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:
- The medium sensitivity of the species, based on conservation status, and;
- The extent of land use change overall (14.77Ha), evaluated as low (1-5% of habitat lost) represents 2.24% of total suitable habitat present within the study areas (660Ha), comprising;
- A minor shift away from baseline conditions, which;
- Is ameliorated by the management of lands (128ha) as part of the Upperchurch Hen Harrier Scheme, over;
- A long-term duration (15-60 years), and with;
- Low reversibility with land use change permanent/ management already consented

[14] ESB Wind Development Ltd. and Coillte (2013) Bunkimalta Wind Energy Project Environmental Impact Statement prepared by ESBI
[15] An Bord Pleanala (2013) Inspectors Report for Bunkimalta Wind Energy Project PL.22.241924.

General Bird Species

Sensitive Aspect

All Elements of the Whole UWF Project with Other Projects or Activities
Cumulative Impact Magnitude: Instances of land use change in respect of suitable breeding habitat will occur from works associated with both the Upperchurch Whole UWF Project and Bunkimalta Windfarm. As effects from the Upperchurch Whole UWF Project are only expected to be slight; and ameliorated by enhancement measures and management proposed in respect of Hen Harrier; it is consequently considered that the likelihood of synergistic effects on Meadow Pipit is low and consequently the resultant magnitude of cumulative effects is low. Sequential effects are unlikely to occur given the small home range of breeding Meadow Pipit; and widespread availability of alternative habitat surrounding both developments.
Significance of the Cumulative Impact: Slight
Rationale for Cumulative Impact Evaluation: • The medium sensitivity of the species, based on conservation status, and; • The extent of land use change overall comprises; • A minor shift away from baseline conditions, which; • Is offset by the management of lands as part of the Upperchurch Hen Harrier Scheme and Bunkimalta Habitat and Species Management Plan, over; • A long-term duration (15-60 years), and with; • Low reversibility with land use change permanent/ management already consented.

Topic **Biodiversity**

8.7.4.4 Impact Evaluation Table: General Birds - Habitat Enhancement

Impact Description	
Project Life Cycle Stage:	Construction Stage

Impact Source: Reinstatement and Replanting of construction works areas
Cumulative Impact Source: Reinstatement, Replanting, enhancement planting, maintenance of rush swards, Planting of Deciduous Trees
Impact Pathway: Land use Change

Impact Description: The planting of equivalent deciduous forestry for lower ecological value conifer plantation, as UWF Replacement Forestry, in addition to the incorporation into Project design of the planting of concealed access roads within the SPA with heather/grasses mix in geocell, the planting of the clear fell area in Castlewaller with native Irish or Scottish heather species, plus the use of locally sourced native hedgerow and tree species in all landscaping and reinstatement will constitute a land use change to higher value habitat for general birds. In addition the management measures as part of the Upperchurch Hen Harrier Scheme such as the maintenance of rush swards, enhancement and planting of hedgerows and riparian habitat, and promotion of semi-natural habitat will increase habitat quality for ground nesting birds such as Meadow Pipit and Skylark, and general birds of open countryside – this will have secondary positive effects not only on Hen Harrier but additionally other raptor species which may be present such as Kestrel. It is likely that the above will result in a net gain to overall bird diversity - with the duration being permanent in the case of the UWF Grid Connection and UWF Replacement Forestry, and long term in the case of the UWF Related Works, Upperchurch Hen Harrier Scheme and Upperchurch Windfarm.

Impact Quality: Positive

Evaluation of the Subject Development Impact – General Birds: Habitat Enhancement

Element 1: UWF Grid Connection

Impact Magnitude:
Felled commercial forestry at Castlewaller (1 Ha) will contain a concealed geocell roadway, which, along with the remainder of the corridor at that location, will be planted with heather (Irish or Scottish). Hedgerow crossing locations will be enhanced with equivalent numbers of native trees as part of Project Design. At Mountphilips, 700m of new hedgerow will be planted alongside the new access road between Site Entrance No. 1 and the new Mountphilips Substation.

Significance of the Impact: Slight (positive)

Rationale for Impact Evaluation:

- The benefit to bird diversity, in particular within the SPA (a very high sensitivity receptor), and;
- The contrast with emerging trends in respect of land management and existing land cover, and;
- The permanent duration, and;
- The low reversibility with proposed enhancement already incorporated into project design

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
Equivalent lengths of native hedgerow and native trees will be replanted in lieu of hedgerow removal. In addition, c.370m of new hedgerow will be planted alongside the Realigned Windfarm Road RWR2.

Significance of the Impact: Imperceptible (positive)

Rationale for Impact Evaluation:

Topic: Biodiversity
Sensitive Aspect: General Bird Species

• The benefit to bird diversity, and; • Long term duration, and; • The low reversibility with proposed enhancement already incorporated into project design.
Element 3: UWF Replacement Forestry
Impact Magnitude: In total, 6Ha of mixed species, native woodland will be created, which will comprise tall trees and understory shrubs, along with wide ride lines, and a mix of tall grasses and scrub land cover maintained during the growth stage. The existing riparian habitat will be enhanced through the planting of Hazel, alder and willow species, and protected through the placement of fencing.
Significance of the Impact: Slight (positive)
Rationale for Impact Evaluation: • The benefit to bird diversity, and; • The contrast with emerging trends in respect of land management, and; • The permanent duration, and; • The low reversibility with proposed enhancement already incorporated into project design.
Element 4: Upperchurch Windfarm
Impact Magnitude: The planting of 360m of new hedgerow using native species, and the enhancement of existing hedgerows with native species will constitute a land use change to a higher value habitat for general birds.
Significance of the Impact: Imperceptible (positive)
Rationale for Impact Evaluation: • The benefit to bird diversity, and; • The low reversibility with proposed enhancement already incorporated into project design.
Element 5: UWF Other Activities
Impact Magnitude: The Upperchurch Hen Harrier scheme will result in 2.2Ha of trees, 1.4km of riparian habitat and 2.8km of new hedgerow being enhanced or created during initial activities. In total 128Ha of agricultural lands will be managed. The measures to be incorporated such as planting of scrub along riparian corridors, management of rush coverage, reductions in stocking levels, limiting of drainage, fertilizing, burning or hedgerow removal will constitute a land use change to a higher value habitat for general birds.
Significance of the Impact: **Significant (positive)**
Rationale for Impact Evaluation: • The benefit to bird diversity, and; • The contrast with emerging trends in respect of land management, and; • The duration proposed for management, and; • The low reversibility with proposed enhancement already consented
Cumulative Information: Individual Evaluations of Other Projects or Activities
Other Project: Consented Bunkimalta Windfarm
Impact Magnitude: A species and Habitat management plan is planned. This comprises both restoration of bog and heath habitats (41.2 ha) and sensitive management of second rotation forests (137.3 ha). Restoration is expected to increase

the area of open peatland. There is a high probability that these measures will result in positive Biodiversity effects on general birds.
Significance of the Impact: Slight positive
Rationale for Impact Evaluation: • It is considered that positive ecological impacts will be derived by the restoration of areas of bog/heath and sensitive management of selected woodland plots[16].
Evaluation of Cumulative Impacts – General Birds: Habitat Enhancement
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: Instances of enhancement, and management of habitat specifically for the benefit of birds will occur as part of the UWF Grid Connection, UWF Related Works, UWF Replacement Forestry (by design), and Upperchurch Windfarm. Cumulative positive effects may accrue due to the proximity of the UWF Replacement Forestry to the Upperchurch Hen Harrier Scheme.
Significance of the Cumulative Impact: Slight (positive)
Rationale for Cumulative Impact Evaluation: • The benefit to bird diversity, and; • The contrast with emerging trends in respect of land management and land cover, and; • The duration which is long term to permanent, and; • The low reversibility.
All Elements of the Whole UWF Project with Other Projects or Activities
Cumulative Impact Magnitude: Instances of enhancement and management of habitat specifically for the benefit of birds will occur as part of the Upperchurch Windfarm Project. Habitat improvement and management measures for Bunkimalta Wind farm are also expected to result in positive Biodiversity benefits to General Birds. This may benefit species which use both sites e.g. wintering species (such as Fieldfare/Redwing etc.) in instances where birds are affected sequentially (through the availability of higher quality habitat) as they forage and move through the landscape. The in-combination effects may also provide more robust source populations of species such as Meadow Pipit, which may increase the overall population at a local or greater level.
Significance of the Cumulative Impact: Slight (positive)
Rationale for Cumulative Impact Evaluation: • The scale of habitat management, in particular as part of the Upperchurch Windfarm Project and; • Long term to Permanent duration, with; • The low reversibility of measures to be implemented

[16] ESB Wind Development Ltd. and Coillte (2013) Bunkimalta Wind Energy Project Environmental Impact Statement prepared by ESBI.

8.7.4.5 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-63 below.

Table 8-63: Description and Rationale for Excluded Impacts to General Bird Species

Key: 1: UWF Grid Connection; 2: UWF Related Works; 3: UWF Replacement Forestry; 4: Upperchurch Windfarm; 5: UWF Other Activities

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage / Planting Stage				
Land take	1,2,3,4,5	Land cover	Habitat Loss (Merlin, Red Grouse)	Merlin: Evaluated as Excluded - Neutral habitat loss within the context of wintering Merlin.
	1,2,3,4,5			Red Grouse: Evaluated as Excluded - No Habitat Loss at Bleanbeg in relation to Red Grouse (Element 1). No habitat loss from Other Elements (2, 3, 4, 5) including Overhead Line Activities as part of 'UWF Other Activities'.
	1,2,3,4,5		Habitat Loss (Eurasian Curlew)	Eurasian Curlew Evaluated as Excluded - A single breeding attempt was recorded in baseline studies, which was located outside the construction area boundaries associated with the UWF Grid Connection.. No further evidence of Curlew was noted therefore it is considered that no currently used breeding habitat will be subject to land use change as a result of the Whole UWF Project. No habitat loss from Other Elements including Overhead Line Activities as part of 'UWF Other Activities'.
Noise and human activity	1,2,3,4,5	Visibility	Disturbance/ Displacement (General Birds, Kingfisher, Red Grouse, Merlin, Meadow Pipit, Eurasian Curlew)	General Birds: Scoped Out for remaining species with sensitivity rating of medium and lower.
	1,2,3,4,5	Air and Visibility		Kingfisher; Evaluated as Excluded - Neutral effects as no nest locations were identified within the zone of effect i.e. proximal to River Crossings on the Newport (Mulkear), Clare and Bilboa Rivers (Element 1). No nests were identified within the zone of effect at watercourse crossing locations associated with UWF Related Works/Upperchurch Windfarm. Best Practice measures are provided to ensure Neutral effects. No watercourse crossing works associated with either UWF Replacement Forestry or UWF Other Activities..
	1,2,3,4,5	Visibility		Red Grouse: Evaluated as Excluded - Brief-temporary duration of works at Bleanbeg, combined with habituation to activities such as peat extraction ensures Neutral effects (Element 1). No habitat loss from Other Elements including Overhead Line Activities as part of 'UWF Other Activities'.
	1,2,3,4,5			Merlin: Evaluated as Excluded - Low numbers of wintering birds will not be measurably affected by the scale of visual intrusion or disturbance. This includes Overhead Line Activities as part of 'UWF Other activities'.

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
	1,2,3,4,5			Meadow Pipit: Evaluated as Excluded - Most passerine (perching) species and general lowland farmland birds are not considered to be particularly susceptible to impacts from wind farms (SNH, 2014) – including construction stage disturbance. Studies on the impacts of wind farms during both construction (Pearce-Higgins *et al.* 2012[17]) and operation (Pearce-Higgins *et al.* 2009[18]) have found little evidence of significant disturbance effects on passerine species.
	1,2,3,4,5			Eurasian Curlew: Evaluated as Excluded - Neutral effect as Project Design measures will avoid works within 800m of a confirmed breeding attempt. No Eurasian Curlew recorded within the study areas for Elements 2,3,4,5.
Movement of soils and machinery	1,2,3,4,5	Direct Contact	Physical injury/destruction of nests or chicks – General Birds	Evaluated as Excluded - Hedgerow trimming and felling will occur outside the bird nesting season. Effects on ground nesting birds including Meadow Pipit from works such as cable trenching will be overseen by Project Ecologist and therefore effects will be Neutral.
Hedgerow trimming Forestry Felling	1,2,3,4,5	Direct Contact	Physical injury/destruction of nests or chicks – General Birds	Scoped out; all trimming /felling will occur outside the bird nesting season.
Operational Stage / Growth Stage				
Maintenance Noise/ Visual intrusion	1,2,3,4,5	Air and Visibility	Disturbance/ displacement – (Golden Plover, Eurasian Curlew, Red Grouse, Merlin, Meadow Pipit)	Golden Plover: Evaluated as Excluded - Neutral disturbance/displacement effects are expected due to maintenance activities because; in relation to UWF Grid Connection (1), Maintenance visits will be conducted annually, by 1-2 people travelling in light vehicles in to joint bays, In relation to Other Elements, all maintenance works will be carried out from hardcore surfaces (2, 3, 4), from public road (5), or on foot (3,5).
	1,2,3,4,5			Eurasian Curlew: Scoped Out; Neutral effects predicted
				Red Grouse: Scoped Out; Neutral effects predicted
				Merlin: Scoped Out; Neutral effects predicted
				Meadow Pipit: Scoped Out; Neutral effects predicted
Decommissioning Stage				
	1,2,3,4,5	Visibility		Golden Plover: Evaluated as Excluded - No significant decommissioning activities for

[17] Greater Impacts of wind farms on bird populations during construction than subsequent operation: results of a multi-site and multi-species analysis. Pearce-Higgins, J.W., Stephen, L., Douse, A., Langston, R.H.W. s.l. : Journal of Applied Ecology, 2012, Vol. 49, pp. 386-394

[18] The distribution of breeding birds around upland wind farms. Pearce-Higgins, J.W., Leigh,S., Langston, R.H.W., Bainbridge, Ian.P., Bullman, R. s.l. : Journal of Applied Ecology, 2009, Vol. 46, pp. 1323-1331.)

General Bird Species

Sensitive Aspect

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Noise and human activity			Disturbance/ Displacement (Golden Plover, Eurasian Curlew, Red Grouse, Merlin)	elements 1, 2, 3 and 5. No Golden Plover were recorded in studies for Upperchurch Windfarm (Element 4).
				Eurasian Curlew: Scoped Out as no decommissioning relative to nesting location (Element 1)
				Red Grouse: Scoped Out as no decommissioning will take place at Bleanbeg (Element 1).
				Merlin: Evaluated as Excluded - decommissioning is not likely to affect low numbers of wintering Merlin measurably.
	1,2,3,4,5		Disturbance/Displacement Mortality of ground nesting birds – Meadow Pipit	Meadow Pipit: Scoped Out as there are no t decommissioning activities associated with either the UWF Grid Connection or UWF Replacement Forestry, and no significant decommissioning activities associated with the UWF Related Works or UWF Other Activities. In relation to Upperchurch Windfarm (Element 4), Activities will only take place at existing hard stand locations within Upperchurch Windfarm, will be temporary in duration, reversible, and occur primarily in habitats of low value for Meadow Pipit. Studies on the impacts of wind farms during both construction (Pearce-Higgins *et al.* 2012) and operation (Pearce-Higgins *et al*. 2009) have found little evidence of significant disturbance effects on passerine species. This is also applicable to decommissioning.

Biodiversity

Topic

8.7.5 Mitigation Measures for Impacts to General Bird Species

Mitigation measures were incorporated into the UWF Grid Connection project design including the Project Design Measures. No additional mitigation measures are required as **no significant adverse impacts** are concluded by the topic authors as likely to occur to General Bird Species as a consequence of the UWF Grid Connection.

8.7.6 Evaluation of Residual Impacts to General Bird Species

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for General Bird Species above (Section 8.7.4) – i.e. **no significant adverse impacts**.

8.7.7 Application of Best Practice and the EMP for General Bird Species

Best Practice Measures (BPM), although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

The following Best Practice Measures have been developed, for the protection of **General Bird Species,** by the authors of this topic chapter, using industry best practice:

GC-BPM-17	Best practice measures for the removal of vegetation during construction
GC-BPM-19	Disturbance to and/or displacement of nesting Common Kingfisher (*Alcedo atthis*).
GC-BPM-22	Management of general non-native invasive species

These Best Practice Measures are included in full at the end of this topic chapter, and also form part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.7.7.1 Invasive Species Management Plan

In addition to the Best Practice Measures relating to Invasive Species, an Invasive Species Management Plan has been developed to prevent the introduction and/or spread of invasive species.

The Invasive Species Management Plan includes monitoring and biosecurity measures which will inform the actions required to effectively respond to any incursions and to control existing invasive species populations. The Invasive Species Management Plan also forms part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.7.8 Summary of Impacts to General Bird Species

A summary of the Impact to General Bird Species is presented in Table 8-64.

Table 8-64: Summary of the impacts to General Bird Species

Impact to General Bird Species:	**Golden Plover: Habitat Loss**	**Golden Plover: Disturbance /Displacement**	**Meadow Pipit: Habitat Loss**	**General Birds: Habitat Enhancement**
Evaluation Impact Table	*Section 8.7.4.1*	*Section 8.7.4.2*	*Section 8.7.4.3*	*Section 8.7.4.4*
Project Life-Cycle Stage	Construction	Construction	Construction	Construction
UWF Grid Connection	**Slight**	**Not Significant**	**Slight**	**Slight (positive)**
Element 2: UWF Related Works	Not Significant	Not Significant	Not Significant	Imperceptible (positive)
Element 3: UWF Replacement Forestry	Slight	Neutral	Slight	Slight (positive)
Element 4: Upperchurch Windfarm	Neutral	Neutral	Slight	Imperceptible (positive)
Element 5: UWF Other Activities	Neutral	Neutral	Moderate (positive)	**Significant positive**
Cumulative Impact:				
All Elements of the Whole UWF Project	Slight	Not Significant	Slight	Slight (positive)
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities Bunkimalta Windfarm	No Cumulative Impact	No Cumulative Impact	Slight	Slight (positive)

The greyed out boxes in the above summary table relate to the cumulative information for the Other Elements of the Whole UWF Project, which are included to show the totality of the project.

8.8 Sensitive Aspect No.7: Bats

This Section provides a description and evaluation of the Sensitive Aspect - Bats.

8.8.1 BASELINE CHARACTERISTICS of Bats

8.8.1.1 STUDY AREA for Bats

The study area for Bats in relation to the UWF Grid Connection is described in Table 8-65 and illustrated on Figure GC 8.8: Bats within the UWF Grid Connection Study Area - Overview map and Maps 1 – 5 (Volume C3 EIAR Figures).

Table 8-65: UWF Grid Connection Study Area for Bats

Study Area for Bats	Justification for the Study Area Extents
• Buildings within 150m of the construction works area boundary • Mature trees within 50m of the construction works area boundary; • Linear vegetation features (e.g. hedgerows) of high suitability for foraging bats within the construction works area boundary; • Bridges within the construction works area boundary and along material haulage routes on the local road network between the concrete suppliers and the works locations.	Professional Judgement and as per Best Practice: Bat Surveys for Professional Ecologists: Good Practice Guidelines, Collins, (2016), and The Conservation of Bats in Bridges Project – A Report on the survey and conservation of bat roosts in bridges in Cumbria, Billington and Norman (1997).

8.8.1.2 Baseline Context and Character of Bats in the UWF Grid Connection Study Area

The UWF Grid Connection will be located in the Slievefelim to Silvermine Mountains upland area in County Tipperary. The landscape present is predominantly forestry and improved agricultural landscapes, interspersed with hedgerows and low-density houses and farm buildings. Mature trees are also present within hedgerows and along public roads.

Bats are common and widespread throughout Ireland, and occupy a wide variety of habitats. In a regional context, the following is noted in the (Draft) North Tipperary Biodiversity Plan 2007: "Many bat species forage in woodland and over water, and the combination of both habitats within North Tipperary makes the area valuable for bat species. Built structures, such as bridges, that occur close to water are of particular value as roosts. Six of Irelands bat species are known to occur in North Tipperary common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Leisler's bat *Nyctalus leisleri*, Natterer's bat *Myotis nattereri* (records from www.batconservationireland.org), Brown long-eared bat *Plecotus auritus* and Daubenton's bat *Myotis daubentonii* (pers comm. S. Jones, S. Geraghty[19])". In addition, the author has recorded Nathusius' pipistrelle Pipistrellus nathusii and whiskered bat Myotis mystacinus in the north Tipperary. Ireland's only other regularly-occurring bat species – the lesser horseshoe bat Rhinolophus hipposideros – can occasionally be found on the Limerick – Tipperary border, but in general the county is just outside the range of this species.

Online national landscape suitability maps for Irish bat species (Lundy *et al.,* 2010) were reviewed and indicate that the suitability index for the 'all bats combined' layer varies across the length of the UWF Grid Connection. Areas of high suitability are found in the environs of Mountphilips at the western end of the UWF Grid Connection, moderate suitability and low suitability in the centre, and moderate suitability at the

[19] As cited in the 'draft North Tipperary Biodiversity Plan 2007"

western end. Overall, the landscape suitability follows a consistent west to east pattern of decreasing suitability for all species, which roughly corresponds with the changes in altitude.

When considered at the level of individual bat species, the UWF Grid Connection Study Area has high suitability for common pipistrelles; moderate suitability for soprano pipistrelles, Leisler's bat, whiskered bat and natterer's bat, low suitability for Daubenton's and brown long-eared bats, and negligible suitability for Nathusius' pipistrelles and lesser horseshoe bats.

Further information on context such as known roosts identified from desktop review is included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.2.1). Appendix 8-1 can be found in Volume C4 EIAR Appendices.

Survey Results

Preliminary ecological appraisals were carried out for 119 buildings within the study area, and presence / absence surveys and/or roost characterisation surveys were carried out in 2016 and 2017 for features of high or moderate roost suitability that were considered to be at risk of direct or indirect effects.

Bat roosts were identified in 14 buildings, including 8 maternity roosts, 7 non-breeding summer roosts, 4 transitional / mating roosts and 4 hibernation roosts (some buildings had more than one roost). Four buildings were considered to be of County Importance and six to be of Local Importance. These are further described per project element below.

Mature trees within 50m of the construction works area were inspected from ground level, and 26 were considered to have low suitability for bats (e.g. small crevices that could be used by individual roosting bats), while 2 were considered to have moderate suitability (e.g. multiple or larger crevices that could support multiple roosting bats). However, these numbers only refer to the potential suitability of these trees for bats, and we note that **no evidence of roosting bats was observed** (e.g. bat droppings) in any of these trees. All other mature trees within 50m of the construction area boundaries were inspected and evaluated as having negligible roost suitability. 17 of the low-suitability trees and none of the moderate-suitability trees were within the construction works area boundary.

A number of bridges were inspected along the route of the UWF Grid Connection and material (concrete and stone) haulage routes along local roads; bridges on national or regional roads were scoped out of the assessment, as they are maintained on a regular basis by Transport Infrastructure Ireland, and would not need to be upgraded or strengthened in order to allow the passage of construction vehicles. Within the study area 1 bridge had high suitability, 1 had moderate suitability and 5 bridges had low suitability for bat roosts. However, these numbers only refer to the potential suitability of these for bats, and we note that **no evidence of roosting bats was observed** in any of these bridges.

Bat activity surveys using automated detectors were carried out at twenty-seven locations (including compound locations, and additional treeline/hedgerows with high suitability for bats) within the UWF Grid Connection Study Area. . A full list of bat activity survey results is provided in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.5).

Roosts

Fourteen bat roosts in total were identified, of which 12 were in dwelling houses, one was in an outbuilding/shed and one in a ruined church. None of the roosts were located within the construction area boundary. Four roosts are of County Importance, with the closest 5m from the construction works area. 6 roosts are of local importance, with the closest 5m from the construction works area. Further detail is provided below in Table 8-66.

Table 8-66: Bat Roosts Identified within UWF Grid Connection Study Area

Code	Type	Evidence of bats	Importance Evaluation	Proximity to the UWF Grid Connection
BR1	Ruined church	Maternity, mating and hibernation roost: 5 - 10 natterer's bats	County	20m
BR2	Dwelling house	Maternity roost: 30 - 40 common pipistrelles	Local	120m
BR3	Dwelling house	Day roost / satellite roost: 1 soprano pipistrelle	Negligible	350m
BR4	Dwelling house	Hibernation roost: >100 brown long-eared bats, 1 natterer's bat. Summer day roost: 2 brown long-eared bats, 1 natterer's bat.	County	160m
BR5	Dwelling house	Summer non-breeding roost and mating / transition roost: 3 - 4 common pipistrelles. Hibernation roost: 6 common pipistrelles, 2 brown long-eared bats	County	50m
BR6	Dwelling house	Former transitional roost: >200 pipistrelles. Access points have now been sealed.	Negligible (inactive)	140m
BR7	Dwelling house	Maternity roost: 40 - 50 common pipistrelles	Local	5m
BR8	Dwelling house	Maternity roost: 10 - 20 common pipistrelles	Local	200m
BR9	Dwelling house	Day roost / satellite roost: 1 common pipistrelle	Negligible	50m
BR10	Dwelling house	Maternity roost: 40 - 50 common pipistrelles	Local	400m
BR11	Shed	Day roost / satellite roost: 1 Myotis sp.	Negligible	430m
BR12	Dwelling house	Maternity roost: 40 - 50 common pipistrelles	Local	5m
BR13	Dwelling house	Maternity roost: 30 - 40 common pipistrelles Possible day roost / satellite roost: 1 Myotis sp.	Local	5m
BR16	Dwelling house and farm buildings	Maternity roost: 4 - 5 natterers bats. Transitional / mating roosts: 5 - 10 natterers bats, 20 common pipistrelles, 3 brown long-eared bats. Summer non-breeding / day roost: 2 common pipistrelles, 1 Leisler's bat. Hibernation roost: natterer's bats, common pipistrelles, Leisler's bat.	County	5m

Activity

Activity levels (from 27 sampling locations) were relatively high, with an average of one bat pass every two minutes throughout the survey period (a Bat Activity Index of 29.3). The most frequently-recorded species were common pipistrelles, followed by soprano pipistrelles, *Myotis* spp. Leisler's bat, Nathusius' pipistrelle and brown long-eared bat, in order of abundance. Lesser-horseshoe bats were not recorded. 5 habitat features were considered to be of County Importance as commuting routes / feeding areas and 18 to be of Local Importance.

Table 8-67: Bat Activity Sampling Results

Sampling Location	Habitat	Month	Characterisation of activity	Importance Evaluation
SD1	Mature treeline	Jun	Frequent CP, occasional SP	Local
		Sept	Frequent CP, occasional SP & MY	
SD2	Hedgerow	Aug	Frequent CP	Local
		Sept	Occasional CP	
SD3	Hedgerow	Jun	Negligible	Local
		Sept	Frequent SP, occasional CP	
SD4	Hedgerow	Jun	Frequent CP, occasional SP	Local
		Sept	Occasional CP	
SD5	Hedgerow	Jun	Occasional CP	Negligible
		Sept	Occasional CP	
SD6	Farmyard	Jun	Occasional CP	Local
		Sept	Frequent CP & SP	
SD7	Mature woodland	Aug	Frequent CP, occasional L	Local
		Sept	Frequent CP & SP, occasional MY	
SD8	Ruined church	Jun	Occasional CP & MY	Local
		Sept	Occasional CP	
SD9	Hedgerow	Jun	Negligible	Negligible
		Sept	Negligible	
SD10	Mature woodland	Aug	Frequent CP, occasional SP	Local
		Sept	Negligible	
SD11	Hedgerow	Jun	Frequent CP & SP	County
		Sept	Near-constant SP, frequent CP, occasional MY	
SD12	Hedgerow	Jun	Frequent CP & MY	County
		Sept	Frequent CP, occasional MY	
SD13	Road within conifer plantation	Jun	Near-constant CP	County
		Sept	Frequent CP, occasional SP & MY	
SD14	Road within conifer plantation	Aug	Frequent CP, occasional SP	Local
		Sept	Occasional CP	
SD15	Road within conifer plantation	Jun	Occasional CP & MY	Local
		Sept	Negligible	
SD16	Treeline	Aug	Occasional CP, SP & MY	Local
		Sept	Frequent SP, occasional CP	
SD17	Farmyard	Jun	Frequent CP	Local
		Sept	Frequent CP, occasional SP & MY	
SD18	Road within conifer plantation	Jun	Frequent CP	Local
		Sept	Frequent CP	
SD19	Hedgerow	Sept	Negligible	Negligible
		Sept	Negligible	
SD20	Roadside hedgerow	Aug	Frequent CP & MY, occasional SP	County
		Sept	Frequent CP	
SD21	Road within conifer plantation	Jun	Frequent CP, occasional L & SP	Local
		Sept	Occasional CP	

Sampling Location	Habitat	Month	Characterisation of activity	Importance Evaluation
SD22	Road within conifer plantation	Aug	Occasional CP	Local
		Sept	Frequent CP & SP	
SD23	Hedgerow	Aug	Frequent CP & SP	Local
		Sept	Frequent CP, occasional SP	
SD24	Open ground	Jun	Occasional CP & L	Local
		Sept	Occasional CP	
SD25	Hedgerow	Jun	Occasional CP	Local
		Sept	Occasional CP, SP & MY	
SD26**	Farmyard	Jun	Near-constant CP	County
		Sept	Occasional CP	
SD27**	Edge of conifer plantation	Jun	Occasional CP	Negligible
		Sept	Negligible	

** It should be noted that sampling locations SD26 and SD27 are also within the zone of influence of the UWF Related Works, and are discussed in relation to same within the relevant section of this report.

Further information on activity and roost surveys and results are included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.5). Maps showing the preliminary ecological appraisals of in respect of bats buildings, trees and bridges are provided in Figure GC 8.8: Bats within the UWF Grid Connection Study Area.

Note: The locations of bat roosts are not shown in Figure GC 8.8, but detailed descriptions and coordinates of each roost are provided in a confidential annexe to Appendix 8-1 (Section A8-1.7), which will be provided to the planning authority and key statutory consultees but will not be made publicly available.

8.8.1.3 Importance of Bats

All bat species, as listed in the Fifth Schedule to the Wildlife Act 1976 (as amended in 2000), and their resting places are legally protected in Ireland. The Wildlife Act, 1976, is the principal national legislation providing for the protection of wildlife and the control of some activities, which may adversely affect wildlife. For the purpose of the current evaluation, importance levels are as described under Context, above in respect of both roosts and locations of activity.

All bats are listed on Annex IV of the EU Habitats Directive 92/43/EEC which was transposed into national law through the European Communities (Natural Habitats) Regulations 1997 (S.I. 94/97) as amended in 1998 (S.I. No. 233/1998), 2005 (S.I. No. 378/2005) and 2011 (SI No. 477/2011). This legislation further protects bats both inside and outside of the Natura 2000 site network. Furthermore, lesser horseshoe bat is listed on Annex II of the EU Habitats Directive 92/43/EEC which requires Special Areas of Conservation (SACs) to be designated within the Natura 2000 site network to ensure the maintenance of their conservation status.

The Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, 1982) ensures that governments take into account the conservation needs of species during the formulation of planning and development policies. It also seeks the protection of endangered species and in relation to bats, it stipulates that all bat species and their habitats are conserved.

8.8.1.4 Sensitivity of Bats

The key sensitivities of bats are the destruction or disturbance of their roosting places, and the modification of their commuting routes and foraging habitats (NPWS 2013, Collins *et al.,* 2016). During the day, bats roost in man-made structures (typically houses, farm buildings and bridges), mature trees and caves. They may suffer direct effects due to the destruction or modification of their roosts (e.g. the demolition of a house or felling of a tree), or indirect effects due to disturbance of the area surrounding a roost (e.g. illumination of exit / entry points, or removal of surrounding vegetation). They are most sensitive to effects during their maternity and hibernation periods, which are from May to August and November to March, respectively.

After sunset, bats 'commute' fly from their roosts to a suitable feeding area (referred to as 'commuting' behaviour), and spend most of the night foraging for insect prey. They typically favour linear habitat features (e.g. hedgerows and forest edges) for commuting and foraging, and usually avoid brightly-lit areas (Lundy et al., 2011). They may travel several kilometres from their roost, and may use different feeding areas on different nights.

8.8.1.5 Trends in the Baseline Environment (the 'Do-Nothing' scenario)

Under Article 17 of the EC Habitats Directive (European Commission Directive 92/43/EEC), the Irish government is obliged to assess and report on the conservation status of all habitats and species listed in Annexes I, II, IV and V of the directive, including bats. In the latest submission (NPWS 2013), all Irish bat species are considered to be of favourable conservation status, although the status of Nathusius' pipistrelle is listed as unknown, because there is some uncertainty about their range and breeding status. Most bat species are listed as 'least concern' on the all-Ireland red list of mammals (Marnell *et al.,* 2009), including the Nathusius' pipistrelle. Leisler's bat is listed as 'near-threatened' because Ireland supports an internationally-important population, but the overall population status of this species is known to stable or increasing.

The abundance of Irish bats is monitored by Bat Conservation Ireland (Roche *et al.,* 2012) using annual public surveys such as the 'Car-Based Monitoring Scheme', the 'All-Ireland Daubenton's Bat Waterways Survey', and roost monitoring assessments for brown long-eared bats and lesser horseshoe bats. In combination, these projects monitor all Irish species with the exception of Natterer's bat and whiskered bat. **To date the populations of all monitored species appear to be stable or increasing**.

If the subject development does not proceed, the site is expected to remain in the baseline condition and to be used by bat species on an occasional to regular basis. Based on the national trends of these species, the abundance of bats in the surrounding landscape is expected to remain stable, or to increase at a slow rate.

8.8.1.6 Receiving Environment (the Baseline + Trends)

As the conservation status of all Irish bat species is considered to be stable, it is expected that the baseline levels of bat activity recorded in 2016 / 2017 will not change significantly by the time of construction or operation and decommissioning.

8.8.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

UWF Grid Connection is part of a whole project which comprises the following Other Elements; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Grid Connection is Element 1. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.

The Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in order to present the totality of the project.

NOTE: GREY Shading relates to additional information to facilitate the cumulative evaluations

8.8.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Bats considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 8.8.2.2.1 below.

The evaluation of cumulative impacts to Bats also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Bats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.3: Scoping of Other Projects or Activities (Section A2.3 .1 and Section A2.3. 8).

The results of this scoping exercise are that: it is evaluated that no Other Projects or Activities are likely to cause cumulative effects with either the UWF Grid Connection or the Other Elements of the Whole UWF Project, and therefore no Other Projects or Activities are scoped in for evaluation of cumulative effect to Bats.

8.8.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements which are described in Table 8-68.

Table 8-68: Cumulative Evaluation Study Area for Bats

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 2: UWF Related Works	• Buildings within 150m of Element construction works areas or activity locations • Mature trees within 50m of Element construction works areas or activity locations; • Hedgerow severance locations • Bridges within construction works locations or along concrete/aggregate haulage routes.	Professional Judgement and as per Best Practice: Bat Surveys for Professional Ecologists: Good Practice Guidelines, Collins, (2016), and The Conservation of Bats in Bridges Project – A Report on the survey and conservation of bat roosts in bridges in Cumbria, Billington and Norman (1997).
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities:	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects	

8.8.2.2.1 Potential for Impacts to Bats

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect Bats. The results of this evaluation are included in Table 8-69.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure CE 8.8: Bats within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-69: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects due to no sources of impacts – During surveys, no bat roosts were recorded at the UWF Replacement Forestry lands, one low suitability roost was recorded within 150m of the existing entrance to the afforestation lands, • There is no potential for destruction or disturbance of bat roosts in trees, as there is no requirement to fell or prune trees for the UWF Replacement Forestry, no requirement to upgrade bridge structures, and no requirement for renovations, alterations or use of buildings during either the planting or growth stages, therefore there is no source of impact; • No potential for severance of commuting routes or feeding area, as there is no requirement to remove any hedgerows or other linear features for the UWF Replacement Forestry. Woodland edge habitat will be created for foraging bats, as the UWF Replacement Forestry matures; • No potential for disturbance effects due to lighting, as lighting will not be required for the UWF Replacement Forestry, • No potential for disturbance or displacement effects due to noise or vibration as no significant sources of noise and no sources of vibration will be present onsite during planting or management activities • No potential for mortality of bats due to collision due to the absence of moving structures, • No potential for effects due to harvesting, as the UWF Replacement Forestry will be a permanent woodland and will not be harvested. .
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Included for the evaluation of cumulative effects

8.8.2.3 Cumulative Information: Baseline Characteristics – Context & Character

Bats are common and widespread throughout Ireland, and occupy a wide variety of habitats. In a regional context, the following is noted in the (Draft) North Tipperary Biodiversity Plan 2007: "Many bat species forage in woodland and over water, and the combination of both habitats within North Tipperary makes the area valuable for bat species. Built structures, such as bridges, that occur close to water are of particular value as roosts. Six of Irelands bat species are known to occur in North Tipperary common pipistrelle *Pipistrellus pipistrellus*, soprano pipistrelle *Pipistrellus pygmaeus*, Leisler's bat *Nyctalus leisleri*, Natterer's bat *Myotis nattereri* (records from www.batconservationireland.org), Brown long-eared bat *Plecotus auritus* and Daubenton's bat *Myotis daubentonii* (pers comm. S. Jones, S. Geraghty[20])". In addition, the author has recorded Nathusius' pipistrelle Pipistrellus nathusii and whiskered bat Myotis mystacinus in the north Tipperary. Ireland's only other regularly-occurring bat species – the lesser horseshoe bat Rhinolophus hipposideros – can occasionally be found on the Limerick – Tipperary border, but in general the county is just outside the range of this species.

8.8.2.3.1 Element 2: UWF Related Works

The UWF Related Works will be located in the Slievefelim to Silvermine Mountains upland area in County Tipperary. The landscape present is predominantly improved agricultural/forestry landscape, interspersed with hedgerows and low-density houses and farm buildings. Mature trees are also present within hedgerows and along public roads.

Online national landscape suitability maps for Irish bat species (Lundy et al., 2010) were reviewed and indicate that the suitability index for the 'all bats combined' layer is moderate within the environs of UWF Related Works.

When considered at the level of individual bat species, the UWF Related Works Study Area has high suitability for common pipistrelles; moderate suitability for soprano pipistrelles, Leisler's bat, Whiskered Bat and natterer's bat, low suitability for Daubenton's and brown long-eared bats, and negligible suitability for Nathusius' pipistrelles and lesser horseshoe bats.

Further information on context such as known roosts identified from desktop review is included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.2.1).

Survey Results – UWF Related Works:
Roosts
Preliminary ecological appraisals were carried out for 35 buildings within the study area, and presence / absence surveys and/or roost characterisation surveys were carried out in 2016 and 2017 for features of high or moderate roost suitability that were considered to be at risk of direct or indirect effects.
Four bat roosts were identified, all of which were located in dwelling houses and farm buildings. None of the roosts were located within the construction area boundaries. Two roosts are of County Importance, with the closest 5m from the UWF Related Works construction works area. One roost is of Local importance, located 130m from the construction works area. We note that two of the roosts identified are also discussed within the context of the UWF Grid Connection and Upperchurch Windfarm.

[20] As cited in the 'draft North Tipperary Biodiversity Plan 2007"

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Table 8-70: Identified Bat Roosts in the UWF Related Works study area

Code	Type	Evidence of bats	Valuation	Proximity to UWF Related Works
BR14*	Dwelling house	Day roost / satellite roost: 1 common pipistrelle	Negligible	15m
BR15	Dwelling house and traditional farm buildings	Maternity roost: 50 - 60 common pipistrelles Maternity roost: 5 soprano pipistrelles.	Local	130m
BR16*	Dwelling house and traditional farm buildings	Maternity roost: 4 - 5 natterers bats. Transitional / mating roosts: 5 - 10 natterers bats, 20 common pipistrelles, 3 brown long-eared bats. Summer non-breeding / day roost: 2 common pipistrelles, 1 Leisler's bat. Hibernation roost: natterer's bats, common pipistrelles, Leisler's bat.	County	10m
BR17	Dwelling house	Maternity roost: 2 – 3 natterers bats	County	5m

** It should be noted that roosts R14 and R16 are also within the zone of influence of the UWF Grid Connection and Upperchurch Windfarm, and are discussed in relevant sections of this report. However, although the potential impacts are considered for multiple elements of the project, they refer only to two individual roosts.*

Activity

Activity levels (from two sampling locations within the study area) were relatively high, with an average of one bat pass every three minutes throughout the survey period (a Bat Activity Index of 20.8). The only species recorded in significant numbers was common pipistrelles; all other species had negligible activity. Lesser-horseshoe bats were not recorded. One habitat feature was considered to be of County Importance as a commuting route / feeding area.

Table 8-71: Bat Activity Sampling Results in the UWF Related Works study area

Site	Habitat	Month	Characterisation of activity	Ecological value
SD26	Farmyard	Jun	Near-constant CP	County
		Sept	Occasional CP	
SD27	Edge of conifer plantation	Jun	Occasional CP	Negligible
		Sept	Negligible	

*** It should be noted that SD26 and SD27 are also within the zone of influence of the UWF Grid Connection, and are also discussed under same in the relevant section of this report.*

Further information on activity and roost surveys and results are included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.5) and maps showing the preliminary ecological appraisals of in respect of bats buildings, trees and bridges are provided in Figure RW 8.8: Bats within the UWF Related Works Study Area. Figure RW 8.8 is part of the EIA Report for the UWF Related Works, and is included in Volume F: Reference Documents with this planning application

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8.8.2.3.2 Element 3: UWF Replacement Forestry

Not applicable –Element evaluated as excluded. See Section 8.8.2.2.1

8.8.2.3.3 Element 4: Upperchurch Windfarm

Preliminary ecological appraisals were carried out for 7 buildings within the study area, and presence / absence surveys and/or roost characterisation surveys were carried out in 2016 and 2017 for features of high or moderate roost suitability that were considered to be at risk of direct or indirect effects.

One bat roost of County Importance is located within farm buildings at Site Compound No.2, which is associated with the Upperchurch Windfarm, and therefore overlaps the construction works area directly. A further day roost/satellite roost of negligible importance is also present 15m from the construction works area within another part of the Upperchurch Windfarm.

Table 8-72: Identified Bat Roosts in the Upperchurch Windfarm study area

Code	Type	Evidence of bats	Valuation	Proximity to Upperchurch Windfarm
BR14	Dwelling house	Day roost / satellite roost: 1 common pipistrelle	Negligible	15m
BR16	Dwelling house and traditional farm buildings	Maternity roost: 4 - 5 natterers' bats. Transitional / mating roosts: 5 - 10 natterers bats, 20 common pipistrelles, 3 brown long-eared bats. Summer non-breeding / day roost: 2 common pipistrelles, 1 Leisler's bat. Hibernation roost: natterer's bats, common pipistrelles, Leisler's bat.	County	0m

Activity

Activity surveys for the Upperchurch Windfarm were carried out by Malachy Walsh & Partners in 2012 and 2013, and the results were presented in the wind farm EIS. Some excerpts from the bat report are provided below:

"The results of bats surveys indicate that up to seven species of bat are utilising habitats within the study area or are commuting through the site to more suitable habitat in the greater area.

Throughout the site common pipistrelles and soprano pipistrelles were recorded on the edge of woodland, along access tracks, hedgerows, treelines, over areas of scrub, semi-natural grassland and improved agricultural grassland. Common pipistrelle was the most common species recorded during surveys in 2012 and 2013."

8.8.2.3.4 Element 5: UWF Other Activities

Due to the absence of possible sources of hedgerow severance in respect of UWF Other Activities (only minimal trimming of outer branches is planned) activity surveys to inform an appraisal of likely effects were not required

Roosts: No bat roosts were present. Trees at hedgerow trimming locations as part of Haul Route Activities are not suitable for roosting bats. No trimming is required for Overhead Line activities.

8.8.2.3.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 8.8.2.1.

8.8.3 PROJECT DESIGN MEASURES for Bats

At the conception of the UWF Grid Connection, the design team evaluated the potential for significant impacts to the environment. Impacts will only take place where three components exist together; (1) the source of the impact (project), (2) the receptor of the impact (sensitive aspect) and (3) a pathway between the source and the sensitive aspect. The objective of mitigation measures is to avoid, prevent or reduce, one of the three components of an impact by choosing an alternative location, alternative design or an alternative process.

Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the development – these are the Project Design Environmental Protection Measures, which are shortened to 'Project Design Measures' in this EIA Report.

The development as evaluated in the EIA Report incorporates the Project Design Measures.

The Project Design Measures outlined in Table 8-73 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Bats**.

Table 8-73: UWF Grid Connection Project Design Measures relevant to Bats

PD ID	Project Design Environmental Protection Measure (PD)
PD02	Flag-men will be used at temporary site entrances rather than creating sightlines by the removal of roadside boundaries. These flagmen will control the movement of traffic on the public road, so that road users can continue to use the local road network in a in a safe and efficient manner.
PD37	All construction works will be carried out during daylight hours. Security lighting will be used at compounds. All lighting will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational.
PD38	Confirmatory surveys will be carried out at all trees with bat suitability that will require felling or other major modifications (e.g. removal of rotten branches). These trees will be subject to a ground-level visual inspection by the Project Ecologist (or a bat specialist acting on their behalf) prior to site clearance works in order to confirm the findings of the 2016 / 2017 surveys. (Note: 17 trees with low suitability were identified within the UWF Grid Connection construction works area boundary during 2016/2017 surveys).
PD39	Where a tree with moderate or high bat suitability is to be felled, a presence/absence bat surveys will be carried out. (Note. It is not expected that any trees with moderate or high suitability will be felled).
PD40	Felling of trees with bat roost suitability will be undertaken in the period late-August to late-October/early-November. Trees with low suitability for bats will be felled carefully and slowly in order to avoid impact-related injuries to any bats that may be roosting inside them. Sections of the tree with potential roost features for bats (e.g. crevices, damaged branches) will be cut in sections, lowered carefully to the ground and left undisturbed for 48 hours before removal.
PD41	Where the felling of trees with bat suitability is carried out, robust, weather-proof bat-boxes, for example Schwegler type 1FF and 2F models, will be placed in each of the affected sections to compensate for the loss of potential tree roosts. The number of bat boxes will match the number of trees with bat suitability to be felled.
PD42	Installation of bat crossing structures at severed hedgerows, proximate to areas of high bat activity or roost locations. And following the completion of construction works, the replanting of these severed hedgerows with semi-mature shrubs/trees (like for like) and limits on temporary lighting near hedgerows.

Cumulative Information: Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the fundamental design of the UWF Related Works and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in Appendices 5.3 and 5.5 in Volume C4: EIAR Appendices.

8.8.4 EVALUATION OF IMPACTS to Bats

In this Section, the likely direct and indirect effects of the UWF Grid Connection are identified and evaluated. Then the likely cumulative effects of the UWF Grid Connection together with the Other Elements of the Whole UWF Project and Other Projects or Activities are identified and evaluated.

A conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) - Bats.

As a result of the exercise, some impacts were included and some were excluded.

Table 8-74: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Destruction or disturbance of bat roosts in trees, (construction stage)	*Mortality through roost destruction of roosts in forestry, in bridges or in hedgerows, (construction stage)*
Severance of commuting routes or feeding areas, (construction stage)	*Destruction/Disturbance of Bat Roosts in Buildings, (construction stage)*
Disturbance or Displacement due to lighting, (construction stage)	*Disturbance or Displacement of Bat Roosts due to Noise and Vibration, (construction stage)*
	Inadvertent mortality through roost destruction due to hedgerow trimming activities (operational stage)
	Avoidance due to increased EMF (operational stage)
	Disturbance or Displacement due to lighting (operational stage)
	Disturbance or Displacement due to Noise and Vibration (operational stage)
	Mortality of bats due to collision or barotrauma (operational stage)
	Inadvertent mortality through roost destruction, (decommissioning stage)
	Disturbance or Displacement due to lighting, (decommissioning stage)
	Indirect Disturbance from Noise and Vibration, (decommissioning stage)

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 8.8.4.1 to 8.8.4.3.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, Section 8.8.4.4.

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8.8.4.1 Impact Evaluation Table: Destruction or disturbance of bat roosts in trees

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Removal of mature trees, trimming and pruning of mature trees and hedgerows
Cumulative Impact Source: Tree felling, Trimming and pruning of mature trees and hedgerows
Impact Pathway: Landcover

Impact Description: Crevices and cavities in mature trees can provide roosting opportunities for bats, with some species (e.g. Leisler's bat) thought to favour roosting sites in trees. Recent research has demonstrated that the use of roosts in trees can be highly transitory, with frequent roost switching between nights and across the season, although some large cavities can be used as maternity or hibernation roosts for longer periods of time. Almost all records to date have been from broadleaf trees (particularly oaks), with only a very small number from specimen conifers, and none from conifer plantations[21].

Any damage or disturbance to trees with crevices or cavities can have direct or indirect impacts on any bats that may be roosting within them. Felling can cause death or injury to bats, or the associated disturbance can cause them to emerge during daylight, thus exposing them to diurnal predators. Similarly, construction work within the root zone of trees can cause the death of trees, causing them to fall at a later date. The spatial extent of impacts is limited to the tree in question (including its root zone and overhanging branches).

Trimming of hedgerows and low-hanging branches of trees will be required along some roads in order to facilitate the passage of construction vehicles. Almost all of these locations are on public roads and already subject to the standard maintenance regime for public roads, and it is expected that all such hedgerows / trees would have been trimmed in the past. Therefore, there is a negligible risk that bats could roost in any of these branches, so this element of the project will not have any direct impacts on potential tree roosts. All works will occur within daylight hours as part of Project Design.

Impact Quality: Negative

Evaluation of Subject Development Impact – Destruction or disturbance of bat roosts in trees

Element 1: UWF Grid Connection

Impact Magnitude:
17 No. trees with bat roost suitability are located either within or partially within the UWF Grid Connection construction works area boundary. All of these trees were evaluated as having low suitability for roosting bats, i.e. small crevices that could be used on a transitory basis by individual roosting bats. No trees of moderate or high suitability were recorded within the construction works area. The trees were surveyed in either 2016 or 2017, and no evidence of roosting bats was observed, so it is considered that there is a low likelihood (e.g. <5%) that bats would be roosting within them at the time of construction. It is likely that some or all of these trees will be directly or indirectly affected during construction works, although decisions to fell these trees will be made at the construction stage. Even if the trees are not felled, it will be necessary to trim or prune some of the lower branches to facilitate access, and root disturbance could occur during excavation works. In recognition of the potential risk of impacts on any bats that may be roosting in these trees at the time of works, a series of best-practice measures have been incorporated into the design of the development, including pre-felling inspections, felling procedures, and the installation of bat boxes. This will ensure that any impacts on any bats present in the trees would be imperceptible.

There is no potential for sequential effects to bats, as the extent of any instance of roost disturbance/destruction is limited to those Bats which may be present in individual trees.

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[21] Andrews H & Gardener M 2016. Bat Tree Habitat Key – Database Report 2016. AEcol, Bridgwater

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Only 17 of the trees located within the zone of effect, and all were considered to have low suitability for roosting bats, and;
- Considering their low suitability for roosting bats, the likelihood that bats would occupy any of these trees at the time of felling is considered to be low (<5%);
- There was no evidence that bats were roosting in any of these trees during inspections in 2016 / 2017;
- Best practice measures have been incorporated into the project design, including pre-felling inspections, sensitive felling procedures, and the installation of bat boxes.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
There are no trees with bat roosting suitability within the study area.

Significance of the Impact: Neutral Impact

Rationale for Impact Evaluation:

- no change in baseline conditions

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.8.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:

No potential tree roosts were identified in the EIS for the Upperchurch Windfarm and it was noted that the conifer plantations within the site offer "*very poor roosting habitat*".

In the RFI reporting it was noted that "*large mature treelines in the greater area offer potential roosting sites for bats particularly along the roads in Shevry and Gleninchnaveigh*". However, only a small number of trees will be felled along these roads, and none were considered to have suitability for bats. Therefore, this element of the project will not have any direct impact on potential tree roosts.

Significance of the Impact: Neutral Impact

Rationale for Impact Evaluation:

- None of the trees within the footprint of the development are suitable for roosting bats, so there will be no change to the baseline conditions

Element 5: UWF Other Activities

Impact Magnitude: There is no requirement to fell trees. Trimming of hedgerows and low-hanging branches of trees will occur as part of Haul Route Activities. Haul Route Activity locations are on public roads and already subject to the standard maintenance regime for public roads, and it is expected that all such hedgerows / trees would have been trimmed in the past. Therefore, there is a negligible risk that bats could roost in any of these branches. No tree or hedgerow trimming is required for Overhead Line Activities. Significant planting of new trees will occur as part of the Upperchurch Hen Harrier Scheme (totalling 2.8km).

Significance of the Impact: Neutral Impact

Rationale for Impact Evaluation:

- None of the trees within the footprint of the development are suitable for roosting bats, so there will be no change to the baseline conditions
- Trimming associated with Haul Route Activity locations will not contrast with any baseline activities, and;

• Tree planting in respect of the Upperchurch Hen Harrier Scheme will increase availability of trees for Bats.
Evaluation of Cumulative Impacts – Destruction or disturbance of bat roosts in trees
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: There is no potential for the UWF Related Works to cumulatively effect bats, as Neutral effects are likely to occur to Bats as a result of the development of the UWF Related Works. At a wider population level, Neutral cumulative effects are likely as the UWF Grid Connection is the only Element which will cause measurable effects - where instances of tree felling has the potential to affect Bat Roosts, whereas the remaining elements do not include trees suitable for roosting bats, and trimming activities on public roads as part of UWF Other Activities will have Neutral effect on bat roosts. There is no potential for cumulative sequential effects; as the extent of any instance of roost disturbance/destruction is limited to those Bats which may be present in individual trees.
Significance of the Cumulative Impact: No Cumulative Impact
Rationale for Cumulative Impact Evaluation: • Effects are limited to the UWF Grid Connection.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Bats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

8.8.4.2 Impact Evaluation Table: Severance of commuting routes or feeding areas

Impact Description	
Project Life Cycle Stage:	Construction Stage/early Operational Stage

Impact Source: Site clearance

Cumulative Impact Source: Site clearance

Impact Pathway: Land cover

Impact Description: Bats forage and commute along hedgerows, treelines and other linear habitat features. Both temporary and permanent clearance of short sections of habitats such as Hedgerows will be required to facilitate some construction works, particularly along the routes of new access roads or underground trenching locations. The removal of this habitat would not kill or injure any bats, but it may disrupt their behaviour, reducing the value of regular feeding areas and forcing bats to use alternate commuting routes. In many cases bats will be able to adapt to an altered route, as many bat species (e.g. pipistrelles) readily cross gaps of 5 - 10m. However, the disruption of key feeding areas or commuting routes may have a significant effect. For example, alteration of the key commuting routes to and from bat roosts can potentially cause bats to permanently abandon the roost.

Bat protection measures have been incorporated into the project design in order to minimise the effects of habitat severance on bats. This includes the installation of bat crossing structures at severed hedgerows proximal to areas of high Bat activity or roost locations, the replanting of severed hedgerows with semi-mature (i.e. at least ten years growth) shrubs/trees on a like-for-like basis, and limits on lighting. This will substantially reduce the risk of impacts on bats in these areas. The bat crossings will be inspected annually during the operational stage, maintained if necessary and removed once vegetation has re-established to the level of the adjacent hedgerow/field boundary. Further to this, at each crossing location, enhancement via the planting of locally sourced native species of trees at either side of the crossing location will be undertaken. This will ensure that a like for like scenario develops where for every shrub/tree removed another is planted, ensuring no net loss of vegetation, and a rapid re-establishment to original height.

Re-instated hedgerows will be planted with semi-mature (locally sourced, native) trees, thus reducing the time required for re-establishment to original vegetation height. Therefore, the effects of vegetation removal would only persist in the short term (approx. 1 – 7 years), and after this period, the hedgerows would return to the baseline condition. It is also noted that other elements of the project will include substantial Hedgerow planting, resulting in a net increase in the coverage of this habitat within the study area.

Impact Quality: Negative and Positive

Evaluation of Subject Development Impact – Severance of commuting routes or feeding areas

Element 1: UWF Grid Connection

Impact Magnitude:

5m sections of hedgerow will be permanently removed at 9 locations, all of which are evaluated as of local importance to bats. Temporary bat crossing structures will be installed at severed hedgerows proximal to areas of either high Bat activity or roost locations (refer to **Figure GC 8.8: Bats within the UWF Grid Connection Study Area**), in order to avoid effects from the severance of these features during works.

In addition, approximately 585m of field boundary (primarily hedgerow and earthen banks) will be temporarily removed at other locations along the route of the UWF Grid Connection. Most of these locations were considered to be of relatively low importance for feeding / commuting bats due to their lack of vegetation (e.g. earth banks), small size and / or lack of continuity(). This includes permanent removal of roadside field boundary at 2 entrances (E1, E15) to facilitate lines of sight, although the roadside boundaries will be replanted with hedgerows behind the sightlines. Temporary removal of 2m to 5m wide sections of field boundary will also occur along the construction works area boundary to facilitate cable trenching works.

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The new gaps, which will be 5m in width in most locations, will be used for between 1 week and 6 months. When construction is complete, all temporarily removed hedgerows or field boundaries will be reinstated with semi-mature vegetation, thus reducing effects.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Only a small extent of hedgerow will be permanently lost, and;
- 700m of additional hedgerow planting will more than compensate for its loss; and
- All temporarily-removed field boundaries will be reinstated to at least their former (or better) condition in the medium term, as outlined in Chapter 5 Description of the Development, and;
- The severance of most commuting routes / feeding areas will be medium term in duration, reversible and offset by the planting of new hedgerows using semi-mature trees / shrubs;
- There will be a lag time in the re-establishment of the vegetation, but the continuity of important bat commuting routes will be maintained using specially-designed bat crossing structures;
- This will ensure that bats can continue to use these features during the re-establishment period.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
10m sections of field boundary will be permanently removed at two locations along Realigned Windfarm Road RWR2. However, as these areas are un-vegetated, they are not considered to be of importance for commuting or foraging bats.
145m of linear vegetation features (primarily hedgerows) will be removed temporarily (c.1 week to 1 month) at 15 locations along works locations for the Internal Windfarm Cabling and for Haul Route Works (HW7 and HW10). Temporary bat crossing structures will be installed at severed hedgerows proximal to areas of either high Bat activity or roost locations, in order to avoid effects from the severance of these features during works. When complete, all temporarily removed hedgerows or field boundaries will be reinstated with semi-mature vegetation.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Only a small extent of hedgerow will be permanently lost.
- 370m of additional hedgerow planting will more than compensate for its loss; and
- All temporarily-removed field boundaries will be reinstated to at least their former (or better) condition in the medium term, as outlined in Chapter 5 Description of the Development;
- The severance of most commuting routes / feeding areas will be medium term in duration, reversible and offset by the planting of new hedgerows;
- There will be a lag time in the re-establishment of the vegetation, but the continuity of linear features near bat roosts will be maintained using specially-designed bat crossing structures;
- This will ensure that bats can continue to use these features during the re-establishment period

Element 3: UWF Replacement Forestry– *N/A, evaluated as excluded, see Section 8.8.2.2.1*

Element 4: Upperchurch Windfarm

Impact Magnitude:
Approximately 360m of good quality hedgerows will be removed as part of the construction of the Upperchurch Windfarm. There shall be a loss of potential foraging habitat within the site. However, this loss of habitat is not considered to be significant given the availability of extensive foraging habitat outside the site. In the Ecological Management Plan for the development it is noted that “approximately 360m of new hedgerow will be planted to mitigate this loss of habitat.”

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Topic

Significance of the Impact: Not significant
Rationale for Impact Evaluation: • The extent of permanent loss is mitigated by the planting of the same extent of replacement habitat; and • Relatively little bat activity was recorded along hedgerow habitats.
Element 5: UWF Other Activities
Impact Magnitude: This element of the project will not involve the severance of any hedgerows or similar features. As part of Upperchurch Hen Harrier Scheme management up to 2.8km of hedgerow is to be planted, constituting a significant offset of Upperchurch Windfarm hedgerow removal in terms of the effects of severance
Significance of the Impact: Imperceptible (positive)
Rationale for Impact Evaluation: • No hedgerows or other similar features will be severed, so there will be no change to the baseline conditions, and; • 2.8 km of new hedgerow planting will improve bat foraging habitat in the short to medium term.
Evaluation of Cumulative Impacts – Severance of commuting routes or feeding areas
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: Some short sections of hedgerow comprising 65m in total will be permanently removed for the UWF Grid Connection element of the Whole UWF Project. Approximately 710m of field boundary will be temporarily removed during construction for periods of up to six months. 20m of hedgerow removal will overlap (4 No.) for both the UWF Grid Connection and the UWF Related Works. Bat crossing structures will be installed at locations proximal to identified bat roosts or areas of high foraging activity, which will ensure that linear connectivity is maintained during this period. When construction is completed, all of these hedgerows will be reinstated to at least their former (or better) condition using semi-mature plants. The provision of these structures will avoid sequential effects on foraging bats in instances where hedgerow severance locations occur within the zone of effect of multiple project elements. In addition, several elements of the Project will involve hedgerow planting, as follows: the Upperchurch Hen Harrier Scheme will incorporate 2.8 km of new hedgerows, and additional hedgerows will be planted as part of the UWF Grid Connection (700m of new hedgerow), UWF Related Works (370m of new hedgerow) and Upperchurch Windfarm (360m as mitigation for loss of suitable hedgerows).
Significance of the Cumulative Impact: Not Significant
Rationale for Cumulative Impact Evaluation: • Only a small extent of hedgerow will be permanently lost. Additional hedgerow planting will more than mitigate for its loss; • All temporarily-removed field boundaries will be reinstated to at least their former (or better) condition in the medium term, as outlined in Chapter 5 Description of the Development; • The severance of most commuting routes / feeding areas will be short term in duration, reversible and offset by the planting of semi-mature trees and shrubs on a like-for-like basis; and • The continuity of important bat commuting routes will be maintained using specially-designed bat crossing structures;

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Bats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

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8.8.4.3 Impact Evaluation Table: Disturbance or Displacement due to Lighting

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Artificial lighting
Cumulative Impact Source: Artificial lighting
Impact Pathway: Visibility

Impact Description: Bats are nocturnal animals, and typically avoid any source of natural or artificial light. Lighting in the vicinity of bat roosts can cause roost abandonment, reduction in numbers of individuals, and reductions in juvenile growth rates. In addition, lighting near hedgerows and other semi-natural habitats can form barriers to the movement of commuting bats, and displace bats from feeding areas.

All construction work will take place during daylight hours as part of Project Design, so it will not be necessary to use artificial lighting at construction works areas. However, lighting will be required at temporary construction compounds for security reasons. A series of bat protection measures have been incorporated into the Project Design in order to minimise the effects of lighting on bats. This will include the fitting of cowls (specifications in line with Best Practice) to all lights in order to minimise light spill, and the use of motion and time sensors to minimise the amount of time the lights are operational. Lights will not be left on overnight.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Disturbance or Displacement due to Lighting

Element 1: UWF Grid Connection

Impact Magnitude:
3 No. Temporary compounds will be used for up to one year, and each location will be fitted with lights. The spatial extent of any disturbance or displacement effects will be small, due to the use of cowls: it would be directed towards the key areas required for security, and may illuminate an area of 10 - 20m from the light source. Lights will not be directed towards any bat roosts or key commuting routes / feeding areas. As lighting will be fitted with motion and time sensors, all lighting will be of momentary duration, typically only for approx. one minute for each time that the sensor is triggered.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The use of cowling will prevent light spill onto bat roosts or key commuting routes / feeding areas, so there will be no change to their baseline condition.
- Any lighting that is required would only be temporarily active, and would not be operational throughout the night, so any localized effects on feeding or roosting bats would be of momentary duration.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
No additional compounds required for the UWF Related Works. The already consented Site Compound No.1 at the Upperchurch Windfarm site will be used by construction personnel working on the UWF Related Works.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- The use of cowling will prevent light spill onto bat roosts or key commuting routes / feeding areas, so there will be no change to their baseline condition.

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• Any lighting that is required would only be temporarily active, and would not be operational throughout the night, so any localized effects on feeding or roosting bats would be of momentary duration
Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.8.2.2.1.*
Element 4: Upperchurch Windfarm
Impact Magnitude: All lighting within compounds will be cowled towards the centre of the compound.
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • The use of cowling will prevent light spillage so there will be no change to their baseline condition. • Any lighting that is required would only be temporarily active, and would not be operational throughout the night, so any localized effects on feeding or roosting bats would be of momentary duration.
Element 5: UWF Other Activities
Impact Magnitude: No artificial lighting is proposed for this element of the project.
Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • No artificial lighting will be required, so there will be no change to the baseline conditions
Evaluation of Cumulative Impacts – Disturbance or Displacement due to Lighting
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: As noted above, some restrictions on lighting have been incorporated into the Project design in order to minimise the effects on bats. This will include the fitting of cowls to all lights in order to minimise light spill, and the use of motion and time sensors to minimise the amount of time the lights are operational. Lights will not be left on overnight. In addition, lighting may only be required for a maximum of one year in any location, and the spatial extent is expected to be of no more than 20m from the light source. Although there are some bat roosts and key commuting routes / feeding areas in the vicinity of the UWF Related Works, consented Upperchurch Windfarm and the UWF Grid Connection, the proposed project design measures will prevent the illumination of any such features, and will ensure that lights will only be active on a temporary basis. This will also prevent any sequential effects on roosting or foraging bats from multiple aspects of the Whole Project.
Significance of the Cumulative Impact: Imperceptible
Rationale for Cumulative Impact Evaluation: • The use of cowling will prevent light spill onto bat roosts or key commuting routes / feeding areas, so there will be no change to their baseline condition. • Any lighting that is required would only be temporarily active, and would not be operational throughout the night, so any localized effects on feeding or roosting bats would be of momentary duration

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Bats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

8.8.4.4 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-75 below.

Table 8-75: Description and Rationale for Excluded Impacts to Bats

Key: 1: UWF Grid Connection; 2: UWF Related Works; 3: UWF Replacement Forestry; 4: Upperchurch Windfarm; 5: UWF Other Activities

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Forestry Felling	1,2, 4, 5	Landcover	Mortality through roost destruction	In relation to 1, 2, 4: No likely effect, as homogenous conifer plantations have extremely limited potential or suitability for roosting bats. In relation to UWF Other Activities: No likely effect due to the absence of possible sources of hedgerow severance in respect of UWF Other Activities, no bat roosts were present and the trees at hedgerow trimming locations as part of Haul Route Activities are not suitable for roosting bats. No trimming is required for Overhead Line Activities.
Construction Works	1,2, 4,5	Bridge Upgrade Works	Mortality through roost destruction	No potential for effects, as no works are required to upgrade the integrity of structures along haulage routes. These bridges are already used by large vehicles on a regular basis, so the passage of construction vehicles would not represent a change from the baseline condition
Hedgerow Trimming	1,2, 4,5	Landcover	Inadvertent mortality through roost destruction	No potential for effects, as trimming involves only the removal of outer edges of branches which are unsuitable for Bats
Land use Change	1,2, 4,5	Renovation/alteration of Buildings	Destruction/Disturbance of Bat Roosts in Buildings	Neutral effect, as: an unoccupied dwelling house and associated outbuildings (Roost #16) will be used as a site office for the Upperchurch Windfarm. The use of the site office for welfare facilities will be very similar to its original use as a dwelling house. There will be no renovations of the exterior or interior of the building. No permanent or fixed lighting will be installed around the exterior of the property, and shutters or blinds will be used to prevent light spill from windows on the northern side which faces towards identified roosts. The outbuildings will not be used for storage. Given the above, there is a low probability that the change of use would have direct impacts on any bat roosts, and the magnitude and spatial extent of impacts is considered to be negligible, because: (i) there will be no destruction or disturbance of any of the bat roosts in these structures; and (ii) there will be no new artificial lighting near any roost exit / entry points; therefore, there will be Neutral effects on the bat roost.

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				There will be no renovations or alterations of any other buildings.
Noise and Vibration	1,2,4,5	Air	Disturbance or Displacement of Bat Roosts due to Noise and Vibration	Neutral Effect: Bats are not thought to be particularly sensitive to noise and / or vibration; this pathway for impacts is not discussed in any British or Irish guidelines. As there will be no construction works at night, there is no risk of noise or vibration impacts on foraging or commuting bats. Although there are some bat roosts within 10m of the Project, construction works will only be in close proximity to these roosts for no more than a half a day at any location. It is predicted that construction-related vibration will be approx. 0.5 to 1 mm/s within a zone of influence of approx. 5m. This would be barely perceptible to any human residents of properties, and therefore is also considered barely perceptible to any bats occupying a roost. Therefore, the magnitude of impacts reaching any bat roosts will be imperceptible.
Operational Stage				
Hedgerow Trimming	1,2, 4,5	Landcover	Inadvertent mortality through roost destruction	No potential for effects, as trimming of hedgerows involves only the removal of outer edges of branches which are unsuitable for Bats
EMF	1,2, 4	Air	Avoidance due to increased EMF	No likely effects, as literature supports no precedent for this as a viable impact.
Artificial Lighting	1, 4	Visibility	Disturbance or Displacement due to lighting	Neutral impact, as the only locations with operational lighting (substations, wind turbines) will incorporate bat-sensitive lighting (cowled, motion sensor and timer controlled) as part of the project design.
Noise and Vibration	1,2, 4,5	Air	Disturbance or Displacement due to noise/ vibration	Neutral impact, as there will be no significant noise or vibration during the operational phase.
Above ground structures	1,2,4	Physical contact	Mortality of bats due to collision or barotrauma	No likely effect and no potential for cumulative impacts with Upperchurch Windfarm. Upperchurch Windfarm: As per the 2014 ABP Inspectors Report no significant impact to bats is expected to occur. There would be no potential for cumulative impacts with other project elements, as follows: UWF Grid Connection: no likely impact with the Mountphilips Substation, all other parts are either underground or at ground level (i.e. new roads), UWF Related Works: no likely impact with the Telecom Relay Pole, due to the immobility of this structure.

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Decommissioning Stage				
Hedgerow Trimming	1,2, 4,5	Landcover	Inadvertent mortality through roost destruction	No potential for effects as the UWF Grid Connection will not be decommissioned. In relation to the UWF Related Works or Upperchurch Windfarm trimming activities, if they occur, will only involve the removal of outer edges of branches which are unsuitable for bats. UWF Other Activities, if they occur, will only involve the removal of outer edges of branches which are unsuitable for bats.
Artificial Lighting	1,2, 4	Air	Disturbance or Displacement due to lighting	No potential for effects, the UWF Grid Connection will not be decommissioned. In relation to the UWF Related Works or Upperchurch Windfarm, no potential for effects as there will be no requirement for lighting during decommissioning works
Noise and Vibration	1,2, 4	Air	Indirect Disturbance from Noise and Vibration	No potential for effects, the UWF Grid Connection will not be decommissioned. In relation to the UWF Related Works or Upperchurch Windfarm, no likely effects due to the small scale of decommissioning works or activities, with all work taking place from roads and turbine hardstands, so no potential to generate significant noise or vibration.

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8.8.5 Mitigation Measures for Impacts to Bats

Mitigation measures were incorporated into the UWF Grid Connection project design including the Project Design Measures. No additional mitigation measures are required as **no significant adverse impacts** are concluded by the topic authors as likely to occur to Bats as a consequence of the UWF Grid Connection.

8.8.6 Evaluation of Residual Impacts to Bats

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table sections for Bats above (Section 8.8.4) – i.e. **no significant adverse impacts**.

8.8.7 Application of Best Practice and the EMP for Bats

Best Practice Measures (BPM), although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

The following Best Practice Measures have been developed, for the protection of **Bats,** by the authors of this topic chapter, using industry best practice:

GC-BPM-13	Minimising the effects of lighting on bats
GC-BPM-14	Protection of potential tree and bridge bat roosts
GC-BPM-15	Bats – Post Construction Monitoring

These Best Practice Measures are included in full at the end of this topic chapter, and also form part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.8.8 Summary of Impacts to Bats

A summary of the Impact to Bats is presented in Table 8-76.

Table 8-76: Summary of the impacts to Bats

Impact to Bats:	**Destruction or disturbance of bat roosts in trees**	**Severance of commuting routes or feeding areas**	**Disturbance or Displacement due to Lighting**
Evaluation Impact Table	*Section 8.8.4.1*	*Section 8.8.4.2*	*Section 8.8.4.3*
Project Life-Cycle Stage	Construction	Construction /Early Operation	Construction
UWF Grid Connection	**Imperceptible**	**Imperceptible**	**Imperceptible**
Element 2: UWF Related Works	Neutral	Imperceptible	Imperceptible
Element 3: UWF Replacement Forestry	No Potential for Impact Evaluated as Excluded – see Section 8.8.2.2.1		
Element 4: Upperchurch Windfarm	Neutral	Not Significant	Imperceptible
Element 5: UWF Other Activities	Neutral	Imperceptible (positive)	Neutral
Cumulative Impact:			
All Elements of the Whole UWF Project	No Cumulative Impact	Not Significant	Imperceptible

The greyed out boxes in the above summary table relate to the cumulative information for the Other Elements of the Whole UWF Project, which are included to present the totality of the project.

Note: No cumulative information for Other Projects or Activities is included in the table above, as no Other Projects or Activities are likely to cause cumulative effects to Bats with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

8.9 Sensitive Aspect No.8: Non-Volant Mammals

This Section provides a description and evaluation of the Sensitive Aspect - Non-Volant Mammals.

8.9.1 BASELINE CHARACTERISTICS of Non-Volant Mammals

8.9.1.1 STUDY AREA for Non-Volant Mammals

The study area for Non-Volant Mammals in relation to the UWF Grid Connection is described in Table 8-77 and illustrated on Figure GC 8.9: Non-Volant Mammals within the UWF Grid Connection Study Area - Overview map and Maps 1 – 2 (Volume C3 EIAR Figures).

Table 8-77: UWF Grid Connection Study Area for Non-Volant Mammals

Study Area for Non-Volant Mammals	Justification for the Study Area Extents
Otter: Watercourse crossing locations plus 300m in either direction Badger and Other Mammals: construction works area plus 50m in all directions	Professional Judgement and as pertinent: Otters: Best Practice guidelines published by the Highways Agency (1999) Badgers:Best Practice guidelines published by the NRA (2005) Other mammal species professional judgement and as per Best Practice (CIEEM, 2016).

8.9.1.2 Baseline Context and Character of Non-Volant Mammals in the UWF Grid Connection Study Area

The principal habitats within the context of Non-Volant (non-flying) Mammals include open grassland, bogs, moors, heath and marsh which provides foraging habitat, and coniferous forestry, mixed woodland, hedgerows, and scrub, which provide shelter and provide locations for breeding and resting.

Baseline surveys of the UWF Grid Connection recorded Badger (*Meles meles*), Otter (*Lutra lutra*), Fallow Deer (*Dama dama*), Red Fox (*Vulpes Vulpes*), Irish Hare (*Lepus timidus hibernicus*), Rabbit (*Oryctolagus cuniculus*), Pine Marten (*Martes Martes*), American Mink (*Neovison vison)*, Squirrel (*Sciurus spp*.), Wood Mouse (*Apodemus sylvatica*) and Greater White-toothed Shrew (*Crocidura russula*) using the study area.

The most frequently identified species was Badger, with field evidence in the form of tracks or prints, latrines and snuffle holes (evidence of feeding). Deer, presumably Fallow Deer, were the next most frequently recorded, followed by Red Fox.

No protected sites in respect of mammals exist within the study area.

Survey Results

Badger

Badgers are found throughout Ireland in areas of suitable habitat: large swathes of the Irish countryside provide ideal conditions for badgers, with their mosaic of pasture grasslands, hedgerows, and areas of scrub and woodland. Badger densities are lower in upland and mountainous areas, areas of bog, and marginal pasturelands along the Atlantic fringe. Several setts will be present within a badger group's territory but the focus of the badger group is known as the 'main' sett. The main sett is situated roughly central within the group territory and is usually occupied throughout the year and used as the principal breeding sett. Annex setts or outlier setts are smaller and may only be used intermittently or seasonally. An active main sett is characterised by considerable signs of activity, such as copious bedding, nearby latrine (defecation) sites, and

well-used paths. Studies in several Irish counties have shown that territory size can vary from as little as 15ha to almost 300ha, with a mean of about 80ha.

In respect of the UWF Grid Connection, seven Badger setts were identified at varying distance of 28m to 290m from the construction area boundaries. Only a single (main) sett is within 50m of construction works, with the remainder at 60m (main), 64m (annex), 130m (annex- confirmed as active), 240m (annex), 237m (annex) and 290m (annex) as described. Setts are located in forestry (n=2), Riparian woodland (n=2), and hedgerows (n=3).

Overall, a total of 83 locations of Badger evidence in the form of tracks, prints and latrines were identified. The highest densities of recorded evidence were in closer proximity to setts and broadly correlate to within 500m. No animals were observed however this is typical in respect of a nocturnal species.

Further detail on Badger survey results, including the distribution of recorded evidence, is included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.9). Appendix 8-1 can be found in Volume C4 EIAR Appendices.

Otter

The territories of otters can stretch for several kilometres; the total length of the home range depends on the availability of food. The smallest territories are thought to occur at coastal sites, where territories may be as small as 2km. The longest territories occur in upland streams where an individual may have to range more than 20km to find sufficient food. Territorial marking typically occurs by means of sprainting or anal secretions. These marks are left mostly at features such as bridge footings, boulders, grass tussocks and stream confluences. Within their territories an individual otter may utilise a number of resting sites within its territory; these can be hidden refuges above ground (couches), or under-ground chambers (holts). Holts tend to be natural crevices, associated with the roots of trees growing along river and lake banks. These natural recesses provide the otter with a holt that has multiple entrances from which the otter can escape if disturbed. Couches occur frequently in dense vegetation and may be associated with frequently used runs and slides into the water. The rearing of cubs occurs within 'natal holts', which are not marked by spraint. Although capable of breeding at any time of the year, a peak in breeding occurs during the summer and early autumn.

Otters that live in rivers and lakes tend to be completely nocturnal, described as being crepuscular – activity peaks at dusk and dawn. Otters are principally piscivorous (fish eating), relying predominantly on salmonids (salmon and trout), but also eel and small fish species such as stickleback. However, otters are not limited to fish and feed opportunistically on a range of prey when available: frogs are frequently eaten by otters, and the remains of invertebrates (crayfish), birds and small mammals have also been found in spraints.

There were seven records of Otter within the UWF Grid Connection study area, consisting of paths, slides, tracks and spraints. Evidence was distributed across the Reardnogy Beg River (a tributary of the Clare River, n=3), the Bilboa River (n=2), the Mulkear River (n=1) and the Munnia Stream (a tributary of the Newport River, n=1). Evidence suggestive of either Otter or Mink was recorded at one of the described locations on the Reardnogy Beg and is assumed to be Otter on a precautionary basis. No active breeding or resting sites (Holts or Couches) were identified. No animals were observed however this is typical in respect of a species where most activity takes place at night. The location of otter records within the study area are presented on Figure GC 8.9: Non-Volant Mammals within the UWF Grid Connection Study Area.

Further detail on Otter survey results, including all recorded evidence, is included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.9).

Other species

Fallow Deer (found mainly in mature deciduous or mixed woodlands close to open grassland) are present throughout the receiving environment and evidence was recorded along the UWF Grid Connection corridor. There were four records of Pine Marten evidence noted and this species is assumed to occur in suitable habitat (coniferous or mixed forestry and scrub). Red Fox (found in a wide range of habitats) and Irish Hare (found in bog, moor, heath and marsh in addition to mixed farmland, pastoral farmland and more marginal habitats) are present throughout the UWF Grid Connection Study Area. Presumed evidence of Red Squirrel (mainly found in coniferous or mixed woodland) was observed at 2 no. locations along the UWF Grid Connection corridor. There was no evidence of Irish Stoat in any surveys to inform this appraisal.

The location of recorded evidence of Fallow Deer, Pine Martin, Red Squirrel, Irish Hare and Field Mouse, is included in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.9).

The carcass of the invasive species, Greater White-toothed Shrew (*Crocidura russula*) was recovered within the 50m study area of the UWF Grid Connection next to a Fox scat. American Mink is also present within the study area (Mink scat recorded at least 2 locations).

8.9.1.3 Importance of Non-Volant Mammals

All native mammals are protected by legislation under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000.

Otter is listed on Annex II and Annex IV of the EU Habitats Directive. This Annex II listing requires Member States to designate Special Areas of Conservation (SACs) for the protection of the species. Otter is therefore listed as a qualifying interest of the Lower River Shannon SAC and, hence, is evaluated as of International Importance.

The Eurasian Badger has been given legal protection under the Wildlife Act and is listed in Appendix III of the Bern convention as a species in need of protection. Badger is evaluated as of National Importance.

Pine Marten is listed on Annex V of the EU Habitats Directive and is afforded legal protection under the Wildlife Act, 1976 and the Wildlife (Amendment) Act, 2000. Annex V species are those whose taking from the wild is restricted by European law. Pine Marten are evaluated as of County Importance.

Irish Hare is evaluated as of National Importance. Red Squirrel is evaluated as of County Importance. Fallow Deer are evaluated as of Local Importance (Higher Value). Populations present of Red Fox, Rabbit and Wood Mouse are evaluated as of Local Importance (Lower Value).

The Greater White-toothed Shrew is an Amber-listed invasive species rated as 'medium risk' however their impact on conservation goals remains uncertain due to lack of data (Kelly *et al.,* 2017). As an invasive species no importance evaluation is assigned to this species. As a high impact invasive species American Mink is similarly not assigned an importance evaluation.

8.9.1.4 Sensitivity of Non-Volant Mammals

All mammals are sensitive to the direct effects from disturbance/displacement from breeding and foraging ranges as a result of noise and visual intrusion. Some species show variable or flexible responses such as Otter where research from English Nature (Chanin, 2013) suggests indicate that Otters will rest under roads, in industrial buildings, close to quarries, and at other sites close to high levels of human activity. Mammals are also sensitive to habitat loss and additive mortality from inadvertent contact with operating machinery or vehicles. The National Parks & Wildlife Service's Threat Response Plan for the Otter (NPWS, 2009[22]), a

[22] https://www.npws.ie/sites/default/files/publications/pdf/2009_Otter_TRP.pdf

review of and response to the pressures and threats to otters in Ireland, categorized three principal risks implicated in Otter declines across Europe: i) habitat destruction and degradation; ii) water pollution; and, iii) accidental death and/or persecution..

8.9.1.5 Trends in the Baseline Environment (the 'Do-Nothing' scenario)

Available trends on general Irish mammals are limited however the most recent 'red list' (Marnell *et al.,* 2009) has judged most of Ireland's terrestrial mammal species to be of 'least concern'. Otter and Red Squirrel are considered near threatened.

Article 17 reporting suggests there appears to have been a genuine improvement in the status of Otter in Ireland with future prospects evaluated as 'favourable' (NPWS, 2013). The Badger population is currently stable in Ireland, estimated in Northern Ireland as 33,500 (Reid *et al.,* 2008) and in the Republic of Ireland as 84,000 (Sleeman *et al.,* 2009). The Pine Marten population is thought to be increasing, and is estimated at 3-10,000 mature individuals (O'Mahony *et al.,* 2007). Future prospects are evaluated as 'favourable' (NPWS, 2013).

Trends in respect of Greater White Toothed Shrew suggest the species is expanding its range by an average of 5.5 km/year (McDevitt *et al.,* 2014). American Mink distribution in Ireland is also expected to continue to increase (Roy *et al.,* 2009).

A scenario in which this proposed project does not take place would result in a continuation of current trends relating to Non-Volant Mammal species within the study area. Populations of mammals would be expected to remain as described above, i.e. favorable in the case of Otter, stable in the case of Badger etc.

8.9.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to Non-Volant Mammal species, as described herein, will be the receiving environment at the time of construction with ongoing trends as identified expected to be reflected during the operational phase.

8.9.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

UWF Grid Connection is part of a whole project which comprises the following Other Elements; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Grid Connection is Element 1. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.

The Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in order to present the totality of the project.

NOTE: GREY Shading relates to additional information to facilitate the cumulative evaluations

8.9.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Non-Volant Mammals considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6, in Volume C4 EIAR Appendices. Scoping of these Other Elements is presented in Section 8.9.2.2.1 below.

The evaluation of cumulative impacts to Non-Volant Mammals also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Non-Volant Mammals with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.3: Scoping of Other Projects or Activities (Section A2.3 .1 and Section A2.3. 8).

The results of this scoping exercise are that: it is evaluated that no Other Projects or Activities are likely to cause cumulative effects with either the UWF Grid Connection or the Other Elements of the Whole UWF Project, and therefore no Other Projects or Activities are scoped in for evaluation of cumulative effects to Non-Volant Mammals.

8.9.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements which are described in Table 8-78.

Table 8-78: Cumulative Evaluation Study Area for Non-Volant Mammals

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 2: UWF Related Works	Otter: Watercourse crossing locations plus 300m in either direction Badger and Other : construction works area, afforestation lands, activity locations plus 50m in all directions	Professional Judgement and as pertinent: Otters: Best Practice guidelines published by the Highways Agency (1999) Badgers:Best Practice guidelines published by the NRA (2005) Other mammal species professional judgement and as per Best Practice (CIEEM, 2016).
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities:	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects	

Non-Volant Mammals

Sensitive Aspect

8.9.2.2.1 Potential for Impacts to Non-Volant Mammals

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect Non-Volant Mammals. The results of this evaluation are included in Table 8-79.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure CE 8.9: Non-Volant Mammals within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-79: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Included for the evaluation of cumulative effects

8.9.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.9.2.3.1 Element 2: UWF Related Works

Survey Results

Badger: No Badger setts were recorded within the UWF Related Works study area.
Otter: No Otter evidence was recorded within the UWF Related Works study area.
Other species
Fallow Deer (found mainly in mature deciduous or mixed woodlands close to open grassland) are present throughout the receiving environment for the Whole UWF Project and are expected to occur in habitats adjacent to UWF Related Works. As Pine Marten evidence was noted from other elements of the Whole UWF Project this species is assumed to occur in suitable habitat (coniferous or mixed forestry and scrub) where it occurs. Red Fox (found in a wide range of habitats) and Irish Hare (found in bog, moor, heath and marsh in addition to mixed farmland, pastoral farmland and more marginal habitats) are present.

8.9.2.3.2 Element 3: UWF Replacement Forestry

Survey Results

Badger: No Badger setts were recorded within the UWF Replacement Forestry study area. A single print was recorded at ITM 594687 661526 within the study area, along a muddy farm track.
Otter: No Otter evidence was recorded within the UWF Replacement Forestry study area.
Other Species: Fallow Deer (found mainly in mature deciduous or mixed woodlands close to open grassland) are present throughout the receiving environment for the Whole UWF Project including UWF Replacement Forestry. Pine Marten was not recorded from the study area. Red Fox (found in a wide range of habitats) is present and was recorded within the study area. Irish Hare (found in bog, moor, heath and marsh in addition to mixed farmland, pastoral farmland and more marginal habitats) was not recorded.

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8.9.2.3.3 Element 4: Upperchurch Windfarm

Survey Results

Badger: As per the 2013 RFI, within the Upperchurch Windfarm a disused single entrance sett has been described approximately 250m southwest of T7 and a single disused entrance badger sett was recorded along a field boundary 150m west of T4. Evidence of Badger foraging was recorded in prior surveys for the 2013 RFI.

Otter: As per the 2013 EIS, no Otter was recorded during surveys at the Upperchurch Windfarm site.

Other Species: Fallow Deer (found mainly in mature deciduous or mixed woodlands close to open grassland) evidence was recorded previously within the Upperchurch Windfarm (as per the 2013 RFI). There were no records of pine marten (*Martes martes*), hedgehog (*Erinaceus europaeus*) and Irish stoat (*Mustela erminea subsp. Hibernica*) during surveying. The habitats within the study area offer potential habitat for the species. Irish Hare does occur and was observed during RFI studies. Red Fox and Pygmy shrew were recorded as present

8.9.2.3.4 Element 5: UWF Other Activities

Haul Route Activity Locations:

No mammal evidence was recorded. This is as expected given the locations of activities generally occur in immediate proximity to or overlap public roads.

Overhead Line Activity Locations:

Incidental records of mammal signs and individuals were made during surveys (January 2018) within the Overhead Line Activities study area, findings of note are summarised below.

An old Otter Holt was recorded within the bank of a drainage ditch in the townland of Killonan. An otter pathway located 80 metres west of AM 3 was recorded between the Groody River and an adjoining stream, also in the townland of Killonan.

No active Badger setts were recorded within close proximity to the poles. An old badger sett was recorded within the hedgerow 180 metres north east AM 78, in the Mountphilips townland.

Additional mammals noted included Fox, Fallow Deer, and Rabbit. Mammal pathways were recorded frequently within hedgerows and through treelines. These could be used by a number of mammal species.

8.9.2.3.5 Other Projects or Activities:

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 8.9.2.1.

8.9.3 PROJECT DESIGN MEASURES for Non-Volant Mammals

At the conception of the UWF Grid Connection, the design team evaluated the potential for significant impacts to the environment. Impacts will only take place where three components exist together; (1) the source of the impact (project), (2) the receptor of the impact (sensitive aspect) and (3) a pathway between the source and the sensitive aspect. The objective of mitigation measures is to avoid, prevent or reduce, one of the three components of an impact by choosing an alternative location, alternative design or an alternative process.

Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the development – these are the Project Design Environmental Protection Measures, which are shortened to 'Project Design Measures' in this EIA Report.

The development as evaluated in the EIA Report incorporates the Project Design Measures.

The Project Design Measures outlined in Table 8-80 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Non-Volant Mammals**.

Table 8-80: UWF Grid Connection Project Design Measures relevant to Non-Volant Mammals

PD ID	Project Design Environmental Protection Measure (PD)
PD01	All construction works will be carried out during daylight hours.
PD29	Confirmatory surveys for active Otter holts and activity (particularly holts at which breeding females or cubs are present) will be carried out 150m upstream and downstream of watercourse crossing locations.
PD30	All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer/outside of 1 hours after sunrise or before sunset during winter.
PD31	If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken *while cubs are present in the holt* and NPWS will be notified immediately
PD32	No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work, such as digging by hand or scrub clearance will not take place within 15m of such holts, except under license.
PD33	The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any possibly invasive works and declared as 'out of bounds'. Fencing will be in accordance with Clause 303 of the NRA's Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox talks with site staff and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt (NRA, 2006) and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant Statutory Consultees.
PD34	Confirmatory surveys will be carried out within 50 m of either side of the construction works area boundary of identified badger setts to determine the current status of known badger setts (i.e. active or inactive) and to determine if any new setts have been established in the intervening period following initial pre-planning surveys and the commencement of construction activity. These confirmatory badger surveys will be undertaken no more than 12 months in advance of proposed construction activities, during the period November and April when vegetation cover is reduced. NWPS will be notified immediately if the sett previously identified is confirmed as active or if a further active sett is located within 50 meters of the footprint of the development. If sett exclusion is required, this will be undertaken by an experienced ecologist under the necessary license and following best practice guidance (NRA, 2005).
PD35	No construction works will be carried within 50m of an active sett during the main breeding season (December 1st to June 30th).
PD36	Construction activity in the environs of a known active badger sett outside of the breeding period will follow NRA (2005) guidelines, i.e. no heavy machinery will be used within 30m of badger setts

	(unless carried out under license); lighter machinery (generally wheeled vehicles) will not be used within 20m of a sett entrance; light work, such as digging by hand or scrub clearance will not take place within 10m of sett entrances.

Cumulative Information: Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the fundamental design of the UWF Related Works, UWF Replacement Forestry and UWF Other Activities and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4: EIAR Appendices.

8.9.4 EVALUATION OF IMPACTS to Non-Volant Mammals

In this Section, the likely direct and indirect effects of the UWF Grid Connection are identified and evaluated. Then the likely cumulative effects of the UWF Grid Connection together with the Other Elements of the Whole UWF Project are identified and evaluated.

A conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) - Non-Volant Mammals.

As a result of the exercise, some impacts were included and some were excluded.

Table 8-81: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Badger: Habitat Loss (construction stage)	*Otter – Loss of Habitat, (construction stage)*
Badger: Disturbance/Displacement (construction stage)	*Secondary Mortality of Otter, (construction stage)*
Otter: Disturbance/Displacement (construction stage)	*Secondary Mortality of Badger, (construction stage)*
Irish Hare, Pine Marten, Red Squirrel and -Fallow Deer: Habitat Loss (construction stage)	*Secondary Mortality of Pine Marten, Red Squirrel, Fallow Deer, Irish Hare, (construction stage)*
Irish Hare, Pine Marten, Red Squirrel and Fallow Deer: Disturbance/Displacement (construction stage)	*Introduction or spread of invasive species- White Toothed Shrew, (construction stage)*
	Introduction or spread of invasive species- White Toothed Shrew, (operational stage)
	Disturbance/Displacement of General Non-Volant Mammals, (operational stage)
	Secondary Mortality of General Non-Volant Mammals, (operational stage)
	Introduction or spread of invasive species- White Toothed Shrew, (operational stage)
	Disturbance/Displacement of General Non-Volant Mammals, (operational stage)
	Secondary Mortality of General Non-Volant Mammals, (operational stage)

The source-pathway-receptor links for included impacts are described in the Impact Evaluation Tables in the next sections. **The Impact Evaluation Tables are presented in the following sections 8.9.4.1 to 8.9.4.5.**

The source-pathway-receptor links and the rationale for excluded impacts are described in the section directly after the Impact Evaluation Table sections, in Section 8.9.4.6.

8.9.4.1 Impact Evaluation Table: Badger - Habitat Loss

Impact Description	
Project Life Cycle Stage:	Construction stage
Impact Source: construction of new access roads and compounds. Cumulative Impact Source: Excavations, construction of new access roads, compounds and hardstanding areas, afforestation Impact Pathway: Land cover Impact Description: Badger is evaluated as a High Sensitivity receptor. Construction works will cause a permanent loss of some suitable foraging or breeding habitat in the form of grassland, woodland and/or hedgerows under the footprint of permanent structures such as new access roads, compounds, and hardstanding areas. Habitat loss is avoided by the use of concealed geocell roadways, replanted with grass or heather, within the SPA. Some temporary loss will occur during construction works; as reinstatement will occur immediately following the completion of construction works in an area – effects will be Neutral. Loss of suitable foraging habitat, may affect body condition, survival rate and/or breeding capacity dependant on the percentage of loss within a groups territory (>25% is considered as significant[23]) and the availability of other food resources. Badgers will benefit positively from varying degrees of hedgerow enhancement, the creation of new hedgerows and also the management of lands as part of the Upperchurch Hen Harrier Scheme. Impact Quality: Negative, Neutral	
Evaluation of the Subject Development Impact – Badger: Habitat Loss	
Element 1: UWF Grid Connection	
Impact Magnitude: There will be a total permanent land use change within 500m of all 7 identified Badger Setts of 0.17Ha comprising Improved agricultural grassland (0.14Ha), Wet Grassland (0.01Ha), Hedgerows (.003Ha) and Treelines (.0003Ha), (based on an average 80Ha territory per sett). This represents 0.05% of available habitat (340Ha in total).	
Significance of the Impact: Not Significant	
Rationale for Impact Evaluation: • The extent of land use change, within the context (less than 1%) of an average territory size of 80Ha, and; • No significant contrast with baseline conditions is expected, notwithstanding; • The duration of permanent land use change, and; • Low reversibility	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 2: UWF Related Works	
Impact Magnitude: 0.5Ha of suitable foraging habitat as Spoil and Bare Ground, recolonising bare ground, improved agricultural grassland, wet grassland, Conifer plantation and Scrub will be permanently lost. 170m of hedgerow will also be lost, comprising primarily earthen banks.	
Significance of the Impact: Neutral impact	

[23] NRA. *Guidelines for the treatment of Badgers prior to the construction of National Road Schemes*. http://www.tii.ie/tii-library/environment/construction-guidelines/Guidelines-for-the-Treatment-of-Badgers-prior-to-the-Construction-of-a-National-Road-Scheme.pdf

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Rationale for Impact Evaluation:
- The extent of land use change, within the context (less than 1%) of an average territory size of 80Ha, and;
- No active Badger setts were recorded in baseline studies of the UWF Related Works locations, and;
- No contrast with baseline conditions is expected.

Element 3: UWF Replacement Forestry

Impact Magnitude:
4Ha of suitable foraging habitat for Badger in the form of improved agricultural grassland will undergo a permanent land use change to a mixed species, native woodland, which will comprise tall trees and understory shrubs, along with wide ride lines, and a mix of tall grasses and scrub land cover maintained during the growth stage. The existing riparian habitat will be enhanced through the planting of Hazel, alder and willow species, and protected through the placement of fencing. The area to be created represents 5% of an average territory size (80Ha).

Significance of the Impact: Slight (Positive)

Rationale for Impact Evaluation:
- No setts were identified within the study area for UWF Replacement Forestry, but prints indicating a foraging range were noted, and;
- The extent of habitat change which is;
- A positive contrast with baseline conditions;
- With permanent duration, and;
- Low reversibility.

Element 4: Upperchurch Windfarm

Impact Magnitude:
As per the 2013 EIS: Some permanent, irreversible loss of foraging habitat within the improved agricultural grassland in the south-eastern section of the proposed site where a badger trail and droppings were observed.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:
- "Arising from my assessment above and based on the information available therefore I Conclude that the development will not give rise to Significant adverse effects on the environment and that ongoing impacts are limited in terms of scale and significance and can be remediated."

Element 5: UWF Other Activities

Impact Magnitude: No permanent land take of Badger foraging or breeding habitat.

Significance of the Impact: Neutral impact

Rationale for Impact Evaluation:
- Badgers are not likely to forage extensively or rely on roadside habitats, and;
- No permanent land use change will occur, and;
- The brief duration of any temporary effects, with;
- No significant contrast with baseline conditions expected, and;
- The reversibility of temporary habitat loss with reinstatement of roadside verges following delivery and;
- Positive effects will accrue from land management as part of the Upperchurch Hen Harrier Scheme, and;
- Overhead Line Activities will not require land take of suitable Badger habitat nor contrast with the existing environment.

Evaluation of Cumulative Impacts – Badger: Habitat Loss
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: Instances of foraging and or breeding habitat loss will occur across the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm; however as setts have only be identified proximal to the UWF Grid Connection study area, in combination effects are limited to this element. Other temporary loss will occur, and UWF Replacement Forestry will result in a permanent land cover change, to habitat also suitable for Badger resulting in a slight positive change to higher quality breeding and foraging habitat. Management activities as part of the Upperchurch Hen Harrier scheme, whilst targeted at Hen Harrier will also benefit and possibly attract Badgers to the area.
Significance of the Cumulative Impact: Not Significant
Rationale for Cumulative Impact Evaluation: • The extent of total land use change within identified territories, and; • No significant contrast with baseline conditions is expected, and; • The long-term duration of permanent land use change, with; • Low reversibility, is; • Offset by management activities as described

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Non-Volant Mammals with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

8.9.4.2 Impact Evaluation Table: Badger - Disturbance/Displacement

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction Noise and Visual Intrusion
Cumulative Impact Source: Noise and Visual Intrusion
Impact Pathway: Air and visibility

Impact Description: Badgers are high sensitivity receptors. Disturbance to or Displacement of Badgers may occur where construction works are in close proximity to occupied Badger Setts. Serious disturbance may cause an avoidance response and result in the mortality of cubs, which are typically underground during the months of January through to February prior to emergence in April.

Works will be undertaken during daylight hours only as part of Project Design, which significantly reduces effects. No construction works will take place within 50m of an active badger sett in the main breeding season (December to June inclusive), as part of Project Design.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Badger: Disturbance/Displacement

Element 1: UWF Grid Connection

Impact Magnitude:
Of the 7 setts identified, one main sett is located 31m from the Construction area boundary. Disturbance is possible at this location, from both cable trenching and excavation, and passing traffic along a temporary access road. Remaining setts will remain undisturbed due to distance from works. Additional Badger setts present within the vicinity are outside the zone of effect for disturbance (range 130m-240m) and therefore sequential effects will not occur i.e. multiple instances of repeated disturbance on the same individuals. The magnitudes of any effects are evaluated as high.

Significance of the Impact: Moderate

Rationale for Impact Evaluation:

- The proximity of a main sett to a source of disturbance i.e. cable trenching and passing traffic, and;
- No construction works will take place within 50m of an active badger sett in the main breeding season (December to June inclusive) as part of project design.
- Duration will be short term with relevant sections likely to be completed over a period of weeks, and;
- Completed during daylight hours.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude: None

Significance of the Impact: No potential for impact

Rationale for Impact Evaluation:

- No active Badger setts were identified in baseline studies of UWF Related Works.

Element 3: UWF Replacement Forestry

Impact Magnitude: No impact

Significance of the Impact: No potential for impacts
Rationale for Impact Evaluation: • No setts were identified within the study area, and • All planting will be done by hand, undertaken during daylight hours, and; • Of temporary duration; • No contrast to baseline conditions is expected.
Element 4: Upperchurch Windfarm
Impact Magnitude: 'Some noise and anthropogenic disturbance during the construction phase of the development'.
Significance of the Impact: Not significant
Rationale for Impact Evaluation: • Duration temporary. • Impact from disturbance is expected to be mostly reversible post construction. • As per the UWF EIS 2013 - it is probable that a negative impact to badger will not be significant**.**
Element 5: UWF Other Activities
Impact Magnitude: Negligible
Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • No Badger setts were identified at Haul Route activity locations or within 50m of same. • Overhead Line Activities at any one location will be brief-momentary in duration, conducted during daylight hours only, with no excavations and the use only of light vehicles. • Activities pertaining to the Upperchurch Hen Harrier Scheme management prescriptions will be similar to existing agricultural activities.
Evaluation of Cumulative Impacts – Badger: Disturbance/Displacement
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: The UWF Related Works or UWF Replacement Forestry will not contribute to cumulative effects as Neutral effects are expected from both of these projects. Cumulative effects of the Other Elements of the Whole UWF Project relate to the UWF Grid Connection and the consented Upperchurch Windfarm, which are expected to have Moderate and Not Significant effects, respectively. .
Significance of the Cumulative Impact: Moderate
Rationale for Cumulative Impact Evaluation: • The proximity of an active badger main sett and badger records in the study areas; • Project design measures to avoid/reduce effects on Badger, with • Duration will be short term with relevant sections likely to be completed over a period of weeks at locations in proximity to setts along the UWF Grid Connection, and; • Works completed during daylight hours only.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Non-Volant Mammals with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

8.9.4.3 Impact Evaluation Table: Otter - Disturbance/Displacement

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction Noise and Visual Intrusion
Cumulative Impact Source: Noise and Visual Intrusion
Impact Pathway: Air and visibility

Impact Description: Otter are rated as a very high sensitivity receptor (based on International importance ratings) and do not tolerate disturbance at or near holts (breeding dens) that are in active use (breeding may occur at any time of the year, but most likely during the period). As no active holts were located within 150m (upstream or downstream) of works locations (i.e. watercourse crossings) then effects are reduced to disturbance/displacement of foraging or resting animals, primarily within aquatic habitats but also within adjacent riparian corridors. This could include the disturbance of animals at resting places (couches).

These effects are reduced by an adherence to completing works during daylight hours only as part of Project Design. However watercourses are present which form part of or are hydrologically connected to European Sites (cSAC's) which include Otter as a Qualifying Interest. Significant effects on Otter from displacement resulting from noise or visual intrusion may therefore affect in turn the integrity of these designated site(s).

Impact Quality: Negative

Evaluation of the Subject Development Impact – Otter: Disturbance/Displacement

Element 1: UWF Grid Connection

Impact Magnitude:
5 No. watercourse crossings have been identified as potential sources of disturbance to Otter. A number of sensitive locations, specifically where recorded Otter evidence occurs close to drilling operations at the Newport (Mulkear) (W10) and Bilboa Rivers (57), cable trenching works at W7 (the Munnia, a tributary of the Newport). In addition, trenching works within 2 existing structures, and the movement of construction traffic over these existing structures along the Reardnogy Beg (at Watercourse Crossings W43, W44) where otter evidence was identified. The magnitude of source disturbance/stimulus from drilling operations is considered the greater effect in terms of types of watercourse crossings. Although considered unlikely (due to the phased approach being undertaken as part of Project Design for Class 1 and 2 watercourses) the potential exists for sequential effects should animals be displaced and consequently encounter a second source stimulus on a Class 3 or 4 watercourse.

Significance of the Impact: Significant (negative)

Rationale for Impact Evaluation:

- The very high sensitivity rating of the species, and;
- Recorded Otter evidence in close proximity to the identified crossings, notwithstanding;
- Works will take place during daylight hours, and;
- The brief-temporary duration of disturbance events, with
- Project design measures to avoid/reduce effects also in place , however;
- Effects may not be reversible.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude: Negligible

Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • Application of project design measures for the protection of Otter, • No active holts were identified overlapping the construction area boundaries or within 150m, and; • Works will take place during daylight hours only, and; • Be of brief-temporary duration.
Element 3: UWF Replacement Forestry
Impact Magnitude: Negligible
Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • No active holts or resting places were recorded in baseline studies, and; • All planting will be done by hand, and; • Undertaken during daylight hours, and • Of temporary duration; • No significant contrast to baseline conditions is expected. • Any effect will be reversible, given the low magnitude of source disturbance.
Element 4: Upperchurch Windfarm
Impact Magnitude: None
Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • No Otter were recorded and hence disturbance effects were not scoped in for evaluation.
Element 5: UWF Other Activities
Impact Magnitude: Negligible
Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • No otter holts or resting places were recorded at Haul Route Activity locations, and; • Locations of Overhead Line activities and the nature of the activities themselves will not differ from the existing baseline maintenance regime, no upgrades to watercourse crossings will be required, and activities will all be of brief duration and only during daylight hours; • The offsetting effects of long term management activities for the Upperchurch Hen Harrier Scheme which will promote and enhance existing Otter habitat – including the enhancement of riparian corridors. • The low reversibility of the above described management.
Evaluation of Cumulative Impacts – Otter: Disturbance/Displacement
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: There is no likelihood for additive cumulative effects to individual Otters from both the UWF Grid Connection and UWF Related Works or the Upperchurch Windfarm due to the separation distance between the 5 No. UWF Grid Connection watercourse crossing points and the UWF Related Works/UWF crossing points. There is no potential for cumulative additive effects to Otters from both the UWF Related Works and the Upperchurch Windfarm due to the absence of Otter recorded at the watercourses within these sites. There is no

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potential for cumulative effects of the UWF Replacement Forestry with the Other Elements due to the Neutral effect of UWF Replacement Forestry.

The in combination effect of the whole project, where considered in its entirety is in the order of Project Element 1 i.e. the Grid Connection.

Cumulative Impact Evaluation: Significant (negative)

Rationale for Cumulative Impact Evaluation:

- Notwithstanding the separation distances between the 5 no. watercourse crossing locations along the UWF Grid Connection and the watercourse crossing locations associated with the UWF Related Works and Other Elements, and
- The absence of Otter records at the UWF Related Works, UWF Replacement Forestry and UWF study areas, and
- Works will take place during daylight hours, and;
- Be brief-temporary in duration;
- The high sensitivity of the species .and context of crossing locations as part of Project Element 1 utilizing drilling within an SAC with Otter as a Qualifying Interest, with;
- Recorded evidence of Otter in close proximity, and
- Potential (albeit unlikely) for sequential effects.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Non-Volant Mammals with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

Topic **Biodiversity**

8.9.4.4 Impact Evaluation Table: Irish Hare, Pine Marten, Red Squirrel and Fallow Deer - Habitat Loss

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: groundworks and vegetation clearance, and new access roads and compound areas

Cumulative Impact Source: groundworks and vegetation clearance, new access roads and hardstanding areas, afforestation

Impact Pathway: Land cover

Impact Description: Populations of Pine Marten and Red Squirrel are evaluated as of County Importance. Populations of Irish Hare are evaluated as of National Importance. Populations of Fallow Deer are evaluated as of Local Importance (Higher Value).

Construction Works will involve groundworks and vegetation clearance which will result in the temporary and/or permanent land use change of some suitable foraging or breeding habitat - deciduous and mixed forestry/woodland/Scrub in respect of Pine Marten, Red Squirrel and Fallow Deer and open fields, grassland and upland heath and bog in respect of Irish Hare. Temporary land use change will be reinstated immediately resulting in Neutral effects. Permanent effects will be avoided by the use of concealed, geocell roads within the SPA as part of Project Design, the instatement of heather (which will also provide shelter for Hare and Deer and foraging opportunities for Pine Marten) in lieu of 1Ha of clear felled forestry at Castlewaller, the creation of new hedgerows as part of the UWF Grid Connection and UWF Related Works, the management of deciduous woodland as UWF Replacement Forestry (permanent), and management activities as part of the Upperchurch Hen Harrier Scheme which will have secondary positive effects for mammals species through the provision of enhanced shelter and foraging habitat.

Impact Quality: Negative and positive

Evaluation of the Subject Development Impact – Irish Hare, Pine Marten, Red Squirrel and Fallow Deer: Habitat Loss

Element 1: UWF Grid Connection

Impact Magnitude:
Permanent land use change of 2.04Ha (1%) of available suitable foraging or breeding Pine Marten, Red Squirrel and Fallow Deer habitat (184.6Ha).

Permanent land use change of 2.77ha (1.4%) of available suitable foraging or breeding Irish Hare habitat (198Ha).

Significance of the Impact: Not Significant for Pine Marten, Red Squirrel and Fallow Deer, and **Slight** for Irish Hare

Rationale for Impact Evaluation:

- The extent of permanent land use change, evaluated as low (1-5%), within the context of available habitat, and;
- Comprises a minor shift from baseline conditions; notwithstanding
- Reinstatement measures will provide suitable habitat;
- The permanent duration, and
- Low reversibility.

Topic: Biodiversity

Sensitive Aspect: Non-Volant Mammals

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 2: UWF Related Works
Impact Magnitude: Permanent land use change of 0.28Ha (<1%) of available suitable foraging or breeding Pine Marten, Red Squirrel and Fallow Deer habitat (48Ha). Permanent land use change of 0.19ha (<1%) of available suitable foraging or breeding Irish Hare habitat (123Ha).
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • The extent of permanent land use change, evaluated as Negligible (1-5%), within the context of available habitat, and; • Comprises a very slight change from baseline conditions; notwithstanding; • The long term duration, and • Low reversibility;
Element 3: UWF Replacement Forestry
Impact Magnitude: Construction Works will include land take of some suitable foraging habitat for Irish Hare and Fallow Deer. The loss of foraging habitat is offset by the provision of further breeding and foraging habitat through replanting of deciduous woodland.
Significance of the Impact: Not significant
Rationale for Impact Evaluation: • The extent of land use change is primarily improved agricultural grassland, and; • A slight positive contrast with baseline conditions is expected from management, • Which is of Permanent Duration and ; • Not reversible.
Element 4: Upperchurch Windfarm
Impact Magnitude: Pine Marten: There shall be loss of potential suitable habitat, due to the loss of conifer plantation. This negative effect is irreversible. Irish Hare: Some loss of habitat within the footprint of the Upperchurch Windfarm. Red Squirrel: Not recorded, therefore Neutral effect. Fallow Deer: There is a high probability (>50% likelihood) that the Construction Works will include land take of some suitable habitat for Fallow Deer. The scale of habitat loss is evaluated as negligible in the context of available habitat.
Significance of the Impact: Not significant
Rationale for Impact Evaluation: • No Pine Marten were recorded during studies to inform the baseline EIS, and; • The scale of Pine Martin habitat loss (4.35Ha) is evaluated as negligible in the context of available forestry habitat. • Fallow Deer were recorded in low numbers (n=5) during studies to inform the EIS RFI, and; • The scale of habitat loss (4.35Ha) is evaluated as negligible in the context of available forestry habitat
Element 5: UWF Other Activities
Impact Magnitude: Negligible
Significance of the Impact: Neutral impact

Rationale for Impact Evaluation:

- The absence of habitat loss, and;
- The brief duration of any effects, and;
- No significant contrast with baseline conditions is expected, and;
- The reversibility of temporary habitat loss with reinstatement of roadside verges following delivery and;
- The offsetting effects of management activities for the Upperchurch Hen Harrier Scheme which will promote and enhance existing mammalian habitat, with;
- Neutral effects likely from Overhead Line activities as described due to the brief duration of same, and an adherence to working during daylight hours.

Evaluation of Cumulative Impacts – Irish Hare, Pine Marten, Red Squirrel and Fallow Deer: Habitat Loss

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:
Instances of land use change of suitable habitat for Irish Hare, Pine Marten, Red Squirrel and Fallow Deer will occur in the context of the UWF Grid Connection, UWF Related Works and Upperchurch Windfarm. Sequential effects may occur from multiple sources of land take occurring simultaneously at different locations. Effects will be offset by the management of lands such as UWF Replacement Forestry and the Upperchurch Hen Harrier Scheme.

Significance of the Cumulative Impact: Not Significant for Pine Marten, Red Squirrel and Fallow Deer, and **Slight** for Irish Hare

Rationale for Cumulative Impact Evaluation:

- The extent of habitat loss overall (1-5%);
- Will limit effects as animals will have ample habitat to move into in respect of any permanent land use change, even in the instance of sequential land use change, and;
- No significant contrast with baseline conditions is therefore expected, and;
- The offsetting effects of management activities for the Upperchurch Hen Harrier scheme and UWF Replacement Forestry will promote and enhance existing mammalian habitat.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Non-Volant Mammals with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

8.9.4.5 Impact Evaluation Table: Irish Hare, Pine Marten, Red Squirrel and Fallow Deer - Disturbance /Displacement

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Construction Noise and Visual Intrusion
Cumulative Impact Source: Noise and Visual Intrusion
Impact Pathway: Air and visibility

Impact Description: Populations of Pine Marten and Red Squirrel are evaluated as of County Importance. Populations of Irish Hare are evaluated as of National Importance. Populations of Fallow Deer are evaluated as of Local Importance (Higher Value).

Disturbance or displacement effects from visual Intrusion and other anthropogenic sources may have secondary effects from stress, on breeding success, foraging capacity and in a worst-case result in effective habitat loss through displacement. Responses will vary dependant on species (some have increased sensitivity inherently or at varying times of the year such as during the reproductive cycle) and existing habituation (e.g. to farming activities). Effective habitat loss is offset by the high availability of suitable habitat for all species under consideration. An adherence to working during daylight hours only also greatly reduces the likelihood of effects, with most animals expected to undergo brief-temporary effects before returning to previously occupied habitats. The probability of disturbance from visual intrusion and anthropogenic sources is evaluated as medium (5-50% likelihood) given the distribution of fauna recorded, availability of suitable habitat and existence of source stimuli from e.g. farming activities across much of the project elements under consideration.

The potential for sequential effects through multiple sources of stimulus operating concurrently does exist with multiple work crews in operation at the same time. In this instance initially displaced animals may subsequently encounter a second stimulus, leading to additive disturbance.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Irish Hare, Pine Marten, Red Squirrel and Fallow Deer: Disturbance /Displacement

Element 1: UWF Grid Connection

Impact Magnitude:
Populations of the above species in the immediate vicinity of the work locations such as cable trenching, traffic movements, cable laying etc. will experience a temporary source of disturbance/displacement. All are expected to return with no permanent displacement considered likely. Sequential effects may occur should animals encounter multiple sources of source stimulus. Overall populations are not expected to be affected.

Significance of the Impact: Moderate

Rationale for Impact Evaluation:

- The temporary duration of the main stimulus associated with trenching and ducting expected to last 20-24 weeks overall, and;
- Works will take place during daylight hours only, and;
- The expected contrast with baseline conditions from the introduction of visual and other anthropogenic sources.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 2: UWF Related Works
Impact Magnitude: Populations of the above species in the immediate vicinity of the work locations such as cable trenching, traffic movements, cable laying, road widening, Haul Route Works, re-alignment of wind farm roads etc. will experience a temporary source of disturbance/displacement. The spatial extent of any disturbance/displacement will be limited to the immediate vicinity of the construction area boundaries. Sequential effects may occur should animals encounter multiple sources of source stimulus. Overall populations are not expected to be affected.
Significance of the Impact: Moderate
Rationale for Impact Evaluation: • The temporary duration of works, and; • Works will take place during daylight hours only, and; • The expected contrast with baseline conditions from the introduction of visual and other anthropogenic sources.
Element 3: UWF Replacement Forestry
Impact Magnitude: Negligible
Significance of the Impact: Neutral impact
Rationale for Impact Evaluation: • All planting will be done by hand, and; • All planting will be undertaken during daylight hours, therefore; • No significant contrast to baseline conditions is expected.
Element 4: Upperchurch Windfarm
Impact Magnitude: Some noise and anthropogenic disturbance during the construction phase of the development. Duration temporary. Impact from disturbance is expected to be mostly reversible post construction.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • The species of terrestrial mammal including badger within the study area are not consider likely to be impacted by Upperchurch Windfarm apart from the increase in noise and activity during construction phase which would be deemed a localized and temporary impact with species expected to return soon after construction.
Element 5: UWF Other Activities
Impact Magnitude: Populations of the above species in the immediate vicinity of the activities such as Haul Route Activities (hedgerow trimming) and Overhead Line Activities will experience a temporary source of disturbance/displacement. All are expected to return with no permanent displacement considered likely. Sequential effects may occur should animals encounter multiple sources of source stimulus. Overall populations are not expected to be affected.
Significance of the Impact: Moderate
Rationale for Impact Evaluation: • The temporary duration of works, and; • Works will take place during daylight hours only, and;

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• The expected contrast with baseline conditions from the introduction of visual and other anthropogenic sources. • The offsetting effects of management activities for the Upperchurch Hen Harrier Scheme which will promote and enhance existing mammalian habitat.
Evaluation of Cumulative Impacts – Irish Hare, Pine Marten, Red Squirrel and Fallow Deer: Disturbance /Displacement
All Elements of the Whole UWF Project
Cumulative Impact Magnitude: Instances of disturbance may occur across all elements, cumulative impacts may occur where various Elements are located in close proximity to each other The scale/magnitude of any disturbance response is evaluated as medium. The spatial extent of any disturbance/displacement will be limited to the immediate vicinity of the construction area boundaries. Sequential effects are unlikely given the alternative habitat available.
Significance of the Cumulative Impact: Moderate
Rationale for Cumulative Impact Evaluation: • The temporary duration of works, and; • Works will take place during daylight hours only, and; • The expected contrast with baseline conditions from the introduction of visual and other anthropogenic sources. • The offsetting effects of management activities for the Upperchurch Hen Harrier Scheme which will promote and enhance existing mammalian habitat.

Note: No cumulative evaluation of Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Non-Volant Mammals with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

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8.9.4.6 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-82 below.

Table 8-82: Description and Rationale for Excluded Impacts to Non-Volant Mammals

Key: 1: UWF Grid Connection; 2: UWF Related Works; 3: UWF Replacement Forestry; 4: Upperchurch Windfarm; 5: UWF Other Activities

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage /Planting Stage				
Land take	1,2,3,4,5	Land cover	Otter: Loss of habitat	Evaluated as Excluded: There will be no permanent loss of aquatic habitat (Elements 1,2,4). Any loss of riparian habitat will be negligible, resulting in no contrast to baseline conditions and Neutral effects on Otter. No loss of aquatic habitat in relation to Elements 3, 5.
Operating Machinery	1,2,3,4	Direct Contact	Otter: Secondary Mortality	Evaluated as Excluded: No holts of resting places are located within the works areas associated with Elements 1,2,3,4). Sources of mortality are therefore restricted to accidental collision with vehicles, which is avoided through works only occurring in daylight hours. Neutral effects.
Operating Machinery	1,2,4	Direct Contact	Badger: Secondary Mortality	Evaluated as Excluded: No setts are located within the construction works areas. Sources of mortality are therefore restricted to accidental collision with vehicles, with effects avoided through an adherence to only working during daylight hours. Neutral effects.
Operating Machinery	1,2,4,5	Direct Contact	Pine Marten, Red Squirrel, Fallow Deer, Irish Hare: Secondary Mortality	Evaluated as Excluded: Works will only be conducted during daylight hours. Potential Secondary mortality is limited to vehicular collision and as such effects are considered unlikely.
Delivery of Materials	1,2,3,4,5	Landscaping	General Non-Volant Mammals: Introduction or spread of invasive species- White Toothed Shrew	Evaluated as Excluded: The Irish population of this invasive species is considered as Established/ Widespread and expanding. Range estimated at 7,600km2 in 2013, with a rate of expansion of 0.5-14.1km/yr depending on landscape characteristics (McDevitt *et al*., 2014[24]). It is considered that the low number of deliveries of organic materials such as marker posts or hedging (a likely source of transportation or introduction) will have Neutral additive effects, within the context of background trends (a species already established and increasing rapidly).
Operational Stage/ Growth Stage				

[24] McDevitt, A.D., Montgomery, W.I., Tosh, D.G., Lusby, J., Reid, N., White, T.A., McDevitt, C.D., O'Halloran, J., Searle, J.B. and Yearsley, J.M., (2014). Invading and expanding: range dynamics and ecological consequences of the greater white-toothed shrew (Crocidura russula) invasion in Ireland. PLoS One. 2014 Jun 23; 9(6):e100403. doi: 10.1371/journal.pone.0100403. eCollection 2014

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Delivery of Materials	1,2,3,4,5	Landscaping	General Non-Volant Mammals: Introduction or spread of invasive species- White Toothed Shrew	Evaluated as Excluded: No significant deliveries of materials are required for any Element of the Whole UWF Project.
Noise and human activity	1,2,3,4,5	Air and Visibility	General Non-Volant Mammals: Disturbance/Displacement to all Non-Volant mammals	Evaluated as Excluded: Levels of operational maintenance will have Neutral disturbance effects to mammals.
Operating Machinery	1,2,3,4,5	Direct Contact	General Non-Volant Mammals: Secondary Mortality	Evaluated as Excluded: Frequency of vehicular usage too low for measurable effect – any effects will be Neutral.
Decommissioning Stage				
Delivery of Materials	1,2,3,4,5	Landscaping	General Non-Volant Mammals: Introduction or spread of invasive species- White Toothed Shrew	Evaluated as Excluded: In relation to Element 1, 3, no potential for effects as no decommissioning will take place. In relation to Element 2,4,5 – no significant deliveries of materials are required.
Noise and Human Activity	1,2,3,4,5	Air and Visibility	General Non-Volant Mammals: Disturbance/Displacement to all Non-Volant mammals	Evaluated as Excluded: In relation to Element 1, 3, no potential for effects as no decommissioning will take place. In relation to Element 2,4,5 – Daylight hours of works, habituation, and limited frequency of disturbance reduces disturbance/displacement to Neutral'
Operating Machinery	1,2,3,4,5	Direct Contact	General Non-Volant Mammals: Secondary Mortality	Evaluated as Excluded: In relation to Element 1, 3, no potential for effects as no decommissioning will take place. In relation to Element 2,4,5 – Reduced vehicular movement, limited to established roads only reduces effect to 'Neutral'. Mammals will have become habituated to existing roads. Frequency of growth stage vehicular usage reduces effect for Element 3 to Neutral.

8.9.5 Mitigation Measures for Impacts to Non-Volant Mammals

Mitigation measures were incorporated into the UWF Grid Connection project design including the Project Design Measures.

No other additional mitigation measures are required as **no other significant adverse impacts** are concluded by the topic authors as likely to occur to Badger, Irish Hare, Pine Marten, Red Squirrel or Fallow Deer as a consequence of the UWF Grid Connection.

1 No. additional mitigation measure is required as **significant adverse impacts to otter** are likely to occur as a consequence of the implementation of the UWF Grid Connection. This Additional Mitigation measure AMM-01, is presented in Section 8.9.5.1 below and will be implemented during the construction stage of the UWF Grid Connection in order to avoid significant effects to Otter.

8.9.5.1 Additional Mitigation Measure AMM-01: Disturbance to or Displacement of Otter

This measure is based on Best Practice guidance from the National Roads Authority (2006) *Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes"* and the UK's Highways Agency (1999) "*Design Manual for Roads and Bridges - Nature Conservation Advice in Relation to Otters HA81/99".*

These guidance documents provide comprehensive advice and recommendations, which are derived from published peer-reviewed research, relating in particular to the timings of Otter surveys, delineations of survey areas and minimum disturbance distances for Otters during construction.

The Additional Mitigation Measure for Otter also includes measures already included within the project design (i.e. Project Design Measures).

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Additional Mitigation Measure				
Title:	Disturbance/Displacement of Otter		Ref:	AMM-01
Project Stage:	Construction Stage	**Work Sections/Locations:**	All watercourse crossing locations	
Environmental Commitment	To avoid likely significant effects of disturbance/displacement of breeding and foraging Otters throughout the construction phase of the development.			
Roles & Responsibilities				
Construction Manager	Scheduling of construction activities			
Project Ecologist	• Confirmatory survey for active Otter holts and activity in line with Best Practice as already described as part of Project Design • Oversight of both Project Design measures and additional mitigation described herein; The Project Ecologist shall ensure adherence to the following best practice guidance: 1. National Roads Authority (2006). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. The National Roads Authority, Dublin. 2. National Roads Authority (2008.) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. The National Roads Authority, Dublin. 3. Highways Agency (1999). Design Manual for Roads and Bridges - Nature Conservation Advice in Relation to Otters HA81/99. The Highways Agency, London.			
Mitigation Measures				
Measure Objective	Avoid disturbance to or displacement to breeding or foraging Otter during construction			

Existing Project Design Measures:

- Confirmatory survey for active Otter holts and activity in line with Best Practice (particularly holts at which breeding females or cubs are present) will be undertaken 150m upstream and downstream of watercourse crossing points in line with NRA (2006) and Highways Agency (1999) guidance. This survey will determine the current status of areas where Otter activity was recorded in the pre-planning surveys (i.e. active or inactive) and to determine if any new holts/couches have been established in the intervening period between the initial pre-planning surveys and the commencement of construction activity. These surveys are required to be undertaken no more than 10-12 months in advance of proposed construction activities (NRA, 2006).
- If an active holt (particularly holts at which breeding females or cubs are present) is located within 150 meters of the watercourse crossing points, no works will be undertaken *while cubs are present in the holt* and NPWS will be notified immediately;
- All construction works will be carried out during daylight hours
- All construction works within 150m of an active otter holt, will be carried out during daylight hours and outside of 2 hours after sunrise or before sunset during summer/outside of 1 hour after sunrise or before sunset during winter.
- No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding otter Holts, and light work, such as digging by hand or scrub clearance will not take place within 15m of such holts, except under license.
- The prohibited working area associated with otter holts will, where appropriate, be fenced with temporary fencing prior to any possibly invasive works and declared as 'out of bounds'. Fencing will be in accordance with Clause 303 of the NRA's Specification for Roadworks (National Roads Authority). Appropriate awareness of the purpose of the enclosure will be conveyed through toolbox talks with site staff

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and sufficient signage will be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt (NRA, 2006) and subject to audits and non-conformance records in the event of non-compliance, to be included in reports submitted to Local Authorities and relevant statutory Consultees;

Further Additional Mitigation Measures:

- Surveys will be undertaken by an experienced otter surveyor, and will include a systematic search for spraints, paw prints, otter paths, slides, food remains, holts and places used for shelter in addition to locations of regularly used paths and areas of overland 'shortcuts' used by Otter where meanders occur.
- There are no seasonal constraints for otter surveys, but any dense vegetation (especially in summer) can reduce success in the identification of otter Holts or couches. (NRA, 2006). Surveys may also be unreliable if undertaken during or immediately following periods of high flow or after heavy rain, heavy leaf fall or heavy frost and snow, since many field signs may have been washed away or obscured. All surveys will be timed with due cognizance to the above.
- Note: The Project Ecologist will communicate all confirmatory survey results and information to the senior construction team as and when they arise at the weekly EHS meeting. This information will also be issued to the Local Authority and relevant statutory consultees, as agreed at the consenting stage;
- As per NRA (2006) guidelines, following consultation with NPWS, works closer to identified holts (not containing cubs – we note that no works will take place at watercourse crossings within 150m of holts containing cubs) may take place – provided appropriate mitigation measures are in place; Measures will include screening (screen fencing or planted vegetation) and/or restricted working hours on site as described above. The installation of all screen fencing or planted vegetation will be overseen by the Project Ecologist.
- Where holts are present in close proximity to invasive construction works, but are determined not to require destruction, construction works may commence once mitigation measures to address otters have been complied with (NRA, 2006); compliance will be confirmed by the Project Ecologist;
- In the case of a holt containing cubs; works shall only commence once the project ecologist has confirmed that the holt has been vacated;
- In the event destruction of a holt is required (considered unlikely), one or more artificial holts made from logs, boulders or pipes to tried and tested designs will be provided as appropriate (SNH 2017).
- The location selection and installation of these will be monitored by an appropriately qualified ecologist both pre- and post-installation.
- A report on both Confirmatory Surveys and implemented mitigation measures will be completed by suitably experienced ecologists and will be issued to the relevant competent authority and NPWS via the Developer.
- Post Construction monitoring of Otters will be undertaken on a yearly basis for years 1 to3 inclusive post construction to confirm activity levels post construction and will include monitoring of any artificial holts;
- Surveys will include a systematic search for spraints, paw prints, otter paths, slides, food remains, holts and places used for shelter in addition to locations of regularly used paths and areas of overland 'shortcuts' used by Otter where meanders occur.
- An annual report, during construction and during years 1 to 3 post construction, will be issued to the Local Authority and relevant statutory consultees evaluating the results of this survey, and the success of mitigation within the context of the Conservation Objectives of European Sites under consideration.

References

- National Roads Authority (2006). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes. The National Roads Authority, Dublin.

- National Roads Authority (2008.) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. The National Roads Authority, Dublin.
- Highways Agency (1999). Design Manual for Roads and Bridges - Nature Conservation Advice in Relation to Otters HA81/99. The Highways Agency, London.
- Scottish Natural Heritage (SNH) Otters and Development: Scottish Wildlife Series. http://www.snh.org.uk/publications/on-line/wildlife/otters/mitigation.asp
- Scottish Natural Heritage (SNH) PROTECTED SPECIES ADVICE FOR DEVELOPERS. https://www.snh.scot/sites/default/files/2017-07/A1959316%20%20Species%20Planning%20Advice%20-Project%20-%20otter%20-%20FINAL.pdf

8.9.6 Evaluation of Residual Impacts to Non-Volant Mammals

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place.

8.9.6.1 Residual Impacts to Badger, Irish Hare, Pine Martin, Red Squirrel and Fallow Deer

In relation to Badger, Irish Hare, Pine Marten, Red Squirrel and Fallow Deer, no additional mitigation measures are required and thus the Residual Impact to Badger, Irish Hare, Pine Martin, Red Squirrel and Fallow Deer is the same as the Impact set out in Impact Evaluation Table sections above (Section 8.9.4) – i.e. no significant adverse impacts.

8.9.6.2 Residual Impact to Otter

In relation to Otter, following the implementation of the above mitigation measure AMM-01, the **residual impact** of the UWF Grid Connection to **Otter** will be of **Slight adverse significance**.

8.9.7 Application of Best Practice and the EMP for Non-Volant Mammals

Best Practice Measures (BPM), although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

The following Best Practice Measures have been developed, for the protection of **Non-Volant Mammals,** by the authors of this topic chapter, using industry best practice:

GC-BPM-20	Monitoring of Identified Badger Setts
GC-BPM-21	Disturbance and/or physical injury to Other Mammals
GC-BPM-22	Management of general non-native invasive species

These Best Practice Measures are included in full at the end of this topic chapter, and also form part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.9.7.1 Surface Water Management Plan

Water quality and the existing drainage regime will be managed under a Surface Water Management Plan (SWMP) which will be implemented by the appointed Contractor during the construction stage of the UWF Grid Connection.

The Surface Water Management Plan will provide the water management framework for construction works and will ensure that work is carried out with minimal impact on the surface water environment and in accordance with the Project Design and Best Practice Measures and environmental commitments made in this EIA Report.

The Surface Water Management Plan is part of the Environmental Management Plan for UWF Grid Connection, and accompanies this planning application as Volume D.

8.9.7.2 Invasive Species Management Plan

In addition to the Best Practice Measures relating to Invasive Species, an Invasive Species Management Plan has been developed to prevent the introduction and/or spread of invasive species.

The Invasive Species Management Plan includes monitoring and biosecurity measures which will inform the actions required to effectively respond to any incursions and to control existing invasive species populations. The Invasive Species Management Plan also forms part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.9.8 Summary of Impacts to Non-Volant Mammals

A summary of the Impact to Non-Volant Mammals is presented in Table 8-83.

Table 8-83: Summary of the impacts to Non-Volant Mammals

Impact to Non-Volant Mammals:	**Badger: Habitat Loss**	**Badger: Disturbance /Displacement**	**Otter: Disturbance /Displacement**	**Irish Hare, Pine Marten, Red Squirrel and Fallow Deer: Habitat Loss**	**Irish Hare, Pine Marten, Red Squirrel and Fallow Deer: Disturbance /Displacement**
Evaluation Impact Table	*Section 8.9.4.1*	*Section 8.9.4.2*	*Section 8.9.4.3*	*Section 8.9.4.4*	*Section 8.9.4.5*
Project Life-Cycle Stage	Construction	Construction	Construction	Construction	Construction
UWF Grid Connection	**Not Significant**	**Moderate**	**Slight (Residual Impact)**	**Not Significant to Slight**	**Moderate**
Element 2: UWF Related Works	Neutral	No potential for Impact	Neutral	Not Significant	Moderate
Element 3: UWF Replacement Forestry	Slight (positive)	No potential for Impact	Neutral	Not Significant	Neutral
Element 4: Upperchurch Windfarm	Not Significant	Not Significant	Neutral	Not Significant	Not Significant
Element 5: UWF Other Activities	Neutral	Neutral effect	Neutral	Neutral effect	Moderate
Cumulative Impact:					
All Elements of the Whole UWF Project	**Not Significant**	**Moderate**	**Slight (Residual Impact)**	**Not Significant to Slight**	**Moderate**

The greyed out boxes in the above summary table relate to the cumulative information for the Other Elements of the Whole UWF Project, which are included to show the totality of the project.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Non-Volant Mammals with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

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8.10 Sensitive Aspect No.9: Amphibians & Reptiles

This Section provides a description and evaluation of the Sensitive Aspect - Amphibians & Reptiles.

8.10.1 BASELINE CHARACTERISTICS of Amphibians & Reptiles

8.10.1.1 STUDY AREA for Amphibians & Reptiles

The study area for Amphibians & Reptiles in relation to the UWF Grid Connection is described in Table 8-84 and illustrated on Figure GC 8.10: Amphibians & Reptiles within the UWF Grid Connection Study Area - Overview map and Maps 1 – 2 (Volume C3 EIAR Figures).

Table 8-84: UWF Grid Connection Study Area for Amphibians & Reptiles

Study Area for Amphibians & Reptiles	Justification for the Study Area Extents
construction works area plus 50m in all directions	Professional Judgement and as per Best Practice (CIEEM, 2016).

8.10.1.2 Baseline Context and Character of Amphibians & Reptiles in the UWF Grid Connection Study Area

Suitable habitat exists within the study area for Common Frog *Rana temporia,* and Common Lizard (Viviparous Lizard).

Smooth Newt has been recorded from Co. Tipperary in suitable habitat (Meehan 2013). In general it is perceived that information gaps exist in terms of the distribution of these species in North Tipperary (Browne 2007). Extrapolated data primarily from the 2011 National Frog Survey (Reid *et al.,* 2013), used to inform Irelands Article 17 reporting to the EU does indicate distribution of this species within at least one 10km square overlapping the UWF Grid Connection (R86).

Common frog is one of only three amphibians found in Ireland. It is a widespread and abundant species occurring in a broad range of habitats throughout the country. Adults congregate to spawn in ponds and ditches in the spring. Eggs develop into tadpoles as water temperature rises and following metamorphosis; young froglets emerge onto land in early summer. These young animals are particularly vulnerable to predation. They spend 2-3 years on land, feeding on terrestrial invertebrates, before returning to freshwater to breed. Life expectancy of 3-4 years would be typical.

Viviparous Lizard (*Lacerta vivpera*) is found in a range of habitat such as woodland, marshes, moors, and bog.

Survey Results:

Adult frogs were recorded in 6 locations along the UWF Grid Connection. Tadpoles were recorded in 2 locations. These are illustrated on Figure GC 8.10: Amphibians & Reptiles within the UWF Grid Connection Study Area.

Smooth Newt: Due to their wide distribution across Ireland, there is the possibility that Smooth Newt (*Lissotriton vulgaris*) occurs within suitable habitat (typically garden ponds, natural pools, drainage ditches and quarry ponds). However, this species was not recorded during walkover surveys of the UWF Grid Connection which we note overlapped the optimum survey period for the species (late - March and early April 2016).

Viviparous Lizard was also not recorded.

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8.10.1.3 Importance of Amphibians & Reptiles

All amphibian and reptile species are protected under the Wildlife Act (1976, amended 2000).

The Common Frog is also listed on the Annex V of the Habitats Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC), meaning that the removal of this species from the wild is restricted by European law.

All amphibians and reptiles present are evaluated as of Local Importance (Higher Value).

8.10.1.4 Sensitivity of Amphibians & Reptiles

Amphibians and reptiles are sensitive to direct mortality, including at the larval stage (frogs), habitat loss, habitat fragmentation and disturbance through visual intrusion, noise and vibration. Amphibian declines have also been linked to the emergence of previously unrecorded diseases.

Populations of Amphibians and Reptiles are evaluated as Low Sensitivity receptors.

8.10.1.5 Trends in the Baseline Environment (the 'Do-Nothing' scenario)

The Common Frog was assessed as having a 'Favourable' conservation status within the National Frog survey of Ireland 2010/11 (Reid *et al.,* 2013). Its conservation status is classified as least concern in a European context (Kuzmin *et al.,* 2009). No estimate of population trend is available as the 2010/11 survey provided the first baseline for the country.

The Smooth Newt has a conservation status of least concern in a European context (Arntzen *et al.,* 2009). There is no population estimate available for Ireland and therefore, there is no evidence to illustrate the current population status.

There is no population estimate to-date for Viviparous Lizards in Ireland and hence, there is no evidence to illustrate the current population status. In a European context, the Viviparous Lizard has a conservation status of least concern (Agasyen *et al.,* 2010).

Given the above, a scenario in which this proposed project does not take place would result in a continuation of current trends relating to amphibians and reptiles within the study area.

8.10.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to amphibians and reptiles, as identified above, will be the receiving environment at the time of construction and on into the operational phase . Recorded species are expected to persist.

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8.10.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

UWF Grid Connection is part of a whole project which comprises the following Other Elements; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Grid Connection is Element 1. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.

The Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in order to present the totality of the project.

NOTE: GREY Shading relates to additional information to facilitate the cumulative evaluations

8.10.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Amphibians & Reptiles considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 8.10.2.2.1 below.

The evaluation of cumulative impacts to Amphibians & Reptiles also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Amphibians & Reptiles with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.3: Scoping of Other Projects or Activities (Section A2.3 .1 and Section A2.3. 8).

The results of this scoping exercise are that: it is evaluated that no Other Projects or Activities are likely to cause cumulative effects with either the UWF Grid Connection or the Other Elements of the Whole UWF Project, and therefore no Other Projects or Activities are scoped in for evaluation of cumulative effects to Amphibians & Reptiles.

8.10.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements which are described in Table 8-85.

Table 8-85: Cumulative Evaluation Study Area for Amphibians & Reptiles

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 2: UWF Related Works	50m area around and incorporating the construction works areas, afforestation lands and activity locations	Professional Judgement and as per Best Practice (CIEEM, 2016).
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities:	Not Relevant – No Other Projects or Activities were scoped in for evaluation of cumulative effects.	

8.10.2.2.1 Potential for Impacts to Amphibians & Reptiles

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project to cause cumulative effects to the Sensitive Aspect Amphibians & Reptiles. The results of this evaluation are included in Table 8-86.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure CE 8.10: Amphibians & Reptiles within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-86: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Included for the evaluation of cumulative effects
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No likely effects due to: No evidence of Amphibian or Reptile species was recorded from habitat or other surveys of the UWF Other Activities locations.

8.10.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.10.2.3.1 Element 2: UWF Related Works

Extrapolated data primarily from the 2011 National Frog Survey (Reid *et al.,* 2013), used to inform Irelands Article 17 reporting to the EU does not indicate any distribution of this species within either 10km square overlapping the UWF Related Works (R95 and R96).
Viviparous Lizard (*Lacerta vivpera*) was recorded in suitable habitat (acid grassland) within the UWF Related Works study area boundary. No Common Frog or Smooth Newt was noted, but both species is considered as likely to occur in suitable habitat. As per the 2013 EIS, Common Frog is described from a number of locations within the overlapping Upperchurch Windfarm.

8.10.2.3.2 Element 3: UWF Replacement Forestry

Extrapolated data primarily from the 2011 National Frog Survey (Reid *et al.,* 2013), used to inform Irelands Article 17 reporting to the EU does not indicate any distribution of this species within the 10km square which overlaps the UWF Replacement Forestry (R96).
No amphibians or reptiles were recorded from site visits to the UWF Replacement Forestry lands, however as Viviparous Lizard (*Lacerta vivpera*) was recorded in suitable habitat (acid grassland) within the adjacent Upperchurch Windfarm study area, it is considered that this species is likely to occur on the UWF Replacement Forestry lands also.

8.10.2.3.3 Element 4: Upperchurch Windfarm

Upperchurch Windfarm: As per the 2013 EIS, Common Frog is described from a number of locations within the Upperchurch Windfarm. Viviparous Lizard (*Lacerta vivpera*) was also recorded in suitable habitat in acid grassland within the Upperchurch Windfarm. This species has not been previously recorded in the study area

(NBDC, 2016). The location of this survey record is identified on Figure CE 8.10: Amphibians & Reptiles within the Cumulative Evaluation Study Area.

8.10.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded. See Section 8.10.2.2.1.

8.10.2.3.5 Other Projects or Activities

Not applicable – No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 8.10.2.1.

8.10.3 PROJECT DESIGN MEASURES for Amphibians & Reptiles

At the conception of the UWF Grid Connection, the design team evaluated the potential for significant impacts to the environment. Impacts will only take place where three components exist together; (1) the source of the impact (project), (2) the receptor of the impact (sensitive aspect) and (3) a pathway between the source and the sensitive aspect. The objective of mitigation measures is to avoid, prevent or reduce, one of the three components of an impact by choosing an alternative location, alternative design or an alternative process.

Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the development – these are the Project Design Environmental Protection Measures, which are shortened to 'Project Design Measures' in this EIA Report.

The development as evaluated in the EIA Report incorporates the Project Design Measures.

The Project Design Measures outlined in Table 8-87 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Amphibians & Reptiles**.

Table 8-87: UWF Grid Connection Project Design Measures relevant to Amphibians & Reptiles

PD ID	**Project Design Environmental Protection Measure (PD)**
PD01	All construction works will be carried out during daylight hours.
PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted

Cumulative Information: Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the fundamental design of the UWF Related Works, UWF Replacement Forestry and into the consented design of the Upperchurch Windfarm. These Project Design Measures are included in the description of these Elements, and can be found in this EIA Report in Appendices 5.3, 5.4 and 5.5**,** in Volume C4: EIAR Appendices.

8.10.4 EVALUATION OF IMPACTS to Amphibians & Reptiles

In this Section, the likely direct and indirect effects of the UWF Grid Connection are identified and evaluated. Then the likely cumulative effects of the UWF Grid Connection together with the Other Elements of the Whole UWF Project and Other Projects or Activities are identified and evaluated.

A conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) - Amphibians & Reptiles.

As a result of the exercise, **no impacts were included for evaluation**.

Table 8-88: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
No impacts included for evaluation	*Habitat degradation (compaction, change in drainage), (construction stage)*
	Reduction in foraging and breeding habitat, (construction stage)
	Disturbance/Displacement, (construction stage)
	Physical injury/destruction of individual amphibians and reptiles, (construction stage)

The source-pathway-receptor links and the rationale for excluded impacts are described in **Section 8.10.4.1**.

8.10.4.1 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-89 below.

Table 8-89: Description and Rationale for Excluded Impacts to Amphibians & Reptiles

Key: 1: UWF Grid Connection; 2: UWF Related Works; 3: UWF Replacement Forestry; 4: Upperchurch Windfarm; 5: UWF Other Activities

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage /Planting Stage				
Landtake	1,2,3,4	Soils/ Surface Water	Habitat degradation (compaction, change in drainage)	Evaluated as Excluded: Construction Works associated with Element 1,2,4 may result in some secondary effects on habitat composition for Amphibians and reptiles, however the spatial extent of this be Negligible and any habitat degradation effects to local populations are likely to be Neutral. No compaction or habitat degradation likely as a result of Element 3 or 5.
Landtake	1,2,3,4,5	Landcover	Reduction in foraging and breeding habitat	Evaluated as Excluded: In relation to Element 1,2, 4 - There is a high probability that the Construction Works will include some land use change of suitable foraging or breeding habitat. Any other habitat loss is temporary as reinstatement will occur within 2 weeks. No permanent land use change associated with Element 5. Any permanent land use change (Elements 1,2,3,4) is unlikely to be significant within the context of available habitat and low occurrence of species as described herein. The extent of land use change is evaluated as negligible in the context of available habitat. The spatial extent of any loss will be limited to works within the construction boundary comprising permanent features. Neutral effects on Amphibians or Reptiles.
Noise and human activity	1,2,4,5	Visibility	Disturbance/Displacement	Evaluated as Excluded: Construction works and activities may result in some cross-factor effects from disturbance stimuli (visual and vibration related), however due to the spatial extent, limited frequency, and brief duration of any disturbance/displacement, it is considered that any disturbance or displacement effects to local populations are likely to be Neutral.
Operating Machinery	1,2 ,3,4,5	Direct Contact	Physical injury/ mortality of individuals	Evaluated as Excluded: Identified locations do not overlap construction works areas or activity locations. Neutral effects.
Operational Stage / Growth Stage				
Evaluated as Excluded: Operational Stage works or activities will cause Negligible source magnitude or duration of effects, and any effects on Amphibians and Reptiles are expected to be Neutral.				
Decommissioning Stage				
Evaluated as Excluded: Populations of Amphibians and Reptiles are evaluated as Low Sensitivity receptors. Decommissioning Works may result in some cross-factor effects from disturbance stimuli (visual and vibration related), however the spatial extent, limited frequency, and brief duration will be Negligible and any effects to local populations are likely to be Neutral.				

8.10.5 Mitigation Measures for Impacts to Amphibians & Reptiles

Mitigation measures were incorporated into the UWF Grid Connection project design including the Project Design Measures. No additional mitigation measures are required as the topic authors conclude that **Neutral impacts** are likely to occur to Amphibians & Reptiles as a consequence of the UWF Grid Connection.

8.10.6 Evaluation of Residual Impacts to Amphibians & Reptiles

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in the Description and Rationale for Excluded Impacts to Amphibians & Reptiles in Section 8.10.4.1, i.e. **Neutral impact.**

8.10.7 Application of Best Practice and the EMP for Amphibians & Reptiles

Best Practice Measures (BPM), although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

The following Best Practice Measures have been developed, for the protection of **Amphibians & Reptiles,** by the authors of this topic chapter, using industry best practice:

GC-BPM-23	Best practice methods to ensure the protection of common frog (*Rana temporaria*) and smooth newt (*Triturus (Lissotriton) vulgaris*).
GC-BPM-24	Best practice methods to ensure the protection of Viviparous lizard (*Lacerta (Zootoca) vivipara*)

These Best Practice Measures are included in full at the end of this topic chapter, and also form part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.10.7.1 Invasive Species Management Plan

In addition to the Best Practice Measures relating to Invasive Species, an Invasive Species Management Plan has been developed to prevent the introduction and/or spread of invasive species.

The Invasive Species Management Plan includes monitoring and biosecurity measures which will inform the actions required to effectively respond to any incursions and to control existing invasive species populations. The Invasive Species Management Plan also forms part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.10.8 Summary of Impacts to Amphibians & Reptiles

No impacts to Amphibians & Reptiles are concluded by the topic authors as likely to occur.

Table 8-90: Summary of the impacts to Amphibians & Reptiles

Impact to Amphibians & Reptiles	No Impact
Evaluation	*Section 8.10.4.1*
Project Life-Cycle Stage	All
UWF Grid Connection	**Neutral Impacts / No Likely Impacts**
Element 2: UWF Related Works	Neutral impacts / No likely impacts
Element 3: UWF Replacement Forestry	Neutral impacts /No likely impacts
Element 4: Upperchurch Windfarm	Neutral impacts / No likely impacts
Element 5: UWF Other Activities	No Likely Impacts - Evaluated as excluded, See Section 8.10.2.2.1
Cumulative Impact:	
All Elements of the Whole UWF Project	**No Potential for Cumulative Impacts** (as Neutral impacts from any individual Element)

The greyed out boxes in the above summary table relate to the cumulative information for the Other Elements of the Whole UWF Project, which are included to show the totality of the project.

Note: No cumulative information for Other Projects or Activities is included in the table above, because no Other Projects or Activities are likely to cause cumulative effects to Amphibians & Reptiles with either the UWF Grid Connection or the Other Elements of the Whole UWF Project (see Section 8.10.2.1).

8.11 Sensitive Aspect No.10: Marsh Fritillary

This Section provides a description and evaluation of the Sensitive Aspect - Marsh Fritillary.

8.11.1 BASELINE CHARACTERISTICS of Marsh Fritillary

8.11.1.1 STUDY AREA for Marsh Fritillary

The study area for Marsh Fritillary in relation to the UWF Grid Connection is described in Table 8-91 and illustrated on Figure GC 8.11: Marsh Fritillary within the UWF Grid Connection Study Area - Overview map and Maps 1 – 2 (Volume C3 EIAR Figures).

Table 8-91: UWF Grid Connection Study Area for Marsh Fritillary

Study Area for Marsh Fritillary	Justification for the Study Area Extents
50m area around and incorporating the construction works areas	Professional Judgement and as per Best Practice (CIEEM, 2016).

8.11.1.2 Baseline Context and Character of Marsh Fritillary in the UWF Grid Connection Study Area

Marsh Fritillary (*Euphudras aurinia*) has a wide distribution across Ireland, but the distribution is patchy and it is still considered overlooked in some parts of its range. Colonies can be found in a variety of habitats including calcareous grassland, degraded bogs, wet heath, transition mires and fens up to 300m (Reagan *et al.,* 2010). It is the only protected butterfly species in Ireland. The population often fluctuates within its range dependant on weather, food supply and interaction with parasites. Larvae overwinter in a small web close to the ground and emerge in early spring. At a local level, populations can fluctuate highly and are subject to extremely low levels or periodic extinctions. The identification and protection of breeding sites is listed as a regional issue of concern in the Tipperary County Development Plan with inadvertent loss of previously unknown colonies an identified threat. Previous records exist from 2 locations proximal to the Whole UWF Project, Cummer Bog near Kilcommon (<2km) and Dromsallagh, near Cappawhite (~10km). The evidence all indicates that the Marsh Fritillary is relatively sedentary, rarely dispersing beyond 750m, although colonisation may rarely take place over longer distances of 5–20 km (Warren 1994). The distance of 2km has been previously considered as a standardised 'functional landscape' i.e. the area within which most dispersal, new colonisation and regular exchange of genetic material will occur (Fowles & Smith 2006).

Survey Results

Suitable Marsh Fritillary habitat patches were identified at two locations, Baurnadomeeny and Bealaclave, along the UWF Grid Connection. Subsequent visits were undertaken during optimal periods (September 2016, April 2017 and September 2017) to map the scale of these habitat patches and measure/confirm occupancy through the recording *in situ* larval webbing or emerged Larvae as applicable to the survey period.

The total area of suitable habitat at Baurnadomeeny comprises 0.57Ha of which 0.003ha (0.52 %) overlaps or is within the construction area boundaries. The available habitat is spread over a number of scattered pockets as is typical of the species. In September 2016, larval webs were located 42.5 and 65.8 m south of the construction works area boundary whilst single larvae were located 169.8 m north and 60.4 m south of the works area. In April 2017 a total of 583 no. larvae and 1 no. web were confirmed during walked transects through all suitable habitat at this location. Three clusters of larvae (31, 16 and 2 individuals) were located within suitable habitat overlapping the works area. In September 2017, 16 larval webs were recorded within

habitats present at this location. This colony size is classified as (Medium i.e. the predicted peak population is 100-1000 adults).

The total area of suitable habitat at Bealaclave comprises 0.1Ha of which 0.00005ha (0.05%) overlaps or is within the construction area boundaries. Two larval webs were recorded on 22nd September 2016, 34.6 m and 36.5 m south of the works area. In April 2017, 69 larvae were counted during the walked transects at this location. The majority were grouped (12, 40 and 11) together, close to the location of a larval web recorded in September 2016. The remaining larvae were scattered in small numbers across the larger area of suitable habitat. The nearest larva was recorded 21.7 m south of the construction works area boundary. The main cluster of larvae was 32.1 m south of the construction works area. No larvae were located within suitable habitat overlapping the works area boundary. In September 2017 a single web was recorded. This colony size is classified as Small (i.e. the predicted peak population is <100 adults).

Further detail on survey results are presented in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.11). The location and extent of Marsh Fritillary habitat and species is illustrated on Figure GC 8.11: Marsh Fritillary within the UWF Grid Connection Study Area.

8.11.1.3 Importance of Marsh Fritillary

Marsh Fritillary is the only butterfly species resident in Ireland that is listed in Annex II of the EU Habitats Directive 92/43/EEC. The population/habitat extent recorded from the current study is evaluated as of County Importance.

8.11.1.4 Sensitivity of Marsh Fritillary

Marsh Fritillary is sensitive to habitat loss, directly through land take or indirectly through compaction from vehicular movement. Individuals are considered as sensitive to vibrations on a precautionary basis. At the webbing stage larvae are sensitive to habitat disturbance and direct mortality from contact with machinery. Marsh fritillary habitat is sensitive to land use change from drainage regime modification, the application of nutrients, higher intensities of grazing, the introduction of invasive species and alteration of physical structure. At a landscape level habitat fragmentation may affect population function at a larger scale (Asher *et al.,* 2001).

8.11.1.5 Trends in the Baseline Environment (the 'Do-Nothing' scenario)

The species was assessed as having an 'Inadequate' conservation status with an overall declining conservation trend in the most recent Article 17 report (NPWS, 2013) as required under the EU Habitats Directive 92/43/EEC. Within the Article 17 report, the range was assessed as 'favourable', the population was assessed as 'inadequate' with a qualifier of declining, habitat was assessed as 'favourable' and future prospects as 'inadequate' with a qualifier of declining. The species is classified as vulnerable due to a population decline of ≥ 30 percent (A2c) in the Irish Red List for Butterflies (Reagan *et al.,* 2010). Its conservation status is classified as least concern in a European context (Van Swaay *et al.,* 2010).

Given the trends presented above, a scenario in which this project does not take place would result in a continuation of current trends relating to Marsh Fritillary, within the study area, in line with the decline cited above in respect of future prospects.

8.11.1.6 Receiving Environment (the Baseline + Trends)

It is assumed in this report that the baseline environment in relation to invertebrates, particularly Marsh Fritillary, as identified above, will be the receiving environment at the time of construction given the short time period likely to elapse in the interim. With respect to the operational phase, the above described decline is likely to be observed over the lifetime of the UWF Grid Connection.

8.11.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

UWF Grid Connection is part of a whole project which comprises the following Other Elements; Element 2: UWF Related Works, Element 3: UWF Replacement Forestry, Element 4: Upperchurch Windfarm (UWF), and Element 5: UWF Other Activities. The Subject Development, UWF Grid Connection is Element 1. All five elements are collectively referred to as the Whole UWF Project in this EIA Report.

The Other Elements must be considered because UWF Grid Connection is part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in order to present the totality of the project.

NOTE: GREY Shading relates to additional information to facilitate the cumulative evaluations

8.11.2.1 Overview of Other Elements, Other Projects or Activities

The evaluation of cumulative impacts to Marsh Fritillary considered all of the Other Elements of the Whole UWF Project. A description of these Other Elements is included in this EIA Report at Appendices 5.3, 5.4, 5.5 and 5.6**,** in Volume C4 EIAR Appendices**.** Scoping of these Other Elements is presented in Section 8.11.2.2.1 below.

The evaluation of cumulative impacts to Marsh Fritillary also considered Other Projects or Activities. A scoping exercise was carried out to determine which projects or activities, if any, have potential to cause cumulative effects to Marsh Fritillary with either the UWF Grid Connection or the Other Elements of the Whole UWF Project and therefore should be brought forward for evaluation in this topic chapter. A brief overview of the Other Projects or Activities and the scoping exercise by the topic authors is included in Appendix 2.3: Scoping of Other Projects or Activities (Section A2.3 .1 and Section A2.3. 8).

The results of this scoping exercise are that: Forestry, Agriculture and Turf-Cutting activities have been scoped in for evaluation of cumulative effects to Marsh Fritillary.

8.11.2.2 Cumulative Evaluation Study Area

The Cumulative Evaluation Study Area comprises of the UWF Grid Connection Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 8-92.

Table 8-92: Cumulative Evaluation Study Area for Marsh Fritillary

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 2: UWF Related Works	50m area around and incorporating the construction works areas, afforestation lands, activity locations	Professional Judgement and as per Best Practice (CIEEM, 2016).
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		
Other Projects or Activities: Forestry Agriculture Turf-Cutting	2km from Element construction works areas/afforestation lands/activity locations Forestry/Agriculture/Turf Cutting	The distance of 2km has been previously considered as a standardised 'functional landscape' i.e. the area within which most dispersal, new colonisation and regular exchange of genetic material will occur (Fowles & Smith 2006).

8.11.2.2.1 Potential for Impacts to Marsh Fritillary

An evaluation was carried out by the topic authors of the likelihood for the Other Elements of the Whole UWF Project and for the Other Projects or Activities to cause cumulative effects to the Sensitive Aspect Marsh Fritillary. The results of this evaluation are included in Table 8-93.

The location of, and study area boundary associated with, the Other Elements and Other Projects or Activities which are included for cumulative evaluation is illustrated on Figure CE 8.11: Marsh Fritillary within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-93: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 2: UWF Related Works	Included for the evaluation of cumulative effects
Element 3: UWF Replacement Forestry	Evaluated as excluded: No potential for effects due to: No suitable habitat for Marsh Fritillary was recorded on or adjacent (50m) to the UWF Replacement Forestry lands. • No potential for habitat loss or habitat degradation effects as there is no suitable habitat for Marsh Fritillary in or adjacent (50m) to the afforestation lands, • No potential for mortality of in-flight adults or in-situ larvae, as no suitable habitat or Marsh Fritillary populations were recorded within or adjacent (50m) to the afforestation lands, • No potential for disturbance or displacement effects during planting or management activities, as no suitable habitat or Marsh Fritillary populations were recorded within or adjacent (50m) to the afforestation lands and no heavy machinery is required.
Element 4: Upperchurch Windfarm (UWF)	Included for the evaluation of cumulative effects
Element 5: UWF Other Activities	Evaluated as excluded: No potential for effects due to: No suitable habitat for Marsh Fritillary overlaps Haul Route Activity locations or the Upperchurch Hen Harrier Scheme. Marsh Fritillary was recorded proximal to Overhead Line Activities on Shower Bog in 2001. The exact location is unknown however no suitable habitat exists at structure locations in close proximity along the Overhead Line route.
Other Project or Activity	
Activities: Forestry/Agriculture/Turf-Cutting	Yes, included for the evaluation of cumulative effects (Forestry is included as afforestation is a source of habitat loss).

8.11.2.3 Cumulative Information: Baseline Characteristics – Context & Character

The total area of suitable habitat identified from all 3 colonies within the UWF Related Works/Upperchurch Windfarm and UWF Grid Connection study areas comprises 1.2Ha in total with colonies being dispersed at intervals of 10.7km and 12km respectively.

8.11.2.3.1 Element 2: UWF Related Works

Suitable habitat for Marsh Fritillary overlaps UWF Related Works construction works areas at Shevry, where cabling as part of UWF Related Works are to be placed under roads consented as part of the Upperchurch Windfarm.

Habitat for Marsh Fritillary to the extent of 0.54Ha is present at Shevry, of which 0.062Ha (11.5%) overlaps the construction works area. Evidence of breeding in the form of larval webbing was recorded at 4 locations within this habitat in September 2017 - all outside the works area boundary. A parasitic Braconid wasp of the genus *Cotesia* was also recorded. This species can be an influencing factor in local level population fluctuations and may be a limiting factor in records of the species from this location. This colony size is classified as (Small i.e. the predicted peak population is <100 adults) and is located 10.7km east of Baurnadomeeny and 12.1km east of Bealaclave.

Further detail on survey results are presented in Appendix 8-1: Detailed Biodiversity Information and Data (Section A8-1.2.4.11). The location and extent of Marsh Fritillary habitat and species is illustrated on Figure RW 8.11: Marsh Fritillary within the UWF Related Works Study Area. Figure RW 8.11 is part of the EIA Report for the UWF Related Works, and is included in Volume F: Reference Documents with this planning application.

8.11.2.3.2 Element 3: UWF Replacement Forestry

Not applicable –evaluated as excluded. See Section 8.11.2.2.1.

8.11.2.3.3 Element 4: Upperchurch Windfarm

Habitat for Marsh Fritillary at Upperchurch is the same habitat identified in relation to the UWF Related Works above– i.e. 0.54Ha is present at Shevry, of which 0.062Ha (11.5%) overlaps the construction works area for both the Upperchurch Windfarm and the UWF Related Works (the Internal Windfarm Cabling will be constructed within the new windfarm road at this location).

8.11.2.3.4 Element 5: UWF Other Activities

Not applicable – Element evaluated as excluded – see Section 8.11.2.2.1.

8.11.2.3.5 Other Projects or Activities

Turf-Cutting: Only one Marsh Fritillary colony is known within the geographical study area for Cumulative effects (2km); this is located at Cummer Bog. Cummer Bog is subject to peat extraction (turf cutting).

Agriculture and Forestry: Colonies may occur in wet grassland (agriculture) but are unlikely to be present in Forestry.

8.11.3 PROJECT DESIGN MEASURES for Marsh Fritillary

At the conception of the UWF Grid Connection, the design team evaluated the potential for significant impacts to the environment. Impacts will only take place where three components exist together; (1) the source of the impact (project), (2) the receptor of the impact (sensitive aspect) and (3) a pathway between the source and the sensitive aspect. The objective of mitigation measures is to avoid, prevent or reduce, one of the three components of an impact by choosing an alternative location, alternative design or an alternative process.

Potential or likely significant impacts were avoided, prevented or reduced by integrating mitigation measures into the fundamental design of the development – these are the Project Design Environmental Protection Measures, which are shortened to 'Project Design Measures' in this EIA Report.

The development as evaluated in the EIA Report incorporates the Project Design Measures.

The Project Design Measures outlined in Table 8-94 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Marsh Fritillary**.

Table 8-94: UWF Grid Connection Project Design Measures relevant to Marsh Fritillary

PD ID	Project Design Environmental Protection Measure (PD)
PD06	If any compaction has occurred along the construction works area, these areas will be ploughed with a sub-soiler to loosen the subsoil layer
PD07	Construction traffic will be restricted to the construction works area and tracking across adjacent ground will not be permitted
PD43	Pre-construction survey of the distribution of Devil's-bit Scabious (larval food plant of Marsh Fritillary) during the last available April prior to the commencement of construction works. This requires that any areas of Devil's-bit Scabious that are located within the construction works area boundary, will be strimmed/cut to ground level in the last available late April / early May period prior to the commencement of construction.

Additionally, Chapter 5: Description of the Development (UWF Grid Connection), describes drainage systems which will be installed and reinstatement that will be carried out on site:

Section 5.2.3.4.6 - An integrated drainage system will be installed along new permanent roads and will maintain the existing drainage regime through the regular piping and release of clean water from the upslope side the works area to the downslope side.

Section 5.2.3.4.12 - Following the completion of construction works in an area, with the exception of new permanent infrastructure such as New Permanent Access Roads or permanently felled forestry areas, the lands under the construction works areas will be reinstated to their former condition and returned to the landowner for use as before.

Cumulative Information: Potential or likely significant impacts caused by the Other Elements of the Whole UWF Project were avoided, prevented or reduced by incorporating Project Design Measures into the fundamental design of the UWF Related Works. These Project Design Measures are included in the description of the UWF Related Works, which can be found in this EIA Report as Appendices 5.3 in Volume C4: EIAR Appendices.

8.11.4 EVALUATION OF IMPACTS to Marsh Fritillary

In this Section, the likely direct and indirect effects of the UWF Grid Connection are identified and evaluated. Then the likely cumulative effects of the UWF Grid Connection together with the Other Elements of the Whole UWF Project and Other Projects or Activities are identified and evaluated.

A conceptual site model exercise was carried out to facilitate the identification of source-pathway-receptor links between the project (source) and the sensitive aspect (receptor) - Marsh Fritillary.

As a result of the exercise, some impacts were included and some were excluded.

Table 8-95: List of all Impacts included and excluded from the Impact Evaluation Table sections

Impacts Included (Evaluated in the Impact Evaluation Table sections)	***Impacts Excluded*** *(Justification at the end of the Impact Evaluation Table sections)*
Habitat Loss (construction stage)	*Habitat Degradation (Introduction of invasive alien species which may out-compete food plants such as DBS), (construction stage)*
	Habitat degradation (drainage alteration) - Marsh Fritillary, (construction stage)
	Habitat degradation (Compaction) - Marsh Fritillary, (construction stage)
	Mortality to in-flight MF Adults through contact with machinery, (construction stage)
	Potential disturbance/displacement from Vibration, (construction stage)
	Mortality of in situ Larvae, (construction stage)
	Potential disturbance/displacement of Marsh Fritillary individuals breeding in suitable habitat proximal to the Whole UWF Project during maintenance, (construction stage)

The source-pathway-receptor links for the impact included are described in the Impact Evaluation Table in the next section.

The Impact Evaluation Table is presented in the following 8.11.4.1.

The source-pathway-receptor links and the rationale for impacts excluded are described in **Section 8.11.4.2,** directly after the Impact Evaluation Table section.

Marsh Fritillary

Sensitive Aspect

8.11.4.1 Impact Evaluation Table: Habitat Loss

Impact Description	
Project Life Cycle Stage:	Construction stage

Impact Source: Excavation Works
Cumulative Impact Source: Excavation Works
Impact Pathway: Land Cover

Impact Description: Marsh Fritillary is a medium sensitivity receptor of County Importance.

Permanent land use change or Habitat loss of Marsh Fritillary habitat such as Devils-Bit scabious rich swards may result in loss of habitat 'patches' , a size reduction in individual colonies or reduce meta-population connectivity, and cause secondary, population level declines. Temporary land use change will not result in long term effects as all lands will be reinstated immediately.

Effects have been reduced by the selective placement of e.g. temporary roads within the construction works areas to avoid DBS rich swards or locations where larvae were recorded. Management prescriptions to be implemented as part of the Upperchurch Hen Harrier scheme, such as a limitation on the excavation of drains, will allow improved grassland to revert back to wet grassland/semi-natural grassland habitats and possibly further Marsh Fritillary habitat, meta-population interconnectivity.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Habitat Loss

Element 1: UWF Grid Connection

Impact Magnitude:
Temporary landtake of suitable habitat comprising 0.00299 Ha (29.9m^2) or 0.56% of total suitable habitat present will occur during the construction stage.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- No permanent loss of suitable habitat will occur, and;
- Habitat extent to be temporarily lost represents a negligible amount (<0.6%) of total suitable habitat present, and;
- No webs or larvae were recorded from the habitats under consideration, and;
- The temporary to short-term duration (up to 1 year), and;
- The reversibility of the impact with the restoration of lands.

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project

Element 2: UWF Related Works

Impact Magnitude:
Permanent land use change of 0.062Ha or 11.5% of suitable habitat present will occur during the construction stage.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The magnitude of the habitat loss: evaluated as medium (5-20% of habitat present), and;
- The absence of webs within the habitats to be removed and low overall number present, and;

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- The contrast to the baseline environment represents a partial change to baseline attributes, and;
- The long-term nature of the loss, and;
- The low reversibility of the identified effect

Element 3: UWF Replacement Forestry – *N/A, evaluated as excluded, see Section 8.11.2.2.1.*

Element 4: Upperchurch Windfarm

Impact Magnitude:
Permanent land use change of 0.062Ha (620m^2) or 11.5% of suitable habitat present at the location will occur during the construction stage.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The magnitude of the habitat loss: evaluated as medium (5-20% of habitat present), and;
- The absence of webs within the habitats to be removed and low overall number present, and;
- The contrast to the baseline environment represents a partial change to baseline attributes, and;
- The long-term nature of the loss, and;
- The low reversibility of the identified effect

Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 8.11.2.2.1.*

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Forestry /Agriculture/Turf-cutting

Impact Magnitude:
Afforestation can result in direct habitat loss for Marsh Fritillary of suitable habitat. Agricultural activities such as reclamation (land use change) can also effect habitat loss whilst turf-cutting can directly remove suitable habitat. A corollary of this is that suitable habitat for Marsh Fritillary often exists on the margins of cutover bog due to the grassland structure brought about from peat extraction.
Only one colony is known within the geographical study area for Cumulative effects (2km); this is located at Cummer Bog. Cummer bog is subject to peat extraction and therefore Marsh Fritillary habitat loss is considered. The probability of Habitat Loss is evaluated as High on a precautionary basis. In the absence of predictive estimates on extraction the magnitude of habitat loss is evaluated as High (20-80% pf population or habitat change). Afforestation within the geographical study zone is considered unlikely to result in significant habitat loss; as much of the suitable habitat is within the Slieve Felim to Silvermines SPA and afforestation will be limited. Agricultural activities are considered unlikely to result in any contrast to baseline activities.

Significance of the Impact: Moderate

Rationale for Impact Evaluation:

- The likely continuance of Peat Extraction in Cummer Bog

Evaluation of Cumulative Impacts – Habitat Loss

All Elements of the Whole UWF Project

Cumulative Impact Magnitude:
In total 1.2Ha of suitable habitat for this sensitive receptor of County Importance is present within the Cumulative Evaluation Study Area. 0.00299ha of this will be temporarily lost prior to re-instatement within the UWF Grid Connection element whilst 0.062ha will be lost within the UWF Related Works and Upperchurch Windfarm elements. As the works areas overlap at this location, there is no potential for cumulative effects between the UWF Related Works and the Upperchurch Windfarm (the effect will only occur once).

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Furthermore there is no potential for likely cumulative effects to Marsh Fritillary between the UWF Grid Connection and the UWF Related Works/Upperchurch Windfarm colonies due to the separation distance between the colonies.
Cumulative effects to the wider county population level may occur due to impacts to individual local populations.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

- The overall extent and degree of Habitat loss (5.1% of available habitat) in respect of a County Important receptor, and;
- The long-term nature of the loss, which is offset by;
- The absence of webs in the habitats to be lost.

All Elements of the Whole UWF Project with Other Projects or Activities

Cumulative Impact Magnitude:
In total 1.2Ha of suitable habitat for this sensitive receptor of County Importance is present within the Whole UWF Project Study Area. 0.25% of this will be temporarily lost prior to re-instatement within the UWF Grid Connection whilst 5.1% will be lost within the UWF Related Works/Upperchurch Windfarm. Habitat loss from peat extraction within the geographical study zone is evaluated as high on a precautionary basis and may impact at least one colony *potentially* connected to those identified within the Windfarm Study areas; notwithstanding that the distance from the Cummer Bog colony is greater than 5km to either the UWF Grid Connection or the UWF Related Work/Upperchurch Windfarm colonies.

Significance of the Cumulative Impact: Moderate

Rationale for Cumulative Impact Evaluation:

- The overall extent and degree of Habitat loss from the Whole UWF Project and;
- The long-term nature of the loss, and;
- The likely continuance of peat extraction at the nearest known colony within the study zone.

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8.11.4.2 Description and Rationale for Excluded (scoped out) Impacts

The source-pathway-receptor links and the rationale for impacts excluded from the Impact Evaluation Table sections are described in Table 8-96 below.

Table 8-96: Description and Rationale for Excluded Impacts to Marsh Fritillary

Key: 1: UWF Grid Connection; 2: UWF Related Works; 3: UWF Replacement Forestry; 4: Upperchurch Windfarm; 5: UWF Other Activities

Source(s) Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Movement of soils and machinery	1,4	Soils	Habitat Degradation (Introduction of invasive alien species which may out-compete food plants such as DBS.)	Evaluated as Excluded: Marsh Fritillary is a medium sensitivity receptor of County Importance. In total across the 5 elements no invasive species of Flora are present within construction works areas that overlap Marsh Fritillary habitat. There is extremely low probability of invasive flora being transferred to habitat patches present. Effects are unlikely.
Landuse Change	1,2,4	Surface Water	Habitat degradation (drainage alteration)	In respect of the UWF Grid Connection habitat patches/colonies implemented surface water management will maintain surface water flows to down-gradient areas of habitat, and; •Access roads at Baurnadomeeny (S66) are temporary, with no permanent effects expected , whilst; •Effects will not be significant at Bealaclave (S55) with flows expected to be maintained; In respect of UWF Related Works/Upperchurch Windfarm habitat patches/colony: •Implemented surface water management at Shevry will maintain surface water flows to down-gradient areas of habitat. Neutral effects are considered likely.
Movement of Soils and Machinery	1,2,4	Soils	Habitat degradation (Compaction)	Evaluated as Excluded; In relation to Elements 1,2,4 - Vehicular movement will be limited to temporary and permanent roads within the construction area boundaries, the effect of which is appraised under Habitat Loss.
Operating Machinery	1,2,4	Direct Contact	Mortality to in-flight MF Adults through contact with machinery	Evaluated as Excluded; It is considered as extremely unlikely that the short duration of the works period at any Marsh Fritillary colony will result in this secondary effect. No contrast to baseline conditions (e.g. the presence of operating farm machinery) is expected. Neutral effects are considered likely.
Excavation Works	1,2,4	Ground and Air Vibrations	Potential disturbance/displacement from Vibration	Low levels of ground and air vibrations are expected to be detectable within the immediate vicinity (1-5m) of tracking machines. A maximum estimate is (0.5 to 1mm/s). There is a low probability of this affecting in situ Marsh Fritillary. In respect of the UWF Grid Connection habitat patches/colonies:

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Source(s) Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				•Only a single web is located within the 5m buffer zone of vehicular usage (at Baurnadomeeny, with zero at Bealaclave) •The dampening of vibrations from soft ground reduces effects, and; •The brief to temporary duration (less than 1 day to up to 1 year) of the construction period reduces effects. In respect of UWF Related Works/Upperchurch Windfarm habitat patch/colony: Zero webs were located within the 5m buffer zone of vehicular usage (at Shevry). Neutral effects are considered likely.
Excavation Works	1,2,4	Excavations	Mortality of In-Situ larvae	Project Design Measures will avoid mortality of in-situ larvae.
Operational Stage				
Machinery Movement	1,2,4	Ground and Air Vibrations	Potential disturbance/displacement of Marsh Fritillary individuals breeding in suitable habitat proximal to the Whole UWF Project during maintenance	Evaluated as Excluded: In relation to UWF Grid Connection - Annual maintenance, comprising 1-2 people, travelling in light vehicles along new/existing road to Joint Bay locations, or walking over lands between Joint Bays will have a Neutral effect. In relation to UWF Related Works/Upperchurch Windfarm – regular maintenance will typically comprise light vehicles travelling along windfarm roads to turbine locations or walking over lands during cable route inspections, Neutral effect.
Decommissioning Stage				
Evaluated as Excluded: Neutral effects on General Invertebrates are considered likely due to the scale of works required.				

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8.11.5 Mitigation Measures for Impacts to Marsh Fritillary

Mitigation measures were incorporated into the UWF Grid Connection project design including the Project Design Measures. No additional mitigation measures are required as **no significant adverse impacts** are concluded by the topic authors as likely to occur to Marsh Fritillary as a consequence of the UWF Grid Connection.

8.11.6 Evaluation of Residual Impacts to Marsh Fritillary

Residual Impacts are the final or intended effects that will occur after mitigation measures have been put into place. No additional mitigation measures are required and thus the Residual Impact is the same as the Impact set out in Impact Evaluation Table for Marsh Fritillary above (Section 8.11.4.1) – i.e. **no significant adverse impacts.**

8.11.7 Application of Best Practice and the EMP for Marsh Fritillary

Best Practice Measures (BPM), although not part of the Project Design for the UWF Grid Connection, will be employed to afford further protection to the Environment.

The following Best Practice Measures have been developed, for the protection of **Marsh Fritillary,** by the authors of this topic chapter, using industry best practice:

GC-BPM-25	Measures to ensure the protection of Marsh Fritillary (*Euphydryas aurinia*)

These Best Practice Measures are included in full at the end of this topic chapter, and also form part of the Environmental Management Plan for UWF Grid Connection, which is included as Volume D with the planning application.

8.11.8 Summary of Impacts to Marsh Fritillary

A summary of the Impact to Marsh Fritillary is presented in Table 8-97.

Table 8-97: Summary of the impacts to Marsh Fritillary

Impact to Marsh Fritillary:	**Habitat Loss**
Evaluation Impact Table	*Section 8.11.4.1*
Project Life-Cycle Stage	Construction
UWF Grid Connection	**Not Significant**
Element 2: UWF Related Works	Slight
Element 3: UWF Replacement Forestry	No Potential for Impacts - Evaluated as Excluded, see Section 8.11.2.2.1
Element 4: Upperchurch Windfarm	Slight
Element 5: UWF Other Activities	No Potential for Impacts - Evaluated as Excluded, see Section 8.11.2.2.1
Cumulative Impact:	
All Elements of the Whole UWF Project	Slight
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities Forestry, Agriculture, Turf-Cutting	Moderate

The greyed out boxes in the above summary table relate to the cumulative information for the Other Elements of the Whole UWF Project, which are included to show the totality of the project.

8.12 Policy Context

8.12.1 National Policy - National Biodiversity Action Plan

National Biodiversity Action Plan, for the period 2017-2021:

The Plan sets out actions through which a range of government, civil and private sectors will undertake to achieve Ireland's 'Vision for Biodiversity', and follows on from the work of the first and second National Biodiversity Action Plans. The Plan has been developed in line with the EU and International Biodiversity strategies and policies.

119 targeted actions are contained in the Plan, underpinned by seven strategic objectives. The objectives lay out a clear framework for Ireland's national approach to biodiversity, ensuring that efforts and achievements of the past are built upon, while looking ahead to what can be achieved over the next five years and beyond. They include:

- mainstreaming biodiversity across the decision making process in the State;
- strengthening the knowledge base underpinning work on biodiversity issues;
- increasing public awareness and participation;
- ensuring conservation of biodiversity in the wider countryside;
- ensuring conservation of biodiversity in the marine environment;
- expanding and improving on the management of protected areas and protected species;
- enhancing the contribution to international biodiversity issues

8.12.2 Regional Policy - Mid-West Regional Planning Guidelines 2010-2022

The administrative area of North Tipperary fell under the Mid-West Regional Authority until it was incorporated into the new Southern Regional Assembly in 2014. The Southern Regional Assembly is currently preparing a new Spatial Economic and Planning Strategy for the Region. The Mid-West Regional Planning Guidelines 2010-2022 still apply until this new strategy is published.

The principal issues regarding the conserving and enhancing of environmental qualities from a regional perspective include;

- The development of well-based collaborative processes or managing natural resources that cross county and regional boundaries;
- Developing common approaches to managing key environmental assets including groundwater, surface water, Natura 2000 sites and other habitats as well as air quality while acknowledging the primary role of individual Local Authorities in this work;
- The protection and enhancement of water quality in line with the Water Framework Directive and River Basin Management Plans;
- Improvement of the quality of drinking water at certain locations;
- Maintenance of the quality of drinking water where it is satisfactory at present;
- Managing flood risk is also a key planning and development challenge, particularly as there is a multiplicity of agencies managing the Shannon River System;

Maintaining the architectural heritage and improving the design quality of new developments

Policy Context

8.12.3 North Tipperary County Development Plan 2010 (as varied):

North and South Tipperary County Councils were amalgamated into Tipperary County Council in June 2014.

The relevant County Development Plan for the formally North Tipperary local authority area is now North Tipperary County Development Plan 2010-2016 (as varied), adopted in December 2015. This plan is the current policy documents for the location of all the Project Elements at present.

Relevant provisions include,

- HERT 29 is to maintain the quality and conservation values of European Sites and other sites.

HERT 29a is to restrict any development which would be harmful to or result in significant deterioration of habitats or species in European Sites and other sites.

8.12.4 Felling and Reforestation Policy

Forest Service Policy[25] in respect of supporting renewable energy and energy security is herein referred. We note the following as cited in respect of 'Overriding environmental considerations':

"*As set out in Section 3.4.2, certain natural habitat and species of Community interests are protected under the Habitats and Birds Directives. In certain situations, trees and forests may be incompatible with the conservation of protected Annex habitats and species at a site and / or national level, and deforestation may be considered. For example, the continuation (via reforestation) of forest cover on a particular site within an SAC may be deemed incompatible with the maintenance and restoration of a particular habitat for which that SAC was designated. Similar situations may also exist under the Water Framework Directive, where provisions under the Reforestation Objectives CCF and BIO may not suffice. In such situations, permanent forest removal may be considered by the Forest Service, on application. This approach was applied within the context of EU LIFE Projects focused on bog restoration – see Case Study 1. Deforestation will be viewed as an option for such sites where the conversion of the site to an 'open habitat' is key to benefiting the habitat or species in question. For other habitats and species, deforestation may not be strictly required. An alternative may be to use low density native woodland planting to create an open mosaic of woodland and open habitats. Each application will be assessed by the Forest Service on a case-by-case basis*."

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[25] Department of Agriculture, Food and the Marine (2017). Felling and Reforestation Policy.

8.13 Best Practice Measures

GC-BPM-01	**Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where the Dam and Over Pump Method is used.**

Environmental Commitment

- Prevention of significant surface water quality impacts at watercourse crossings due to in-stream works.
- Prevention of significant morphological impacts at watercourse crossings due to open trench works.

Relevant Watercourse Crossing Points

The damming and over-pumping method will typically be carried out at watercourses where a permanent crossing structure is being installed or where an existing culvert is being replaced.

Relevant Watercourse Crossing Points: **W8, W35, W47, W60, W64 and W65.**

The damming and over-pumping method will also be used at cable-only crossings where flows are very low at the time of the proposed crossing works.

Relevant Watercourse Crossing Points: **W12, W32 and W61.**

Responsibility of	**Role/Duty**
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works as required.

Surface Water Quality Protection Measures

In-stream works at Class 1 and Class 2 watercourses will only be done over a dry period during the months of July, August and September, as required by IFI for in-stream works, (Project Design Measure);

- Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
- A minimum 10 meter vegetative buffer zone will be maintained (if present) between disturbed areas and the watercourse bank. There will be no storage of material / equipment, excavated material (see below) or overnight parking of machinery inside the 10m buffer zone;
- Double silt fencing will be placed upslope of the buffer zone on each side of the watercourse. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement for overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location works;
- Bog mats will be used underneath the excavator, inside the 10 meter vegetative buffer zone, to prevent soil erosion/rutting and potential surface water quality impacts from localized surface water runoff;
- A temporary sump will be constructed in the watercourse bed upstream of the proposed dam location if a natural pool does not already exist. The sump will be lined with clean rockfill to prevent scouring and erosion during pumping at the intake;
- An energy dissipater (such as clean rock fill or splash plates) will be placed on the watercourse bed downstream of the dam at the pump outfall. This will prevent scouring and erosion of the watercourse bed at the outfall during pumping;
- Dams are to be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment;
- Watercourse bed excavation works will only commence once the stream flow is isolated from the proposed trench excavation area;

Best Practice Measures

- Temporary storage of excavated material will be undertaken outside of the 10m buffer on flat ground or within a local hollow area. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;
- Any pumped water from trench dewatering will be discharged onto a well vegetated, flat, dry area at least 50m from a watercourse via a straw bale dewatering structure or geotextile filter bag (i.e. silt bag) (Project Design Measure). Silt fencing will also be placed downslope of the outfall;
- If there is no suitable area for discharge onto ground, temporary settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- Sediment laden water from trench dewatering will not be discharged directly to a watercourse (Project Design Measure);
- Clay bunds will be placed within the trench backfill on either side of the watercourse to prevent the trench acting as a drain towards the watercourse, thus preventing potential water quality impacts;
- Once the lean mix concrete is in place in the trench, a layer of fine sand (5 – 10cm) will be over the cement prior to backfilling. This will prevent release of cement into the watercourse when flow is restored;
- Upon completion of the in-stream work, the watercourse crossing will be restored to its original configuration and stabilized to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required (Project Design Measure);
- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- Disturbance of bankside soils and watercourse sediments will be kept to the minimum required for the cable laying process to avoid any unnecessary impact on the watercourse morphology;
- There will be no batching or storage of cement allowed at the watercourse crossing;
- There will be no refueling allowed within 100m of the watercourse crossing (Project Design Measure);
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing; and,
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.

References

- IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

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GC-BPM-02	**Measures for Protection of Surface Water Quality during Watercourse Crossing Open Trench Works where dam and Pipe/ Flume method is used.**

Environmental Commitment

- Prevention of significant surface water quality impacts during watercourse crossing works in-stream works.
- Prevention of significant morphological impacts at watercourse crossings due to in-stream works.

Relevant Watercourse Crossing Points

The flume/pipe watercourse crossing method will typically be used where a temporary watercourse crossing structure is proposed.

Relevant Watercourse Crossing Points: **W1, W2, W3, W4, W5, W6, W11, W13, W18, W19, W20, W21, W22, W23, W29, W30, W31, W33, W34, W37, W45, W46, W48, W49, W55, W58 and W59**

The flume/pipe watercourse crossing method will also be used at cable-only crossings where flows are too large to be managed by the dam and over pump method at the time of the proposed crossing works.

Relevant Watercourse Crossing Points: **W12, W32 and W61.**

Responsibility of	**Role/Duty**
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

In-stream works at Class 1 and Class 2 watercourses will only be done over a dry period during the months of July, August and September, as required by IFI for in-stream works, (Project Design Measure);

Firstly, the crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;

A minimum 10 metre vegetative buffer zone will be maintained between disturbed areas and the water-course. There will be no storage of material / equipment, excavated material (see below) or overnight parking of machinery inside the 10m buffer zone;

Double silt fencing will be placed upslope of the buffer zone on each side of the watercourse. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replace-ment for overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location works;

Bog mats will be used underneath the excavator inside the 10 metre vegetative buffer zone to prevent soil erosion/rutting and potential water quality impacts from localised surface water runoff;

A pipe/flume with sufficient capacity/size to accommodate flow in the stream will then be placed in the watercourse without disturbance of the watercourse bed;

The pipe within the watercourse will have impervious dams placed on both the upstream and downstream ends to prevent flow within the channel along the proposed trench location (the upstream dam will be placed first);

An energy dissipater (such as clean rock fill or splash plates) will be placed on the watercourse bed down-stream of the pipe/flume outfall. This will prevent scouring and erosion of the watercourse bed at the outfall;

Dams are to be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment;

Best Practice Measures

Only once the watercourse flow is isolated from the excavation area, will the watercourse bed excavation works be allowed to commence (Project Design Measure);
Temporary storage of excavated material will be undertaken outside of the 10m buffer on flat ground or within a local hollow. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;
Sediment laden water from trench dewatering will be discharged onto a well vegetated, flat, dry area at least 50m from a watercourse via a straw bale dewatering structure or geotextile filter bag. Silt fencing will be placed downslope of the outfall;
If there is no suitable area for discharge onto ground, temporary settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
Sediment laden water from trench dewatering will not be discharged directly to a watercourse (Project Design Measure);
Clay bunds will be placed within the trench backfill on either side of the watercourse to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts;
Once the lean mix concrete is in place in the trench, a layer of fine sand (5 – 10cm) will be over the cement prior to backfilling. This will prevent release of cement into the watercourse when flow is restored;
Upon completion of the in-stream work, the stream crossing will be restored to its original configuration and stabilised to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required;
If the watercourse crossing is to be used as a temporary crossing for construction machinery, double silt fencing and berms will be placed at the crossing to prevent sediment/runoff from the access road surface entering the watercourse;
Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
Disturbance of bankside soils and watercourse sediments will be kept to the minimum required for the cable laying process to avoid unnecessary impact on the watercourse morphology;
There will be no batching or storage of cement allowed at the watercourse crossing;
There will be no refuelling allowed within 100m of the watercourse crossing;
All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing; and,
Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.

References

- IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

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GC-BPM-03	**Measures for Protection of Surface Water Quality during Stream Crossing Open Trench Works where the Channel Diversion Method is Used.**

Environmental Commitment

Prevention of significant surface water quality impacts at stream crossings due to in-stream works.

Work Sections/Locations

A new temporary diversion channel will be put in place to the south of the W7 watercourse crossing. The watercourse at **W7** is an EPA blueline mapped stream (Class 1 watercourse).

The channel will divert flow into a separate watercourse that merges with the watercourse to be diverted downstream of the **W7** crossing location. The proposed diversion channel is approximately 50m in length.

Responsibility of	**Role/Duty**
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- As the watercourse is Class 1, the in-stream works will only be done over a dry period in the months of July, August or September, as required by IFI for in-stream works (Project Design Measure);
- Firstly, the works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
- A minimum 10 meter vegetative buffer zone will be maintained between disturbed areas and the watercourse. There will be no storage of material / equipment, excavated material (see below) or overnight parking of machinery inside the 10m buffer zone;
- Double silt fencing will be placed upslope of the buffer zone on each side of the watercourse. The silt fencing will have removable "gates" as required to allow access of excavator while maintaining ease of replacement for overnight or during periods of heavy rainfall. The silt fencing will be extended at least 10m upstream and downstream of the crossing location;
- Bog mats will be used underneath the excavator inside the 10 meter vegetative buffer zone to prevent soil erosion and potential water quality impacts from localised surface water runoff;
- Temporary storage of excavated overburden from the diversion channel will be undertaken outside of the 10m buffer on flat ground or within a local hollow. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;
- The watercourse dam (in the stream to be diverted) will be made of sand (clean) bags, cobbles or clean well-graded coarse gravel fill. Poorly sorted material will not be used as it would be a potential source of fine sediment (the dam will be installed once the diversion channel is in place);
- The banks and bottom of the diversion channel will be lined with impermeable geotextile to prevent erosion and surface water quality impacts. A layer of clean course gravel will be placed over the geotextile on the bed of the channel to keep it in place;
- An energy dissipater (such as clean rock fill or splash plates) will be placed on the watercourse bed and opposing bank of the receiving watercourse downstream of the diversion channel. This will prevent scouring and erosion of the watercourse bed and bank at the outfall during diversion;

Best Practice Measures

- Watercourse bed trench excavation works will commence once stream flow is fully diverted from the crossing excavation area;
- Temporary storage of excavated material from the crossing trench will be undertaken separately to the material from the diversion channel. All storage areas will be outside the 10m buffer zone. A containment berm will be placed downslope of the excavated material which in turn will be surrounded by secondary silt fence protection to prevent saturated soil from flowing back into the watercourse;
- Sediment laden water from trench dewatering will be discharged onto a well vegetated, dry, flat area at least 50m from a watercourse via a straw bale dewatering structure or geotextile filter bag. The outfall will also be surrounding by silt fencing;
- If there is no suitable area for discharge onto ground, settlement ponds will be used where necessary and will be put in place prior to commencement of preparation works;
- Any water from trench dewatering will not be discharged directly to a watercourse (Project Design Measure);
- Clay bunds will be placed within the trench backfill on either side of the watercourse to prevent the trench acting as a drain towards the stream, thus preventing potential water quality impacts;
- Once the lean mix concrete is in place in the trench, a layer of fine sand (5 – 10cm) will be over the cement prior to backfilling. This will prevent release of cement into the watercourse when flow is restored;
- Upon completion of the in-stream works, the stream crossing and will be restored to its original configuration and stabilised to prevent bank erosion by means of timber stakes, timber planks and geotextiles as required (Project Design Measure);
- The diversion channel will be backfilled and reinstated to its original level and rock armour will be placed at the stream banks where the inflow and outflow of the diversion channel previously existed;
- The ground surface along the reinstated diversion channel will be re-seeded at the soonest opportunity to prevent soil erosion;
- The silt fencing on either side of the stream buffer will be left in place and maintained until the disturbed ground has re-vegetated;
- Operation of machinery and use of equipment within the 10m buffer will be kept to a minimum to avoid any unnecessary disturbance;
- Disturbance of bankside soils and stream sediments will be restricted to the minimum required for the cable laying process to avoid unnecessary impact on the stream morphology;
- There will be no batching or storage of cement allowed at the stream crossing;
- There will be no refuelling allowed within 100m of the stream crossing;
- All plant will be checked for purpose of use prior to mobilisation at the stream crossing; and,
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted.

References

- IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters.
- NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes.

Topic **Biodiversity**

GC-BPM-04	**Measures for Protection of Surface Water Quality during Widening or Replacing an Existing Culvert.**

Environmental Commitment

Prevention of significant surface water quality impacts from sediment input during widening or replacing an existing culvert crossing. Typically this work will be undertaken where there is a requirement to widen an existing road at a watercourse crossing or where the existing culvert is inadequate for crossing with construction traffic.

Work Sections/Locations

Existing culverts will be replaced at the following locations:

Relevant Watercourse Crossing Points: **W8**, **W35**, **W47**.

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- Replacing / extending of culverts in watercourses of ecological importance (Class 1 and Class 2 type watercourses) will only be done over a dry period between July and September (as required by IFI);
- When the watercourse is Class 1 or Class 2, and there is a requirement to disturb either the bed or bank, the watercourse will be dammed upstream and pumped prior to work commencing (refer to GC-BPM-01);
- Where culverts in drains (Class 4) or low ecological importance (Class 3) are being replaced, temporary check dams / silt fencing arrangements will be placed within the drain downstream of the crossing location. No damming or over pumping will be necessary unless flows are significant;
- If a cable is being placed beneath the culvert and dewatering of the excavation is required, please refer to GC-BPM-01 or GC-BPM-02 for water management / water quality protection measures;
- Where culvert widening has been completed, only clean, well-sorted fill or hardcore will be used to widen the road at the crossing location. Poorly sorted material will not be used as it would be a potential source of fine sediment;
- Before the road surface layer is put in place, a layer of geotextile will be placed over the fill to prevent wash down of fines into the fill and potentially into the watercourse;
- A temporary berm (i.e. sandbags and/or rectangular straw bales) will placed along the edge of the access road to prevent loose material being dislodged or washed into the watercourse;
- Use of weather forecasts will be made, and works will be planned when a dry spell of weather is forecasted;
- If high levels of silt or other contamination is noted in any local watercourse, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- Work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface watercourses;
- All disturbed ground will be re-seeded at the soonest opportunity to prevent erosion;
- There will be no batching or storage of cement allowed at the watercourse crossing;

Best Practice Measures

- There will be no refuelling allowed within 100m of the watercourse crossing; and,
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.

References

- IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

Topic **Biodiversity**

GC-BPM-05	**Surface Water Quality Protection Measures During Excavation Works Within 50m of a Watercourse.**

Environmental Commitment

Prevention of significant surface water quality impacts from sediment input when excavation works (cable trenching, temporary, permanent access construction, haul route works etc.) are being carried out within 50m of a Class 1 (EPA blueline mapped watercourse) or Class 2 (EPA blueline equivalent).

Work Sections/Locations

Trench excavations and access road construction (temporary or permanent) will be required within 50m of a watercourse at all Class 1 and Class 2 watercourse crossing locations along the 110kV UGC;

Trench excavations and access road construction will run over / adjacent / parallel to Class 1 or Class 2 watercourses at 110kV UGC route sections **S1, S2, S3, S4, S5, S7, S8, S11, S12, S13 S16, S17, S20, S21(Newport River), S25, S26, S28, S29, S30, S34, S36, S37, S44, S45, AR5, AR6, S52, S53 (Claire River), S54, S55, S56, S58, S58, S60, S71, S72, S74, S75 (Bilboa River), S81, S82**;

- Construction of joint bays within 50m of Class 1 or Class 2 watercourse will be required along the 110kv UGC at joint bay no. **J7, J18 and J19.**

Responsibility of	**Role/Duty**
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- Where works are proposed within the 50m watercourse buffer zone, additional mitigation will be employed to ensure the watercourse is protected;
- Weather forecasting resources will be used, and works will be planned when a dry spell of weather is forecasted;
- Where the cable trench / access road / works area is running adjacent and parallel to a watercourse (all watercourse types, Class 1 to Class 4), a minimum 5m buffer will be maintained between the works area and the watercourse edge;
- Silt fencing will be placed down-gradient of the works during construction at all locations within the 50m watercourse buffer;
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- In a case where only a 5 - 10m buffer is being maintained, double silt fencing will be put in place on the downslope side;
- Additional silt fencing or temporary straw bales (rectangular bales, pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards a local watercourse;
- Where the cable trench / access road route slopes down perpendicular towards a watercourse (*i.e.* base of stream valley), regularly spaced, temporary bunds or shallow swales will also be put in place perpendicular across the route corridor to dissipate surface water runoff from the works area and onto adjacent vegetated ground. Additional silt fencing will be put at the outfall location of the bunds / swales;
- Temporary check dams / silt fencing arrangements will be placed in any local artificial watercourses/drains (Class 4 and Class 5 watercourses) within 30m of the works corridor (this will also include existing road drains along the haul route works);
- The check dams / silt fencing arrangements will be placed every 10m;

Best Practice Measures

- Bog mats will be used in wet / boggy areas zone to prevent ground rutting and soil erosion which could lead to potential water quality impacts. All ground rutted by vehicles / machinery will be levelled or backfilled to prevent their progression as preferential pathways for surface water runoff;
- If high levels of silt or other contaminants are noted in any local watercourse, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- Excavation work will not be undertaken during periods of high rainfall. This will minimise the risk of entrainment of suspended sediment in surface water runoff and transport via this pathway to surface watercourses;
- All disturbed ground will be re-seeded at the soonest, practicable opportunity to prevent erosion;
- All temporary surface water control / protection measures such as silt fencing and check dams will be kept in place until disturbed ground has vegetated and stabilised. Regular daily checks will be undertaken;
- Where the cable trench route runs downslope for long distances (>50m) towards a watercourse, regular spaced impermeable bunds will be placed within the trench backfill to prevent the trench acting as a drain towards the stream thus preventing potential water quality impacts from surface water drainage within the trench;
- There will be no refuelling allowed within 100m of a watercourse; and,
- All plant will be checked for purpose of use prior to mobilisation.

References

- IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters.
- NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes.

Topic **Biodiversity**

GC-BPM-06	Surface Water Quality Protection Measures During Tree Felling Works.

Environmental Commitment

Prevention of significant surface water quality impacts from sediment/nutrient input during coniferous tree felling.

Work Sections/Locations

- Coniferous tree block felling will be required at the following locations:
- UGC 110kV: S36, S38 – S39, S40, S45, S46, S71, S72, S73, S78 and S85.

Responsibility of	Role/Duty
Construction Manager	Monitor weather conditions. Supervise tree felling works and drainage works.

Pre-felling surveys

- Inspection of main drainage ditches and outfalls will be completed during wet periods, and well in advance of the proposed felling works;
- Another full inspection of the proposed felling area will be completed by the Construction Manager one day in advance of the proposed felling works;
- Communication with tree felling operatives in advance to determine whether any areas have been reported where there is unusual water logging or bogging of machines;
- Inspection of all areas reported as having unusual ground conditions; and,
- Pre-felling surface water sampling will be undertaken at the main watercourse downstream of the works area (sampling will be completed during a wet period).

Protection of watercourses during felling works

- Machine combinations will be chosen which are most suitable for ground conditions at the time of felling, and which will minimise soils disturbance;
- Checking and maintenance of roads and culverts will be undertaken by the Construction Manager throughout the felling operation;
- No tracking of vehicles through watercourses will occur, as vehicles will use road infrastructure and watercourse crossing points;
- Drains which flow from the areas to be felled will have temporary silt traps installed;
- Where felling is to be completed inside the 10 – 25m aquatic buffer zone along a watercourse, double silt fencing will be arranged downslope of the proposed works area;
- Brash mats or bog mats will be used to support vehicles on soft ground, reducing peat and mineral soils erosion and avoiding the formation of rutted areas, in which surface water ponding will occur;
- Timber will be stacked in dry areas away from surface water buffer zones. Temporary rectangular straw bales to be emplaced on the down-gradient side of timber processing areas;
- Works will be carried out during periods of no, or low rainfall, in order to minimise entrainment of exposed sediment in surface water runoff;
- Following tree felling all drains will be inspected to ensure that they are functioning and silt traps will remain in place until all disturbed ground has stabilised;

Best Practice Measures

- Extraction tracks near drains will be broken up and diversion channels created to ensure that water in the tracks spreads out over the adjoining vegetated ground. Silt fencing will be installed downslope of any diversion channels where ground has been broken or disturbed;
- All accumulated silt will be removed from existing drains, culverts and silt traps. This removed material will be deposited away from watercourses to ensure that it will not be carried back into the trap or stream during subsequent rainfall.

Post-felling surveys

- Post-felling surface water sampling will be undertaken at the main watercourse downstream of the works area (sampling will be completed during a wet period).

References

- Forestry Commission (2004): Forests and Water Guidelines, Fourth Edition. Publ. Forestry Commission, Edinburgh;
- Coillte (2009): Forest Operations & Water Protection Guidelines;
- Forest Services (Draft) Forestry and Freshwater Pearl Mussel Requirements – Site Assessment and Mitigation Measures; and,
- Forest Service (2000): Forestry and Water Quality Guidelines. Forest Service, DAF, Johnstown Castle Estate, Co. Wexford.

Topic **Biodiversity**

GC-BPM-07	**Protection of Surface Water and Groundwater Quality during use of Cement Based Compounds.**

Environmental Commitment

Prevention of significant surface water and groundwater quality impacts during use of Cement Based Compounds.

Work Sections/Locations

- 110kV UGC
- Mountphilips Substation

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Ensure best practice storage and use of Cement Based Compounds.

Measures along the 110kV UGC

- No wet-cement products will be used along the grid connection route (Project Design Measure);
- A semi-dry granular cement mix will be used in the cable trench, and, pre-cast structures / pipes will be used for new temporary or permanent crossings;
- No washing out of any plant or equipment used in concrete transport or concreting operations will be allowed along the route;
- Any spills no matter how small or material or overburden contaminated with cement mix will be moved off-site for disposal at a licensed premises;
- Outfalls or natural pathways *(i.e.* preferential flow paths) from the trench towards any local drain or watercourse will be prevented. Outfalls or natural pathways will be temporarily blocked using sand bags and geotextile until the cement mix has set; and,
- At watercourse crossing locations, a layer of fine sand (5 – 10cm) will be placed over the cement mix within the trench prior to backfilling. This will prevent release of cement into the watercourse when flow is restored.

Measures at Mountphilips Substation and End Masts

- No batching of wet-cement products will occur on site (Project Design Measure).
- Ready-mixed supply of wet concrete products will be used and pre-cast products will be used for water-crossing structures and joint bays;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete will be delivered on site, only the chute will need to be cleaned, using the smallest volume of water practicable. Cement wash water will be collected in a sealed, temporary lagoon which will be placed at least 50m from a watercourse;
- No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water will be tanked and removed from the site to a suitable, non-polluting, discharge location;
- Weather forecasting will be used to plan dry days for pouring concrete;
- The pour site will be kept free of standing water and plastic covers will be ready in case of sudden rainfall event.

Monitoring Measure

Best Practice Measures

- Regular pH monitoring of the construction drainage water will be completed. When there is an increase of pH above the natural baseline in the local stream, pH adjustment will be undertaken prior to the release of the surface water drainage.

References

- IFI (2016) Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters.
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.
- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006)
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors.

Topic **Biodiversity**

GC-BPM-08	**Protection of Surface Water and Groundwater Quality During Storage and Handling of Fuels, Oils and Chemicals.**

Environmental Commitment

Prevention of significant water quality impacts during storage and handling of fuels, oils and chemicals.

Work Sections/Locations

- Construction works area boundary

Responsibility of	**Role/Duty**
Construction Manager	Monitor weather conditions. Ensure best practice use and storage of fuels, oils and chemicals on-site.

Manage of on-site refueling

- On site re-fuelling of immobile machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site, and will be towed around the site by a 4x4 jeep to where machinery is located;
- The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages;
- The fuel bowser will be parked on a level area in the construction compound when not in use and only designated, trained and competent operatives will be authorised to refuel plant on site;
- Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- All generators and suction pumps used at watercourse crossing locations will have a double skinned fuel tank or be placed on a drip tray; and,
- There will be no storage of fuel or refuelling or mobile plant permitted within 100m of a watercourse.

Storing fuel properly

- Fuels stored on site will be minimised. Storage areas, which will be located at the temporary compounds, will be bunded appropriately for the fuel storage volume for the time period of the construction (Project Design Measure).

Monitoring Measure

- Regular pH monitoring of the construction drainage water will be completed. When there is an increase of pH above the natural baseline in the local stream, pH adjustment will be undertaken prior to the release of the surface water drainage.

Avoid leakage from plant and tools

- The plant, machinery and tools used during construction will be regularly inspected for leaks and fitness for purpose.

Contingency for spillages

- An emergency plan for the construction phase to deal with accidental spillages is contained within Environmental Management Plan (Section 6).
- Spill kits will be available to deal with any accidental spillage in and outside the refuelling area; and,
- Any spills no matter how small or material or overburden contaminated with fuel/oil will be moved off-site for disposal at a licensed premise.

Best Practice Measures

References

- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006).
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.
- EMP for UWF Grid Connection, Section 6: Environmental Emergency Procedure for Oil/Fuel Spillage

Topic **Biodiversity**

GC-BPM-09	Design of New Permanent Watercourse Crossing Structures to Prevent Flood Risk

Environmental Commitment

Prevention of flooding at watercourse crossings due to undersized culverts / bridges.

Work Sections/Locations

Relevant Watercourse Crossing Points: **W18, W19, W20, W21, W22 and W23** (Class 4 water crossings), also **W2** (Class 3 water crossings), also **W3, W4, W13 and W90** (Class 2 water crossings), also **W48 and W55** (Class 1 water crossings).

Responsibility of	Role/Duty
Construction Manager	Ensure appropriate culvert/bridge design. Supervise the construction works.

Surface Water Quality Protection Measures

- All permanent culverts/bridges will be sized to cope with a minimum 100-year flood event (Project Design Measure);
- A freeboard of 300mm, or as required by OPW, will be kept below the crossing structure during a 100-year flood event;
- At a minimum, all new pipe culverts will be 900mm in diameter regardless of the anticipated flood flow (Project Design Measure) (*i.e.* minimum 900mm culvert will be used in Class 3/Class 4 watercourses regardless of flows);
- New and replaced permanent crossing structures will be construction in accordance with the Office of Public Works (OPW) guidelines Construction, Replacement or Alteration of Bridges and Culverts (2013),
- As agreed with OPW (telephone consultation, February 2018) will be subject to a Section 50 application to OPW following the grant of planning permission.

References

- The Planning System and Flood Risk Management Guidelines (DoEHLG, 2009).
- OPW (2013) Construction, Replacement or Alteration of Bridges and Culverts.
- NRA (2008) Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes.

Best Practice Measures

GC-BPM-10	Surface Water Quality Protection Measures During Temporary Storage of Overburden

Environmental Commitment

Prevention of significant surface water quality impacts during Temporary Storage of Overburden.

Work Sections/Locations

Temporary overburden storage will be located at the following locations:
110kV UGC: S19, S23, S37, S40, S51, S54, S71, S72, S73, S74, S76, S85, S86 and S88

Responsibility of	Role/Duty
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works

Surface Water Quality Protection Measures

- No temporary overburden storage areas will be permitted within 50m of a Class 1 (EPA blueline mapped watercourse) or Class 2 (EPA unmapped blueline equivalent) watercourse (**Project Design Measure**);
- Sloping ground and areas with wet ground conditions / ponding will be avoided;
- Where possible, the temporary overburden storage area will be located on vegetated ground as the existing vegetation will act as an effective buffer against any sediment in runoff from the storage area;
- The overburden mound will not be compacted, nor will the surface of the mound be smoothed or battered back as rough surfaces on overburden mounds increase infiltration and reduce surface water run-off and erosion;
- A perimeter of double silt fencing will be placed around the temporary storage area. Silt fencing will be checked on a daily basis and replaced when necessary;
- Temporary check dams and silt fencing arrangements will be placed in local Class 4 watercourses (Drains) and Class 3 watercourses (Marginal Watercourses) if they exists within 20m of the storage area;
- Where the temporary overburden storages areas are located in forestry, temporary blocking of mound drains/rills will be undertaken downslope of the storage area. All existing roadside drains will have temporary check dams installed;
- During periods of heavy rainfall a sheet of polyethene or a geotextile will be used to cover the overburden to prevent erosion; and,
- All temporary overburden storages areas will be checked / monitored on a daily basis until stabilised to ensure no drainage issues of surface water quality impacts are occurring.

References

- IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;
- NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes; and,
- CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites.

Topic **Biodiversity**

GC-BPM-11	Surface Water Quality Protection Measures during Permanent Storage of Overburden

Environmental Commitment

Prevention of significant surface water quality impacts during Permanent Storage of Overburden.

Work Sections/Locations

Permanent overburden storage will be located at the following locations:

110kV UGC: S2, S5, S6, S19, S37, AR4, S72, S74 and S85

Responsibility of	Role/Duty
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- No permanent overburden storage areas will be permitted within 50m of a Class 1 (EPA blueline mapped watercourse) or Class 2 (EPA unmapped blueline equivalent) watercourse (Project Design Measure);
- Sloping ground and areas with wet ground conditions will be avoided;
- If possible, within grassland, the permanent overburden storage area will be located on vegetated ground as the existing vegetation will act as an effective buffer against any sediment in runoff from the storage area until it has stabilised by vegetation;
- Within grassland, a perimeter of double silt fencing or a sand bag/geotextile berm will be placed around the permanent storage area until the mound has stabilised by vegetation;
- Where the permanent overburden storages areas are located in forestry, temporary blocking of mound drains/rills will be undertaken downslope of the storage area until the mound has stabilised by vegetation;
- At permanent storage areas along proposed permanent access roads or existing roads (*i.e.* forestry tracks and farm tracks) silt trap / silt fence arrangements will be placed within the proposed / existing road drainage and left in place until the mound has stabilised by vegetation;
- The overburden mound will be seeded at the soonest opportunity to prevent erosion; and,
- All permanent overburden storages areas will be checked / monitored on a weekly basis until stabilised to ensure no drainage issues of surface water quality impacts are occurring.

References

- IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;
- NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes; and,
- CIRIA C648 (2006) Control of Water Pollution from Linear Construction Sites.

Best Practice Measures

GC-BPM-12	**Monitoring of nesting and roosting Hen Harrier (*Circus cyaneus*)**

Environmental Commitment

To identify and monitor breeding Hen Harrier

Work Sections/Locations

2km buffer of UWF Grid Connection construction works areas, UWF Related Works/UWF Replacement Forestry/Consented Upperchurch Windfarm/ Windfarm and UWF Other Activity Locations located within or adjacent to suitable Hen Harrier habitat- including the Upperchurch Hen Harrier Scheme (UHHS).

Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of construction activities
Project Ecologist	• Carrying out of surveys to Best Practice guidance for nesting Hen Harrier. • Must be aware of the best practice guidance listed in References below.

Surveying of nesting and roosting Hen Harrier

- Monthly surveys following (SNH) guidance will be undertaken by a suitably qualified Ornithologist
- Confirmatory hen harrier breeding surveys will be completed, before construction works initiate, such that all pre breeding nuptial activity, nesting activity and active nests are recorded within 2km of the construction works area boundary (Project Design Measure). Breeding Surveys will take place monthly between February and August of the construction year and will be targeted at confirming breeding attempts and/or nest locations within the 2km buffer area utilized to establish baseline conditions.
- Confirmatory hen harrier roosting surveys will be completed, within 1000m of the construction works boundary. Roosting surveys will take place monthly between October and February of the construction year and will be targeted at confirming roosting locations within the 1km buffer area utilized to establish baseline conditions.
- These surveys (both breeding and roosting) will be completed prior to the start-up of all construction activities, until construction is complete and for 4 years thereafter (Years 1-3 and Year 5) (Project Design Measure).
- Surveys will also be undertaken in years coinciding with any National Surveys of Hen Harrier to fully inform future trends in respect of the Slievefelim to Silvermines Mountains SPA.
- A report including nesting activity, levels of usage and any disturbance events, will be provided to the Competent Authority and NPWS following the completion of each survey season.
- The Project Ecologist will keep NPWS informed of the real-time status of nesting Hen Harrier as a result of the monitoring associated with this project.

Construction Works Restrictions

- A temporal construction exclusion zone of 500m will be established around any active hen harrier breeding attempt or active nesting location. The temporal exclusion zone will be established by a suitably qualified Ornithologist and will be strictly adhered to by all personnel involved in the construction works. No construction works will take place within the temporal exclusion zone during the breeding season March to August (Project Design Measure).

Topic **Biodiversity**

- A temporal construction exclusion zone of 1000m will be established around identified Hen Harrier roost locations during the winter roosting season (October to February inclusive). The temporal exclusion zone will be established by a suitably qualified Ornithologist and will be strictly adhered to by all personnel involved in the construction works. Construction works within 1000m of a roost will be limited to the period between one hour after sunrise to one hour before sunset (Project Design Measure).

Compliance Monitoring

- The temporal exclusion zone will be monitored by a suitably qualified Ornithologist.
- The Ornithologist with have 'stop works' authority.
- Any non-compliance will be recorded in a register and included in a report to be provided to the competent authority following the completion of the construction stage.

Operational Works Measures

- During the Operational Phase a suitably qualified Ornithologist will be present during any required maintenance works along the 110kV UGC within the SPA to ensure no breeding Hen Harrier are disturbed.

Construction Stage Dust Effects

- If dust issues start to occur proximal to sensitive nest locations, the Project Ecologist/Ornithologist will report the issue to the Environmental Clerk of Works, who will require the Construction Contractor to minimize dust emissions, as per Best Practice Measure GC-BPM-29.

References

- Scottish National Heritage (2014) Survey Methods for Use in Assessing the Impacts of Onshore Windfarms on Bird Communities http://www.snh.gov.uk/docs/C278917.pdf.
- Ruddock and Whitfield (2007) A Review of Disturbance Distances in Selected Bird Species. A report from Natural Research (Projects) Ltd to Scottish Natural Heritage. http://www.snh.org.uk/pdfs/strategy/renewables/BIRDSD.pdf

Best Practice Measures

GC-BPM-13	Minimising the effects of lighting on bats
Environmental Commitment	
To avoid displacement or disturbance of bats arising from the use of artificial lighting.	
Work Sections/Locations	
150m around all UWF Grid Connection construction works areas	
Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of works
Project Ecologist	• The Project Ecologist will liaise with NPWS throughout the construction stage and early operational stage. • Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times. • Must be aware of the best practice guidance listed in References below.

Design principles for lighting

- All known bat roosts within 150m of the construction works areas will be subject to confirmatory survey prior to the onset of construction works in order to identify any changes in the interim period since baseline establishment. Surveys will be carried out at a time of year that is appropriate to the type of roost e.g. June to August for maternity roosts, or November to February for hibernation roosts. This will ensure that the Project Ecologist has accurate information regarding the location and status of roosts, and that the lighting proposals can be adapted accordingly, if required.
- The Project Ecologist will communicate all bat survey results and information to the Project Team. This information will also be issued to the Local Authority and relevant statutory consultees, as agreed at the consenting stage.
- In general, the use of lighting will be avoided throughout the scheme, as most of the surrounding landscape is of at least local importance for bats.
- All construction works will be carried out during daylight hours (Project Design Measure).
- Security lighting will be used at compounds. All lighting will be cowled in order to prevent light spill and no lighting will be left turned on overnight. Lighting will be controlled by motion and time sensors to minimise the amount of time the lights are operational (Project Design Measure).
- Lights would be operational for 30 seconds and would then switch off automatically.
- Additionally, lights will be directed only onto the required area, in conjunction with the ECoW, the Contractor will choose lighting in accordance with Guidance Notes for the Reduction of Obtrusive Light GN01-2011 when deciding on lighting;
- Low UV-lighting bulbs, such as low-UV LEDs or low / high pressure sodium lamps will be used. Mercury or metal halide bulbs will not be used.

References

- Stone, E.L. (2013) Bats and lighting: Overview of current evidence and mitigation guidance. University of Bristol

Topic **Biodiversity**

- Bat Conservation Trust (2008). Bats and the Built Environment Series: Bats and Lighting in the UK
- Bat Conservation Ireland (2010). Bats & Lighting: Guidance Notes for Planners, engineers, architects and developers

Best Practice Measures

GC-BPM-14	Protection of potential tree and bridge bat roosts

Environmental Commitment

Best Practice measures in respect of direct disturbance or destruction of potential tree and bridge roosts throughout the pre-construction, during construction and operational phases of the development.

Work Sections/Locations

Tree felling locations, bridges along haul routes and works areas

Responsibility of	Role/Duty
Construction Manager	• Scheduling of construction activities
Project Ecologist	• Pre-construction confirmatory surveys will be carried out by the Project Ecologist (under license) on all bat roosts identified within the zone of effect of works boundary. • The Project Ecologist will liaise with NPWS throughout. • Monitoring felling and pruning works on trees with bat suitability. • Must be aware of the best practice guidance listed in References below.

Survey Measures for Potential Tree Roosts

- All trees that require felling or other modifications (e.g. branch removal, trimming) will be subject to a confirmatory ground-level visual inspection by the Project Ecologist prior to the onset of works.
- All trees with moderate or high suitability for bats will have a presence / absence bat detector survey during the season of peak activity (usually May to September, inclusive).
- Trees of negligible or low suitability generally do not require a presence / absence bat detector survey, but this will be reviewed by the Project Ecologist.
- The Project Ecologist will communicate all bat survey results and information to the Project Team. This information will also be issued to the Local Authority and relevant statutory consultees, as agreed at the consenting stage.

Tree Felling measures

- Trees with low suitability for bats will be cut in sections by a suitably qualified tree surgeon, and all sections with crevices or cavities will be lowered carefully to the ground and left undisturbed for 48 hours before removal.
- Any trees of moderate or high suitability will have a presence / absence bat detector survey prior to felling. If roosting bats are present, the consultant will develop a case-specific mitigation strategy (e.g. seasonal restrictions on felling works, fitting of exclusion tubes at roost entrances), and apply to the NPWS for a derogation licence. Any bats will be permanently excluded from the tree before felling, and replacement roosting opportunities (i.e. bat boxes) will be provided.
- If a tree of moderate or high suitability is surveyed and no bats are recorded, then it will be felled immediately. It will be cut in sections by a tree surgeon, and all sections with crevices or cavities will be lowered carefully to the ground and left undisturbed for 48 hours before removal.

Derogation Licenses

Topic **Biodiversity**

- Any requirement for derogation from the European Communities (Birds and Natural Habitats) Regulations 2011 will be reviewed by the Project Ecologist following consultation with local representatives of the National Parks and Wildlife Service.

Avoid effects on bats through disturbance or destruction of potential bridge roosts.

- Structures which were previously identified as having no potential for bats (no suitable crevices) (Grade 0; Billington and Norman, 1997) will require a visual inspection to confirm that the previous assessment remains valid and no suitable crevices have formed in the intervening period. If the structure remains unsuitable for bats, no additional surveys are required.
- All bridges which were previously identified as having evidence of bats or suitable crevices for bats (Grade 1 to 3; Billington and Norman, 1997) will have a visual inspection (using lights, fiberscope, etc.) and bat detector surveys (to be undertaken throughout the duration of the night and include dusk emergence and dawn swarming periods) will be undertaken prior to the commencement of bridge maintenance/upgrade works to determine if bats are using the structure at the time of any works.
- If no bats are found to be present during the surveys but suitable crevices are present, these will be temporarily blocked in advance of works to ensure bats do not occupy the structure in the intervening period.
- If bats are found in any bridges, the Project Ecologist will develop a case-specific mitigation strategy (e.g. seasonal restrictions on works, fitting of exclusion valves at roost entrances, blocking of unoccupied crevices) and apply to the NPWS for a derogation license for the proposed works.
- If undertaken, any maintenance/upgrade works will include the conservation of a number of the most suitable crevices in the bridge structure as part of the works programme. If the complete loss of all suitable crevices is unavoidable, mitigation measures in the form of bat boxes and/or bat tubes will be erected on the bridge to provide alternative roosting opportunities. The number and placement of the bat boxes and/or tubes will be determined by a bat specialist.

References

- National Roads Authority (2005). Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority, Dublin.
- Billington, G.E. and Norman, G.M. (1997). A Report on the Survey and Conservation of Bat Roosts in Bridges in Cumbria. Kendal, English Nature
- Kelleher, C. and 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.

Best Practice Measures

GC-BPM-15	Bats – Post Construction Monitoring

Environmental Commitment

Operational monitoring of bat roosts and sensitive severed hedgerow locations post construction to monitor effects (if any) from the construction of the UWF Grid Connection

Work Sections/Locations

Bat roost identified during baseline evaluations, Bat Crossing locations in field boundaries along the works area

Responsibility of	Role/Duty
Project Ecologist	• Post-construction activity surveys. • Liaising with NPWS. • Must be aware of the best practice guidance listed in References below.

Operational Surveys

- Post-construction activity surveys will be carried out annually by the Project Ecologist
- Roost surveys on roosts identified as part of baseline evaluation will be carried out under Licence within the suitable survey season as per Best Practice,
- All hedgerow locations subject to Bat Crossing Structures and reinstatement measures will also be surveyed by a suitably qualified Bat expert within the suitable survey season as per Best Practice.
- Surveys will be carried out annually during the early operational years and will continue until all revegetation has reached maturity and bat habitat severance effects are closed out. i.e. 6 years
- At the end of this period, if necessary, recommendations will be made on further survey requirements following consultation with NPWS.
- Results will be made available to the Local Authority and relevant statutory consultees in the form of an annual report.

References

- National Roads Authority (2005). Guidelines for the Treatment of Bats during the Construction of National Road Schemes. National Roads Authority, Dublin.
- Billington, G.E. and Norman, G.M. (1997). A Report on the Survey and Conservation of Bat Roosts in Bridges in Cumbria. Kendal, English Nature
- Kelleher, C. and 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.

Topic **Biodiversity**

GC-BPM-16	**Monitoring of non-native invasive plant species.**
Environmental Commitment	
Monitoring of non-native invasive plant species.	
Work Sections/Locations	
All construction works sections and operational stage wayleave areas	
Responsibility of	**Role/Duty**
Project Ecologist	• Implementation of surveying • Must be aware of the best practice guidance listed in References below.
Avoid adverse effects of the introduction and spread of non-native invasive species	
• Monitoring in the form of confirmatory surveys will be carried out by the Project Ecologist to accurately determine the current status of invasive species locations identified during baseline studies. • Surveying will be carried out each year of operation and this survey information will be used to inform any operational stage maintenance activities. Surveys will focus always on the works area plus 7m. Surveying of municipal areas – i.e. public road haulage routes, will not be included in surveys. • The results of this will be made available to Project Team, and any bodies as agreed at the consenting stage. • The measures included in the Invasive Species Management Plan will be implemented.	
References	
• National Roads Authority (2010). Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads. National Roads Authority, Dublin. • EMP for UWF Grid Connection - Invasive Species Management Plan.	

Best Practice Measures

GC-BPM-17	Best practice measures for the removal of vegetation during construction.
Environmental Commitment	
To ensure the protection of species using hedgerow and scrub habitat during the construction phase.	
Work Sections/Locations	
All sections	
Responsibility of	**Role/Duty**
Project Manager	• Inform Project Ecologist of any requirement to clear scrub or remove hedgerows during the nesting and breeding season (1st March to 31st August inclusive).
Construction Manager	• Scheduling of construction activities
Project Ecologist	• The Project Ecologist will be aware of all areas of hedgerow and scrub habitat which require removal during the construction phase, giving particular regard to the statutory restrictions on vegetation clearance, (the relevant statutory provisions are listed in References)
Measures to ensure protection of species using hedgerow and scrub habitat	
Section 40 of the Wildlife Act 1976, as amended by Section 46 of the Wildlife (Amendment) Act 2000, restricts the cutting, grubbing, burning or destruction by other means of vegetation growing on uncultivated land or in hedges or ditches during the nesting, and breeding season for birds and wildlife, from 1st March to 31st August, inclusive. **Please note that all removed hedgerows or parts thereof, will be replaced to ensure that linear habitats remain unaffected in the long term.** The following approach will be taken in order to comply with the Wildlife Acts: • Where practical, vegetation clearance will be carried out outside of the restricted period (1st March to 31st August). • Where clearance is required within the closed season, a survey will be carried out by the Project Ecologist for the presence of active birds' nests (i.e. nests with eggs or young birds). If such are found, where feasible the area will be avoided until the nesting attempt is complete. If avoidance is not feasible, such as where all works along one section of the route need to be completed to avoid incursions into the area at a later stage, the Project Ecologist will seek a derogation license from the NPWS. Such works cannot take place until this derogation license is received. • Construction works practices will incorporate fire prevention measures at all works areas	
References	
• Statutory provisions in relation to breeding birds, namely Section 46(a) of the Wildlife (Amendment) Act 2000; • Statutory provisions in relation to bats and bat roosts, namely, Wildlife Acts, 1976 and 2000, and the EU Habitats Directive (Under S.I. 94 of 1997).	

Topic **Biodiversity**

GC-BPM-18	Best practice for the protection and preservation of tree roots during the construction phase

Environmental Commitment

To ensure the protection and preservation of tree roots during the pre-construction and during construction phase.

Work Sections/Locations

All sections

Responsibility of	Role/Duty
Construction Manager	• Scheduling of construction activities
Project Ecologist	• The Project Ecologist will be aware of all trees which are to be retained and preserved during the construction and/or decommissioning phase, giving particular regard to the statutory restrictions on vegetation clearance. The relevant Statutory provisions are listed in References below. • Must be aware of the best practice guidance listed in References below.

To ensure the protection and preservation of tree roots during the pre-construction and during construction phase

- All works within a Root Protection Area (RPA) (see NRA guidance (2006) for calculation of the RPA) will be supervised by the Project Ecologist.
- An important point to remember prior to the design and installation of protective barriers, are that roots are often asymmetric so an arbitrarily chosen circular protection zone can often prove to be inadequate. Asymmetry of roots can be suspected if the ground is sloping to one side or if there are other variables restricting root development.
- The instalment of protective measures and the undertaking of all remedial works will be carried out prior to commencement of any construction activity at the RPA.
- Any remedial works required to trees identified for retention will be carried out prior to construction by qualified tree surgeons in accordance with BS 3998 (1989) Recommendations for tree work.
- Vertical barriers and/or ground protection will protect all trees that are being retained on site. These provisions will be put in place prior to any development work or soil excavations are carried out within the RPA.
- The purpose of protective barriers is to exclude any harmful construction activity that may damage the RPA. They also help protect the main stem of the tree.
- Tree protection barriers will be fit for the purposes of excluding construction activities and be durable to withstand an impact. The barrier will consist of a vertical and horizontal frame and will be at least 2.3m in height.
- Clear concise signage will be affixed to the barrier in an unrestricted easily viewed location. The signage must specify that no construction activity is to take place within the RPA. This will remain the place until completion of all works unless certain works are deemed acceptable following consultation with an arborist.
- The signage must also state that no materials of any description are to be stored or the “spilling out” of materials will not occur within the RPA.
- Consultations with a qualified arborist will be undertaken if required during the development, if certain construction activities within the RPA are unavoidable, e.g. excavation works.

Best Practice Measures

- Any excavation works carried out within the RPA will be undertaken with extreme care and will be carried out with due diligence, avoiding damage to the protective bark covering larger roots. This may involve excavation by mini-digger and/or hand as deemed appropriate.
- Exposed roots will be wrapped in hessian sacking to avoid desiccation and roots less than 2.5cm in diameter can be pruned back to a side root.
- The advice of a qualified arborist will be sought if larger roots that influence anchorage of the tree need to be severed.
- Toolbox talks with site personnel will include the relevant best practice measures above and all site personnel will be made aware of the importance of the protective barrier.
- In general, a ground alteration in excess of 75mm will be avoided.
- Changes in ground levels in the vicinity of a tree may alter the existing soil hydrology and may necessitate the incorporation of adequate drainage around the tree.

References

- Section 46(a) of the Wildlife (Amendment) Act 2000
- Tree Preservation Orders (TPO), which are made under Section 205 of the Planning and Development Act, 2000
- Statutory provisions in relation to bats and bat roosts, namely, Wildlife Acts, 1976 and 2000, and the EU Habitats Directive (Under S.I. 94 of 1997).
- BS 3998 (1989) Recommendations for tree work
- NRA (2006). Guidelines for the protection and preservation of trees, hedgerows and scrub prior to, during and post construction of national road schemes. National Roads Authority, Dublin.

Topic **Biodiversity**

GC-BPM-19	Disturbance to and/or displacement of nesting Common Kingfisher (*Alcedo atthis*).

Environmental Commitment

To avoid disturbance/displacement of nesting Kingfisher throughout the construction phase of the development.

Work Sections/Locations

All watercourse crossing locations

Responsibility of	Role/Duty
Project Manager	• Scheduling of construction activities
Project Ecologist	• Carrying out surveying to Best Practice guidance. • Must be aware of the best practice guidance listed in References below.

Avoid disturbance and/or displacement of nesting Kingfisher during pre-construction and during construction phase of the development.

- Confirmatory surveys will be carried out by a suitably qualified Ornithologist and will follow standard methodology (Cummins *et al*, 2010),
- Surveys will be undertaken between March and April (early visit) and again between May and June (late visit) of the construction year and will be targeted at confirming breeding attempts and/or nest locations along rivers within 300m of works area boundary (No nests were located within 300m during baseline surveys).
- All crossing locations will be also be surveyed to confirm Kingfisher suitability both in terms of nest banks and suitable bankside vegetation at the time of construction.
- No construction activities will be permitted within the temporal construction exclusion zone (500m) around identified nest locations during the bird breeding season (March – August inclusive or until nesting is confirmed as complete following supervision by a suitably qualified Ornithologist).
- Channel and bankside vegetation (trees, scrub etc.) where confirmed as suitable for Kingfisher, will be left untouched where possible to retain branches for foraging Kingfishers and to minimize disturbance to nesting birds.
- At least some marginal vegetation will be retained on suitable Kingfisher nesting banks - if present. These are mostly vertical banks over one meter in height, composed of soft material into which they can dig their burrows.

Other Riparian Bird Species

- During Kingfisher surveys, all crossing locations will also be surveyed to confirm the presence or absence of other aquatic/riparian species such as Dipper, Grey Wagtail.
- If present at watercourse crossing locations, Statutory provisions in relation to breeding birds, namely Section 46(a) of the Wildlife (Amendment) Act 2000 will be fully adhered with.

Best Practice Measures

References

- Cummins, S., Fisher, J., McKeever, R.G., McNaghten, L., and Crowe, O. (2010) Assessment of the distribution and abundance of Kingfisher (Alcedo atthis) and other riparian birds on six SAC river systems in Ireland. National Parks and Wildlife Service and BirdWatch Ireland.
- https://www.npws.ie/sites/default/files/publications/pdf/Cummins_et_al_2010_Kingfisher_survey.pdf
- Crowe, O. (2010) Ecological Impact Assessment (EcIA) of the Effects of Statutory Arterial Drainage Maintenance Activities on Kingfisher (Alcedo atthis) and other riparian birds II. Office of Public Works and BirdWatch Ireland. http://www.opw.ie/en/media/Issue%20No.%2012%20%20EcIA%20Kingfisher%20Alcedo%20atthis%20and%20other%20Riparian%20Birds%20II.pdf

Topic **Biodiversity**

GC-BPM-20	Monitoring of Identified Badger Setts
Environmental Commitment	
Monitoring of identified Badger setts during the operational phase of the development.	
Work Sections/Locations	
All setts identified in baseline surveys	
Responsibility of	**Role/Duty**
Project Ecologist	• Must be aware of the best practice guidance listed in References below.
Monitoring of identified Badger setts during the operational phase of the development.	
• Survey of identified badger setts within 50 m of either side of the construction works area boundary to determine the current status of known badger setts (i.e. active or inactive) and to determine if any new setts have been established in the period following the completion of construction. • Surveys will be undertaken annually in Operational Years 1, 2, 3, 4 and 5. • These surveys can be undertaken at any time of the year, but are most effective between November and April when vegetation cover is reduced. However, until mid-January, badgers are less active during colder weather and setts can appear less well-used (NRA, 2008). • Results will be made available to the Local Authority and relevant statutory consultees in the form of an annual report.	
References	
• National Roads Authority (2005). Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes. National Roads Authority, Dublin. • National Roads Authority (2008). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.	

Best Practice Measures

GC-BPM-21	Disturbance and/or physical injury to Other Mammals

Environmental Commitment

To avoid disturbance and/or physical injury to other mammals throughout the pre-construction, during construction and operational phases of the development.

Work Sections/Locations

All sections

Responsibility of	Role/Duty
Construction Manager	• Scheduling of construction activities.
Project Ecologist	• Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times. • Must be aware of the best practice guidance listed in References below.

Construction Stage Surveying

- Confirmatory surveys (of suitable habitat) for the presence/absence of these protected species or their breeding/resting places within 50m of the construction works area will be undertaken prior to the commencement of vegetation and/or hedgerow clearance and excavations.
- Confirmatory surveys to check for any new dens/dreys that may have arisen between the time of the original survey and start of works will be carried out by the Project Ecologist;
- The Project Ecologist will communicate all confirmatory survey results and information to the Project Team. This information will also be issued to the Local Authority and relevant statutory consultees, as agreed at the consenting stage.

Measures to avoid/minimise disturbance effects to pine martin

- In the event of the confirmation of pine martin breeding/resting places specific measures will include:
- Marking exclusion zones around any confirmed pine marten dens;
- The boundary of the exclusion zone will be a minimum of 30m from a non-breeding den and at least 100m from dens which are known or suspected of being used for breeding,
- No construction works will be carried out within the exclusion zones in the breeding season (March-June inclusive);
- If construction works during the breeding season cannot be avoided, the den will be destroyed. The destruction of a den will require an NPWS Licence.

Measures to avoid/minimise disturbance effects to pine martin and red squirrel

- In the event of the confirmation of red squirrel breeding/resting places specific measures will include:
- Marking 50m exclusion zones around any confirmed breeding red squirrel dreys;
- If monitoring confirms the drey is not used for breeding, smaller protection zones will be required (5m or to the nearest neighbouring tree);
- On-going survey of any dreys within 50m of works areas to monitor the breeding status of the drey, (red squirrels can move dreys during the breeding season, so a non-breeding drey could change status);

Topic **Biodiversity**

- Avoiding felling any trees containing red squirrel dreys, if unavoidable, the destruction of a red squirrel drey will require an NPWS licence.
- Where construction works will take place within 50m of a breeding drey, the works will be scheduled, if feasible, to take place between October–January inclusive (which is outside the breeding season), If this is unfeasible the potential for disturbance will be evaluated by the Project Ecologist and works will be monitored;
- Construction machinery will not exceed 20km/hour on access roads to ensure the protection of other Non-Volant mammals including but not limited to Irish hare, pine marten, hedgehog, red squirrel and Irish stoat.

Measures to avoid/minimise disturbance effects to Irish hare, hedgehog, Irish stoat, pine martin, red squirrel

- Construction machinery will not exceed 20km/hour on site access roads.

References

- Scottish Natural Heritage (2012). Protected Species Advice for Developers – Pine Marten. http://www.snh.gov.uk/docs/A1959323.pdf.
- Scottish Natural Heritage (2012). Protected Species Advice for Developers – Red Squirrel. http://www.snh.gov.uk/docs/A1959329.pdf.

Best Practice Measures

GC-BPM-22	Management of general non-native invasive species.		

Environmental Commitment

To avoid the introduction, establishment and spread of non-native species to the proposed development site during the pre-construction, during construction and operational phase.

Work Sections/Locations

All sections

Responsibility of	Role/Duty
Construction Manager	• Requiring supply companies to clean delivery vehicles before entering the site to gain access to works area • Obtaining and keeping a record of delivery companies cleaning of vehicles • Training flagmen in the appropriate method of vehicle cleaning
Flagmen	• Cleaning of delivery vehicles exiting the site with suitable disinfectant • Maintaining a record of all vehicles cleaned and equipment, disinfectant used.
Project Ecologist	• Carrying out spot checks on flagmen during cleaning of delivery vehicles. • Must be aware of the best practice guidance listed in References below.

Inspection and Cleaning of Delivery Vehicles

- Prior to arrival on site, the contractor's vehicles and equipment will be thoroughly cleaned and then dried using high-pressure steam cleaning, with water > 65 degrees C, in addition to the removal of all vegetative material. Items difficult to soak/spray will be wiped down with a suitable disinfectant (e.g. Virkon Aquatic).
- Evidence that all machinery has been cleaned will be required to be on file for review by the statutory authorities. Given that Crayfish Plague has affected rivers in the area recently (2017) the level of evidence required of the Contractor will be actual registration plates of vehicles onsite and a register of when, how and where each of these were cleaned before they arrived on site.
- The flagmen which will be present at each active site access points will be responsible for inspecting and cleaning delivery vehicles both entering and exiting the site, and will receive training in the correct techniques.
- Each flagman will be equipped with a 'disinfection box'. This will contain Virkon Aquatic or another proprietary disinfectant, a spraying mechanism, cloths or sponges, a scrubbing brush and protective gloves. Protective gloves will be worn when using any disinfectant solution.
- Visual inspections will be carried out on all machinery and equipment (particularly for machinery and equipment exiting the site and which has come into contact with water or soils) for evidence of attached plant or animal material, or adherent mud or debris. Any attached or adherent material will be removed before entering or leaving the site of operation, securely stored away from traffic for removal to the waste storage area in the Temporary Compound at the end of the work day.
- No removed material or run-off will be allowed to enter a water body of any sort.
- Following cleaning, all equipment and vehicles will be visually inspected to ensure that all adherent material and debris has been removed manually.
- Records of supplies and cleaning of delivery vehicles will be kept by the flagmen, and will be regularly inspected by the Environmental Clerk of Works.

Topic **Biodiversity**

• Spot checks on the adequacy of cleaning will be carried out by the Project Ecologist.
Measures at or in watercourses
• Residual water in any containers/vessels used in works near watercourses will be flushed with disinfectant (Virkon Aquatic) onto grass. A drying period of at least 24 hours will be adhered to. • All footwear used, or to be used, in streams or rivers will be dipped in or scrubbed with a disinfectant solution (e.g. 1% solution of Virkon Aquatic or another proprietary disinfection product) and thoroughly dried afterwards. This does not apply to footwear use in wetlands or peatland areas. • Any observations of mass mortality of Crayfish will be reported to the relevant authorities within 1 hour of evidence being found.
Measures for white toothed shrew
• Consignments of organic materials, such as hedging material, will be inspected for presence of Greater White-toothed Shrew.
References
• http://www.fisheriesireland.ie/Research/invasive-species.html • http://www.nonnativespecies.org/checkcleandry/

Best Practice Measures

GC-BPM-23	**Best practice methods to ensure the protection of common frog (*Rana temporaria*) and smooth newt (*Triturus (Lissotriton) vulgaris*).**

Environmental Commitment

To avoid effects on the breeding habitat of common frog (*Rana temporaria*) and smooth newt (*Triturus (Lissotriton) vulgaris*) if present along the cable route during the pre-construction and construction phase.

Work Sections/Locations

All construction works areas

Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of construction activities
Project Ecologist	• Must be aware of the locations of all previously identified habitats suitable for breeding amphibian along the route corridor. • Monitor the construction activities when working adjacent to amphibian breeding habitat to ensure that mitigation measures are strictly adhered to at all times. • Must be aware of the best practice guidance listed in References below.

To avoid effects on the breeding habitat of common frog and smooth newt

- Should construction activities be scheduled for areas proximal to previously identified habitat suitable for breeding common frog or smooth newt during the species' respective breeding seasons (frogs: January-March and newts: March-May), confirmatory surveys following standardised methodologies will be carried out at those locations to confirm the presence/absence of breeding adults and/or spawn.
- If evidence of breeding frog or newts is confirmed proximal to the work locations, the areas will be fenced off with appropriate signage in order to protect these species during construction activities;
- Protecting the hydrological regime of the habitat is particularly important. Thus, it is particularly important that the Project Ecologist is suitably qualified so as to have a clear understanding of the drainage characteristics of wet areas such as ponds, pools and drains which have the potential to support breeding amphibians along the route to ensure that these areas are maintained into the future;
- Note: The proposed development is beyond the geographical range of the Natterjack toad (Bufo (Epidalea) calamita), thus this species does not require mitigation within this Project.

References

- National Roads Authority (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.

Topic **Biodiversity**

GC-BPM-24	**Best practice methods to ensure the protection of Viviparous lizard (*Lacerta (Zootoca) vivipara*)**

Environmental Commitment

To avoid effects on Viviparous lizard (*Lacerta (Zootoca) vivipara*) during the pre-construction and construction phase.

Work Sections/Locations

All sections

Responsibility of	**Role/Duty**
Construction Manager	• Scheduling of construction activities
Project Ecologist	• Monitor the construction activities to ensure that mitigation measures are strictly adhered to at all times. • Must be aware of the best practice guidance listed in References below.

To avoid effects on Viviparous lizard.

- As Viviparous lizards are widespread in Ireland and can be found in a range of habitat types such as in bog, heath, the margins of coniferous woodlands, in addition to being common in a range of grassland habitats, particularly those not subject to heavy grazing pressure, a spot-check confirmatory survey by the Project Ecologist will be required within these habitats prior to the commencement of the construction stage to confirm the presence/absence of individuals.
- Capture and relocation operations for this species can be extremely labour-intensive and in most cases the most efficient approach is to cut down and rake-off vegetation during warm weather, with the intention of displacing the resident lizards prior to earthworks or other activities that could result in their incidental mortality (NRA, 2009). Whether or not reptile-proof fencing is then required to exclude the animals will need to be reviewed on a location-specific basis by the Project Ecologist.
- Note: The proposed development is beyond the geographical range of the non-native Slow-worm (Anguis fragilis), thus this species does not require mitigation within this Project.

References

- NRA (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.

Best Practice Measures

GC-BPM-25	Measures to ensure the protection of Marsh Fritillary (*Euphydryas aurinia*)	Ref:	GC-BPM-33

Environmental Commitment

To avoid effects on Marsh Fritillary / Marsh Fritillary habitat during the pre-construction and construction phase.

Work Sections/Locations

UWF Grid Connection: S66, S55, and other suitable habitat within 50m of construction works areas.

Responsibility of	Role/Duty
Construction Manager	• Scheduling of construction activities
Project Ecologist	• Carrying out of Confirmatory Survey of suitable habitat • Monitor the construction works when working adjacent to Marsh Fritillary habitat to ensure that mitigation measures are strictly adhered to at all times. • Must be aware of the best practice guidance listed in References below.

Pre-Construction Surveying measures for Marsh Fritillary

- Confirmatory survey of the distribution of Devil's-bit Scabious (larval food plant of Marsh Fritillary) (project design measure)
- The survey will be carried out during the last available April prior to the commencement of construction in suitable habitat within 50m of the construction works area
- Surveys will be completed within 12 months prior to the commencement of the construction stage, within the correct seasonal period as per Best Practice.

Measures for the protection of Marsh Fritillary at different times of their life-cycle

- Any areas of Devil's-bit Scabious that are located within the construction works area boundary, will be strimmed/cut to ground level in the last available late April / early May period prior to the commencement of construction (project design measure).

Post-Construction Surveying measures for Marsh Fritillary

- Survey all areas with identified Marsh Fritillary colonies within the correct seasonal period annually, in years 1, 2, 3 of operation as per Best Practice,
- Surveying will monitor the status of Marsh Fritillary colonies and record any change to baseline trends as a result of the development of the UWF Grid Connection.
- Results will be made available to the Local Authority and relevant statutory consultees, in the form of an annual report.

References

- National Roads Authority (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. National Roads Authority, Dublin.

Topic **Biodiversity**

GC-BPM-33	Surface Water Quality Protection Measures For Site Runoff during the Mountphilips Substation Construction Works.

Environmental Commitment

Prevention of significant surface water quality impacts during the Mountphilips Substation and End Mast Construction Works.

Work Sections/Locations

The proposed Mountphilips Substation compound and end masts.

Responsibility of	Role/Duty
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works.

Surface Water Quality Protection Measures

- Firstly, the substation compound and end mast construction works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
- A minimum 30 metre vegetative buffer zone will be maintained between the substation works area and the stream to the west of the site;
- There will be no storage of material / equipment, excavated overburden or overnight parking of machinery inside the 30m buffer zone;
- Before any ground works is undertaken, double silt fencing will be placed upslope of the local stream to the west. The first line of the silt fencing will be placed 30m from the stream bank and the second line of silt fencing will be placed 5m from the stream bank;
- Double silt fencing will also be placed along the watercourses (drains) which run along the field boundary to the east and north of the proposed site;
- Due to the proximity of the compound works to the watercourse (drain) to the east of the site, silt traps will be placed at 20m intervals within the watercourse channel;
- The end mast construction site is located on the western side of the local stream, and a minimum 20 metre vegetative buffer zone will be maintained between the works area and the stream. Silt fencing will be arranged as described for the substation works;
- Additional silt fencing or temporary rectangular straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the local stream;
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- As the earthworks proceeds at the substation site, permanent earthen berms will be constructed around the substation compound site, and these berms will be used to contain surface water runoff during the substation compound work;
- Silt fencing will be placed along the base of the berms until they have vegetated and stabilised;
- As construction advances, there will a requirement to collect and treat small volumes of surface water that is contained within the footprint of the compound. This will be completed using perimeter swales and sumps at low points inside the compound;
- Water will be pumped from the sumps into a settlement pond(s) which will allow primary settlement of solids. From the settlement pond(s), water will be pumped to a proposed percolation area at least 30m from the local stream;

Best Practice Measures

- Discharge onto vegetated ground at the percolation area will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing;
- Any sediment laden water from the works area will not be discharged directly to a watercourse or drain (Project Design Measure);
- In relation to the end mast construction area, silt fencing and straw bales will be arranged between the local stream as described above for the substation compound;
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted;
- Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the local stream;
- If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- As a final catch-all contingency, a mobile 'Siltbuster' or similar equivalent specialist treatment system will be available for emergencies in order to treat sediment polluted waters from the excavation should they be required. Siltbusters are mobile silt traps that can remove fine particles from water using a proven technology and hydraulic design in a rugged unit. The mobile units are specifically designed for use on construction-sites with sensitive downstream receptors;
- There will be no batching or storage of cement within 30m of the local stream;
- There will be no refuelling allowed within 100m of the local stream; and,
- All plant will be checked for purpose of use prior to mobilisation at the site.

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GC-BPM-34	Surface Water Quality Protection Measures During Direction Drilling at the Newport (Mulkear) River, Bilboa River and Clare River watercourse crossings.

Environmental Commitment

Prevention of significant surface water quality impacts during Horizontal Directional Drilling at the Newport (Mulkear) River, Bilboa River and Clare River watercourse crossing locations.

Work Sections/Locations

- Newport (Mulkear) River – crossing no. **W10**
- Bilboa River - crossing no. **W57,** and,
- Clare River - crossing no. **W36.**

Responsibility of	Role/Duty
Construction Manager	Monitor weather conditions. Supervise excavation works and drainage works.
Mud Engineer	Monitor drilling works

Project Design Environmental Protection Measure / Best Practice Measure

Surface Water Quality Protection Measures

- In order to prevent significant water quality impacts and morphological impacts, trenchless technology will be carried out to install the 110kV cable below the Newport (Mulkear) River, Bilboa River and Clare River (Project Design);
- Although no in-stream works are proposed, the drilling works will only be done over a dry period and will avoid the months of May, June or July as required by IFI (Project Design Measure);
- The crossing works area will be clearly marked out with fencing or flagging tape to avoid unnecessary disturbance of vegetation;
- The boundary of the Lower River Shannon SAC, which runs close to the Newport (Mulkear) River and Bilboa River bank, will also be clearly marked out and the crossing works area, including temporary surface water control measures (see below), will all be located outside the SAC;
- A minimum 15 metre vegetative buffer zone will be maintained between the works area and the SAC at the River crossing;
- A minimum 15 metre vegetative buffer zone will be maintained between the works area and the Clare River channel;
- There will be no storage of material / equipment or overnight parking of machinery inside the 15m buffer zone;
- Before any ground works are undertaken, double silt fencing will be placed upslope of the river channel along the 15m buffer zone boundary. At the Newport (Mulkear)River and Bilboa River crossing double silt fencing will also be placed along the SAC boundary;
- Additional silt fencing or straw bales (pinned down firmly with stakes) will be placed across any natural surface depressions / channels that slope towards the river;
- Silt fencing will be embedded into the local soils to ensure all site water is captured and filtered;
- The area around the drilling fluid pumping and recycling plant will be bunded using terram geotextile (as it will clog) and sandbags in order to contain any spillages;

Best Practice Measures

- Drilling fluid returns will be contained within a sealed tank / sump to prevent migration from the works area;
- Spills of drilling fluid will be cleaned up immediately and stored in an adequately sized skip before been taken off-site;
- If rainfall events occur during the works, there will be a requirement to collect and treat small volumes of surface water from areas of disturbed ground (*i.e.* soil and subsoil exposures created during site preparation works);
- This will be completed using a shallow swale and sump downslope of the disturbed ground, and water will be pumped to a proposed percolation area at least 50m from the river;
- The discharge of water onto vegetated ground at the percolation area will be via a silt bag which will filter any remaining sediment from the pumped water. The entire percolation area will be enclosed by a perimeter of double silt fencing;
- Any sediment laden water from the works area will not be discharged directly to a watercourse or drain (Project Design Measure);
- Works will not take place during periods of heavy rainfall and will be scaled back or suspended if heavy rain is forecasted;
- Daily monitoring of the compound works area, the water treatment and pumping system and the percolation area will be completed by a suitably qualified person during the construction phase. All necessary preventative measures will be implemented to ensure no entrained sediment, or deleterious matter is discharged to the river;
- If high levels of silt or other contamination is noted in the pumped water or the treatment systems, all construction works will be stopped. No works will recommence until the issue is resolved and the cause of the elevated source is remedied;
- On completion of the works, the ground surface disturbed during the site preparation works and at the entry and exit pits will be carefully reinstated and re-seeded at the soonest opportunity to prevent soil erosion;
- The silt fencing upslope of the river will be left in place and maintained until the disturbed ground has re-vegetated;
- There will be no batching or storage of cement allowed at the watercourse crossing;
- There will be no refuelling allowed within 100m of the watercourse crossing; and,
- All plant will be checked for purpose of use prior to mobilisation at the watercourse crossing.

Monitoring by Mud Engineer

During drilling works the Mud Engineer will monitor fluid density, viscosity and solids content and any increases in pump pressure will be investigated immediately to prevent the risk of pressure build up within the annulus.

Monitoring of fluid tank volumes will also be undertaken to identify any unexpected changes.

Rates of Penetration and circulated cuttings volumes will be monitored to ensure that drilled cuttings are being flushed from the bore and are not building up creating pressure restrictions.

Annular fluid velocity will be kept below Critical Velocity to prevent eddying and subsequent erosion caused by turbulent flow.

When applicable a biodegradable drilling fluid will be selected such as Clear-Bore

Training and Communication

- All personnel involved in the drilling works will be trained in the emergency procedure for frac-out and will understand their responsibility for timely reporting of frac-outs;

Frac-Out Incident Preparedness

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- Frac-out response equipment will be kept at the drilling location or at a readily accessible location close to the drilling works locations.

References

- IFI (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters.
- NRA (2008) Guidelines for the Crossing of Watercourses During the Construction of National Road Schemes.
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- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors.
- See Environmental Management Plan for UWF Grid Connection, Section 6: **Environmental Emergency Procedure for Frac-Out during Drilling Works.**
- EIA Report, Volume C4: EIAR Appendices, Appendix 11.4: UWF Grid Connection HDD Risk Assessment

Best Practice Measures

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8.14 Summary of the Biodiversity Chapter

UWF Grid Connection is mainly located on agricultural and forestry lands in the Slievefelim to Silvermine Mountain uplands area. Some works are also proposed within the public road corridor. The underground cable trench and new access roads associated with the UWF Grid Connection passes through the width of the Slievefelim to Silvermines SPA, while the proposed Mountphilips Substation is located outside of the SPA. The majority of the footprint of the UWF Grid Connection, including the proposed Mountphilips Substation, is located within the catchment area of the River Shannon with the remainder located in the catchment area of the River Suir. The UWF Grid Connection crosses the Lower River Shannon SAC in three locations, where the cables will be installed by directional drilling under the watercourse (Newport (Mulkear) River and Bilboa River) and where the cables will be installed within a short section of an existing farm track on the approach to the Newport (Mulkear) River crossing. The UWF Grid Connection also intersects the Bleanbeg Bog NHA, where the cables will be installed into a short length of an already excavated forestry track.

Surveys of the site recorded breeding and roosting hen harrier, otter, badger, bats, typical upland habitats and bird species, along with pine martin, red squirrel, Irish hare and fallow deer, common frog was also recorded. Small populations of Marsh Fritillary butterfly was recorded in two locations in Bealaclave and Baurnadomeeny.

The Sensitive Aspects of Biodiversity which were evaluated in this topic chapter are: European Sites; National Sites; Aquatic Habitats & Species, Terrestrial Habitats, Hen Harrier, General Bird Species, Bats, Non-Volant Mammals, Amphibians & Reptiles and the Marsh Fritillary butterfly.

A suite of environmental protection measures (59 no.) has been integrated into the project design to ensure that significant effects to the Biodiversity environment are avoided. One additional mitigation measure has been developed to avoid significant disturbance or displacement effects to Otter.

In addition to the Project Design Measures, Best Practice Measures (27 no.) will be implemented during the construction and early operational stage of the UWF Grid Connection, these measures will provide further protection to biodiversity.

An Environmental Management Plan has been developed for the UWF Grid Connection to implement the environmental commitments during the construction and early operational stage. The Environmental Management Plan includes a Surface Water Management Plan and an Invasive Species Management Plan which will provide the framework for water quality, habitats and species protection at the UWF Grid Connection site. The Invasive Species Management Plan will continue to form part of the site management throughout its operational life.

UWF Grid Connection Environmental Management Plan is included as Volume D.

8.14.1 Summary of Effects on European Sites

In relation to European Sites, it was concluded in the NIS (See Volume E), that in light of the conservation objectives and rationale for designation of the European Sites under consideration (Slievefelim to Silvermines SPA, Lower River Shannon SAC and Lower River Suir SAC); the potential for significant effects exists as a result of a single project element of the Whole UWF Project, namely the UWF Grid Connection. However, with the implementation of the Project Design Measures and the Additional Mitigation Measure AMM-01 in respect of Otter, it is concluded that neither the UWF Grid Connection, nor any Other Element of the Whole UWF Project, alone or in combination with each other or with Other Projects or Activities, will result in any effects that will adversely affect the integrity of the European Sites. This NIS is included in Volume E: Appropriate Assessment Reporting.

Summary of the Biodiversity Chapter

8.14.2 Summary of UWF Grid Connection Impacts to the other Sensitive Aspects

The likely impacts to the individual Sensitive Aspects as a result of UWF Grid Connection are outlined below:

- Impacts to Aquatic Habitats & Species will range from Slight to Slight-Moderate,
- Impacts to Terrestrial Habitats will be Not Significant in relation to reduction of habitats, hedgerow severance or loss of high nature value trees, as a consequence of the development of UWF Grid Connection.
- Adverse impacts to the Hen Harrier will be Moderate as a consequence of the development of the UWF Grid Connection.
- Adverse impacts to the General Bird Species will be Not Significant (displacement/disturbance) effects to Golden Plover, and Slight adverse habitat loss effects to Golden Plover and Meadow Pipit. Slight positive habitat enhancement effects will occur due to the planting of heather on the felled forestry area in Castlewaller and the planting of 700m of new hedgerow in Coole/Mountphilips.
- Adverse impacts to Bats will be no greater than Imperceptible.
- Impacts to Non-Volant Mammals will range from Not Significant to Moderate in relation to Badger and other mammals (Irish Hare, Pine Marten, Red Squirrel and Fallow Deer). **Significant disturbance/displacement effects could occur to Otter**, which were recorded at the three directional drilling locations, along with two other watercourses along the UWF Grid Connection. A mitigation measure has been developed specifically for this potentially significant effect, and following its implementation during construction works, **the residual impacts to Otter are expected to be no greater than Slight**.
- Adverse impacts to Marsh Fritillary was evaluated as Not Significant as a consequence of the UWF Grid Connection.
- Neutral impacts are expected to occur to National Sites, including Bleanbeg Bog NHA, and to Amphibians & Reptiles as a consequence of the development of the UWF Grid Connection.

8.14.3 Summary of Cumulative Impacts with Other Elements of the Whole UWF Project

As UWF Grid Connection is one element of the larger Whole Upperchurch Windfarm Project (Whole UWF Project), the potential for cumulative effects was examined with these Other Elements.

- In-combination impacts to Aquatic Habitats & Species will range from Slight to Moderate.
- In-combination adverse impacts to Terrestrial Habitats will not be of a greater significance than for the UWF Grid Connection on it owns, - i.e. cumulatively Not Significant in relation to habitat reduction or hedgerow severance. However, due to the planting of trees associated with the Upperchurch Hen Harrier Scheme (UWF Other Activities) cumulative effects of all Elements of the Whole UWF Project will change from Not Significant adverse to Moderate and positive in relation to habitat enhancement effects to Terrestrial Habitats.
- In-combination impacts to Hen Harrier will change from Moderate adverse for UWF Grid Connection on its own to **significant and positive for the in-combination effect of all Elements of the Whole UWF Project** - this is mainly due to the Very Significant positive effects of both UWF Replacement Forestry and the UWF Other Activities (Upperchurch Hen Harrier Scheme).
- In-combination adverse impacts to General Bird Species will not be of a greater significance than for the UWF Grid Connection on it owns, - i.e. cumulatively Not Significant displacement/disturbance to Golden

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Plover, Slight adverse habitat loss effects to Golden Plover and Meadow Pipit, and cumulatively Slight and positive effects to General Bird Species as a result of habitat enhancement effects.

- Cumulative effects to Bats of the UWF Grid Connection in-combination with the Other Elements will be Imperceptible or not Significant.
- Cumulative effects to Non-Volant Mammals will not be of a greater significance than for the UWF Grid Connection on its own – i.e. Not Significant to Moderate in relation to Badger and other mammals (Irish Hare, Pine Marten, Red Squirrel and Fallow Deer), and Slight adverse (residual) in relation to Otter.
- Cumulative impacts to Marsh Fritillary of the UWF Grid Connection in-combination with the Other Elements (UWF Related Works and Upperchurch Windfarm) will be no greater than Slight adverse.
- There is no potential for in-combination impacts to National Sites or Amphibians & Reptiles.

Summary of Cumulative Impacts with Other Projects or Activities

The cumulative impact with Other Projects or Activities relates to the in-combination effect of UWF Grid Connection, and to a lesser extent UWF Related Works, Upperchurch Windfarm, UWF Replacement Forestry and UWF Other Activities with the consented projects - Bunkimalta Windfarm, Castlewaller Windfarm, Newport Distributor Road, and the activities- Forestry, Agriculture and Turf-Cutting.

- Cumulative impacts of the Other Elements of the Whole UWF Project to Aquatic Habitats & Species only relates to UWF Grid Connection, which together with Bunkimalta Windfarm and Newport Distributor Road could cause cumulative reductions in aquatic habitat quality and are evaluated as cumulatively Slight for the Clare River catchment and cumulatively Slight to Moderate for the Newport (Mulkear) River catchment. No other cumulative impacts with other projects are expected.
- Cumulative impacts to Hen Harrier will be Neutral, when the consented Bunkimalta Windfarm and Castlewaller Windfarm and forestry activities are considered in-combination with the Whole UWF Project.
- Cumulative impacts to General Bird Species is limited to cumulative habitat loss effects to Meadow Pipit and cumulative habitat enhancement effects to general birds, as a result of the cumulative effects of Bunkimalta Windfarm. Cumulative effects will not be greater than for the UWF Grid Connection or cumulative Whole UWF Project – i.e. Slight adverse and Slight positive cumulative effects.
- Cumulative impacts to Marsh Fritillary with Other Projects or Activities have potential to be Moderate adverse at a wider county-level population scale when Turf-Cutting activities in Cummer Bog were taken into account.
- No cumulative impacts of any Element of the Whole UWF Project with Other Projects or Activities are expected to National Sites, Terrestrial Habitats, Bats, Non-Volant Mammals or Amphibians & Reptiles.

The authors conclude that **no significant adverse residual effects to sensitive aspects of the Biodiversity** environment are likely to occur as a result of the development of the UWF Grid Connection, either alone or in combination with Other Elements of the Whole UWF Project or Other Projects or Activities.

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Summary of the Biodiversity Chapter

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8.15 Reference List

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Whole Upperchurch Windfarm Project

Natura Impact Statement
for
Whole UWF Project Elements 1 to 5

May 2018

UWF Grid Connection

Chapter 8 Biodiversity Figures

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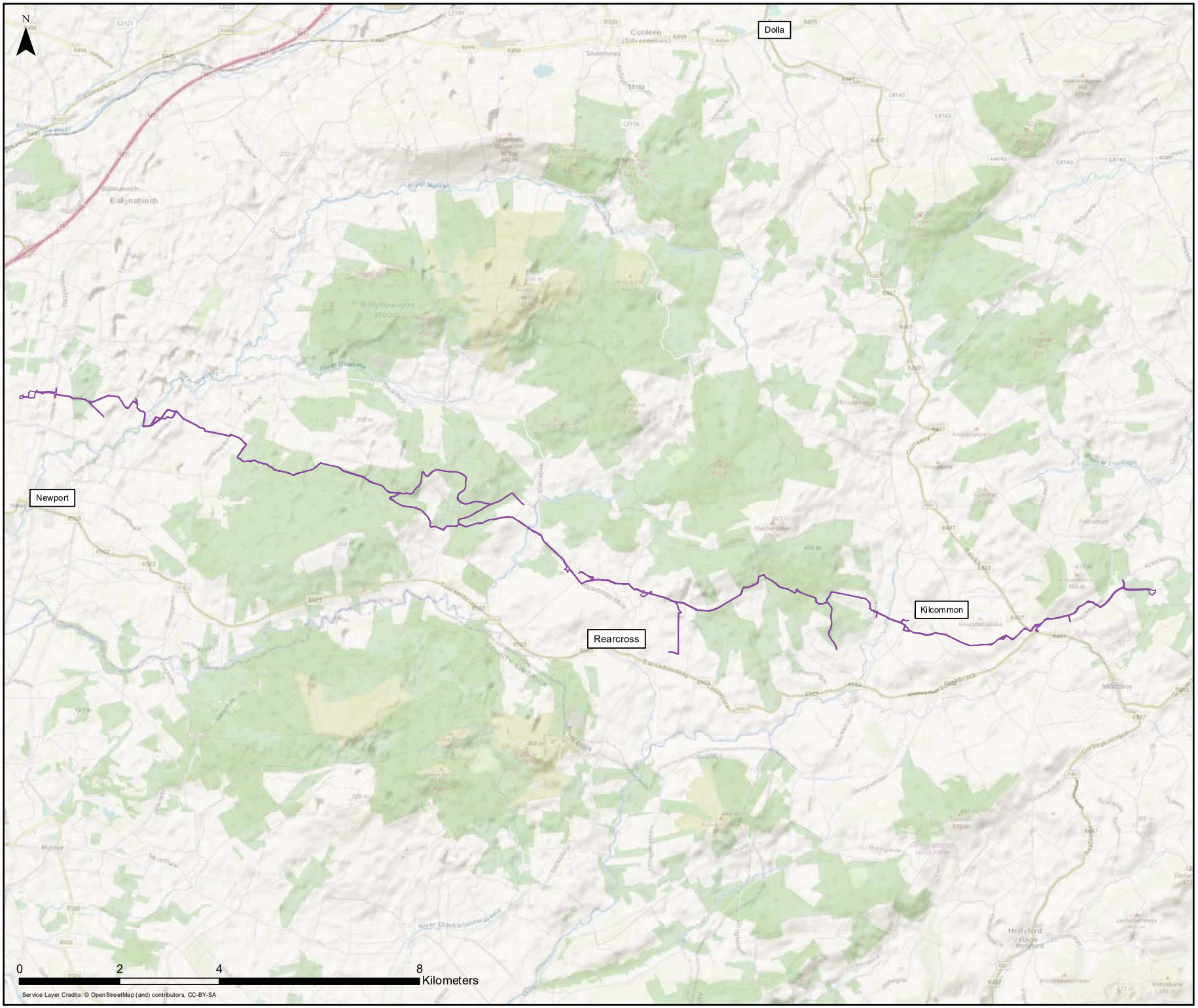

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.1:
UWF Grid Connection Location Map

Legend:

UWF Grid Connection Construction Works Area

For illustrative purposes only. Map not to scale

Disclaimer: Although presented in mapping, please note that the construction works boundary for the Consented Windfarm is included for illustrative purposes only as it is already subject to planning consent. For study area boundaries please see Figure 8.1, and the accompanying EIAR Biodiversity Chapter/Biodiversity Appendix.

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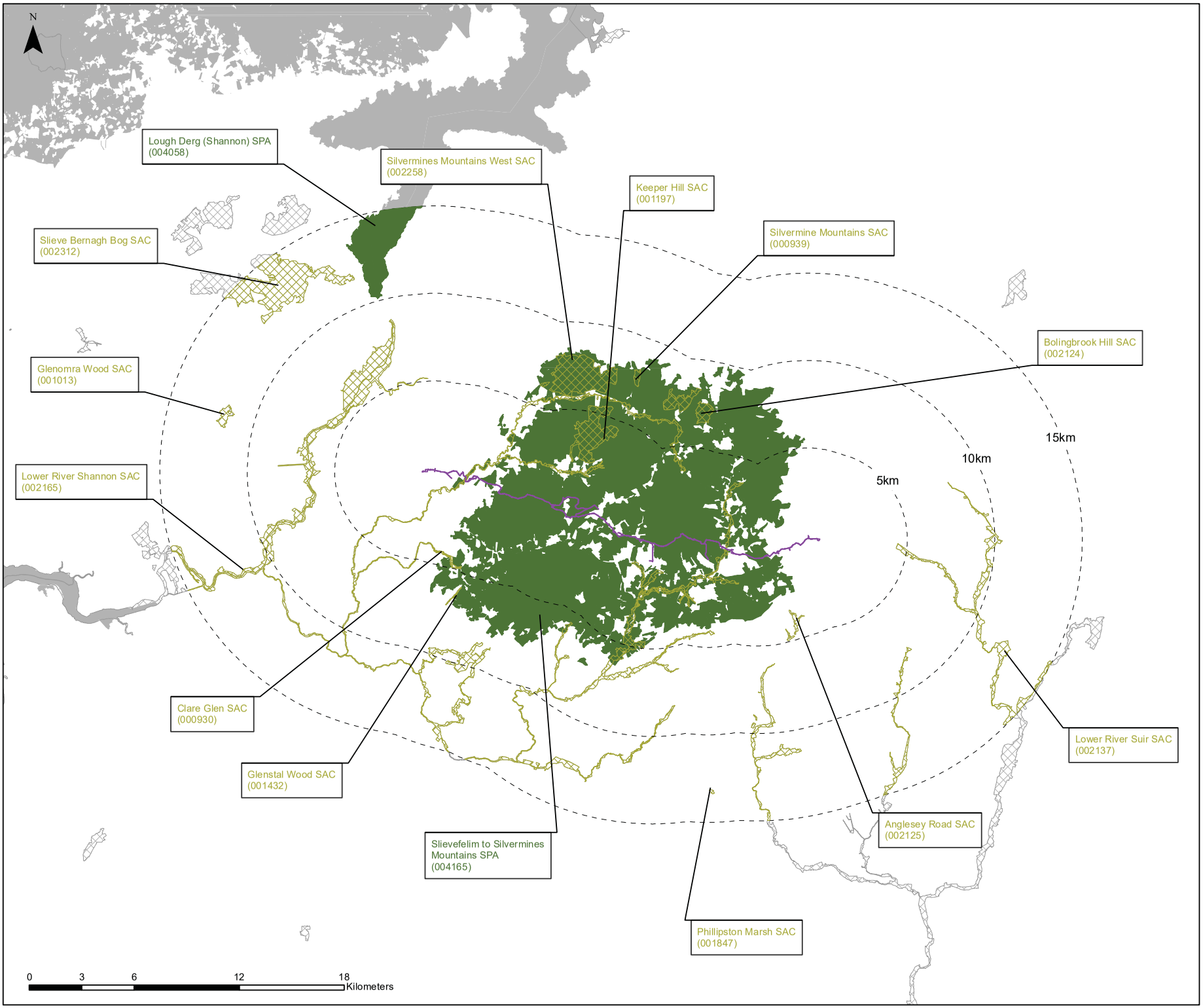

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.2:
European Sites within the
UWF Grid Connection Study Area

Legend:

- UWF Grid Conection Construction Works Area
- Special Areas of Conservation within 15km
- Special Protection Areas within 15km
- Grid Connection 5km, 10km, 15km Buffer

For illustrative purposes only. Map not to scale

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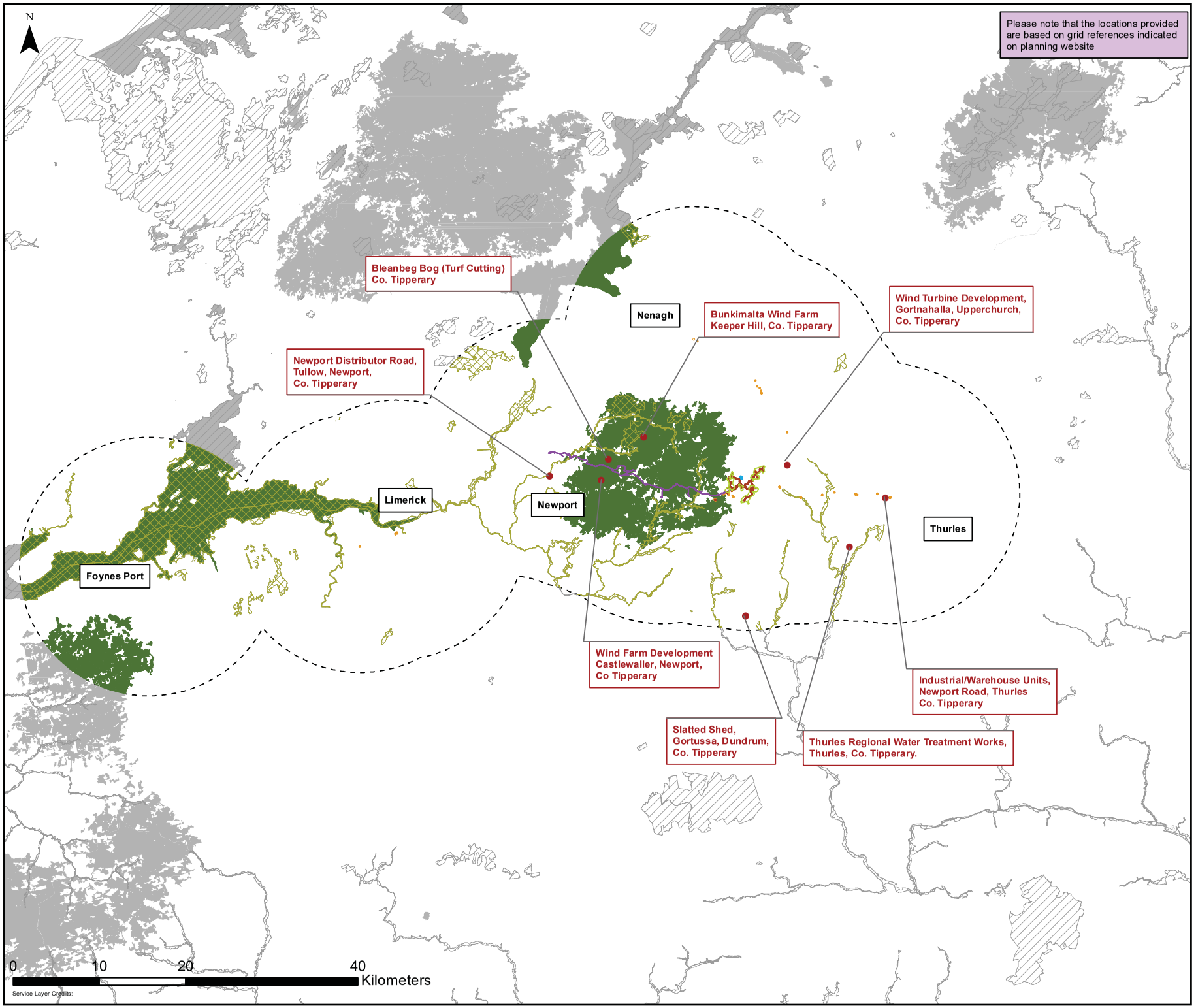

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure CE 8.2: European Sites within the Cumulative Evaluation Study Area

Legend:

- Projects/Activities
- Upperchurch Windfarm 2013 Study Area
- UWF Related Works Construction Works Area
- UWF Grid Connection Construction Works Area
- UWF Replacement Forestry Construction Works Area
- UWF Other Activities Construction Works Boundary
- Special Areas of Conservation within 15km
- Special Protection Areas within
- 15km Buffer (Designated European Sites)

* Forestry & Agriculture: Please see those map book figures which illustrate terrestrial habitats on aerial photography, for reference purposes with respect to the extent of Forestry and Agricultural lands.

** Please Refer to Natura Impact Statement in Volume E

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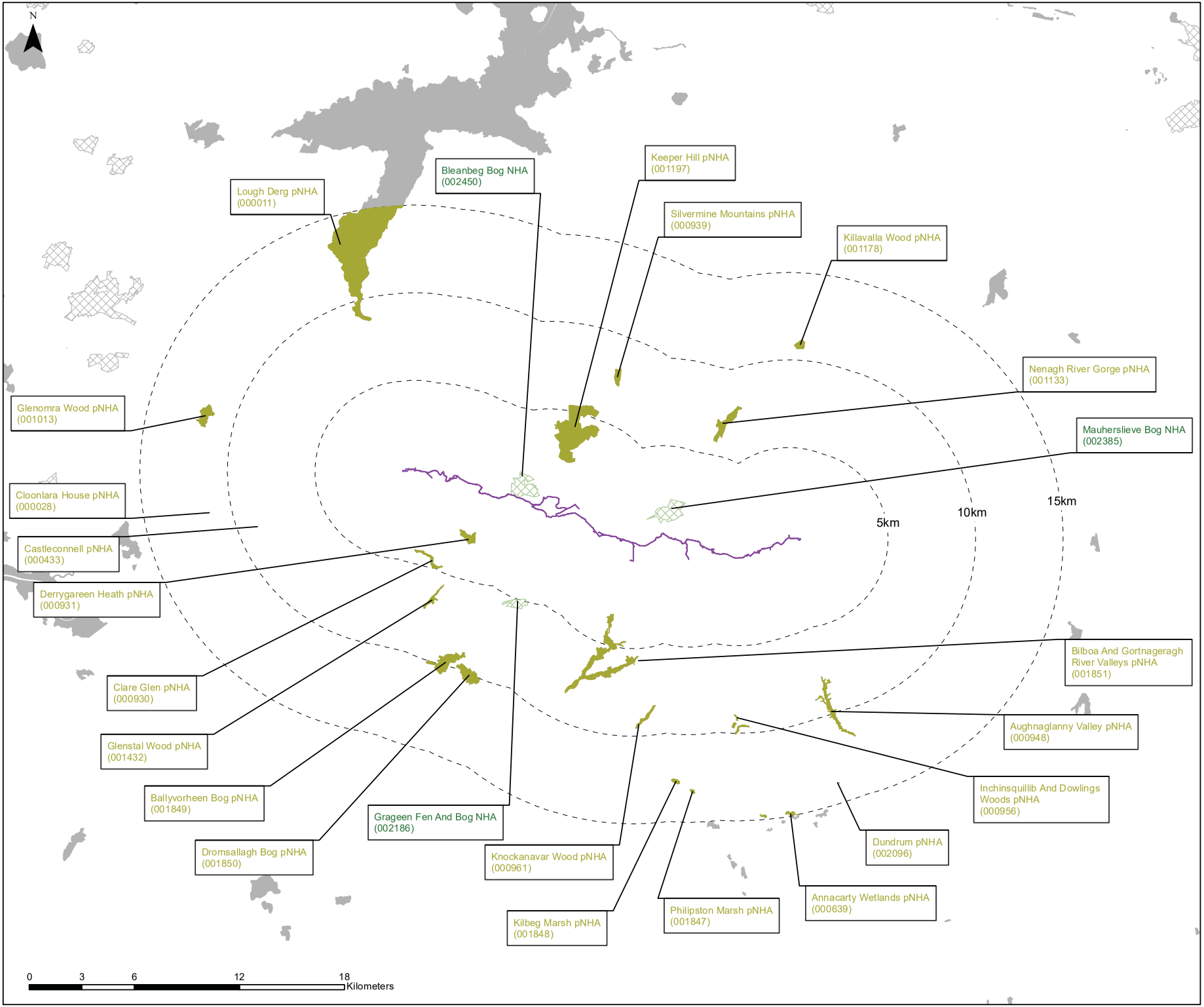

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.3: National Sites within the UWF Grid Connection Study Area

Legend:
- UWF Grid Conection Construction Works Area
- National Heratage Areas within 15km
- Proposed Natural Heritage Areas within 15km
- Grid Connection 5km, 10km, 15km Buffer

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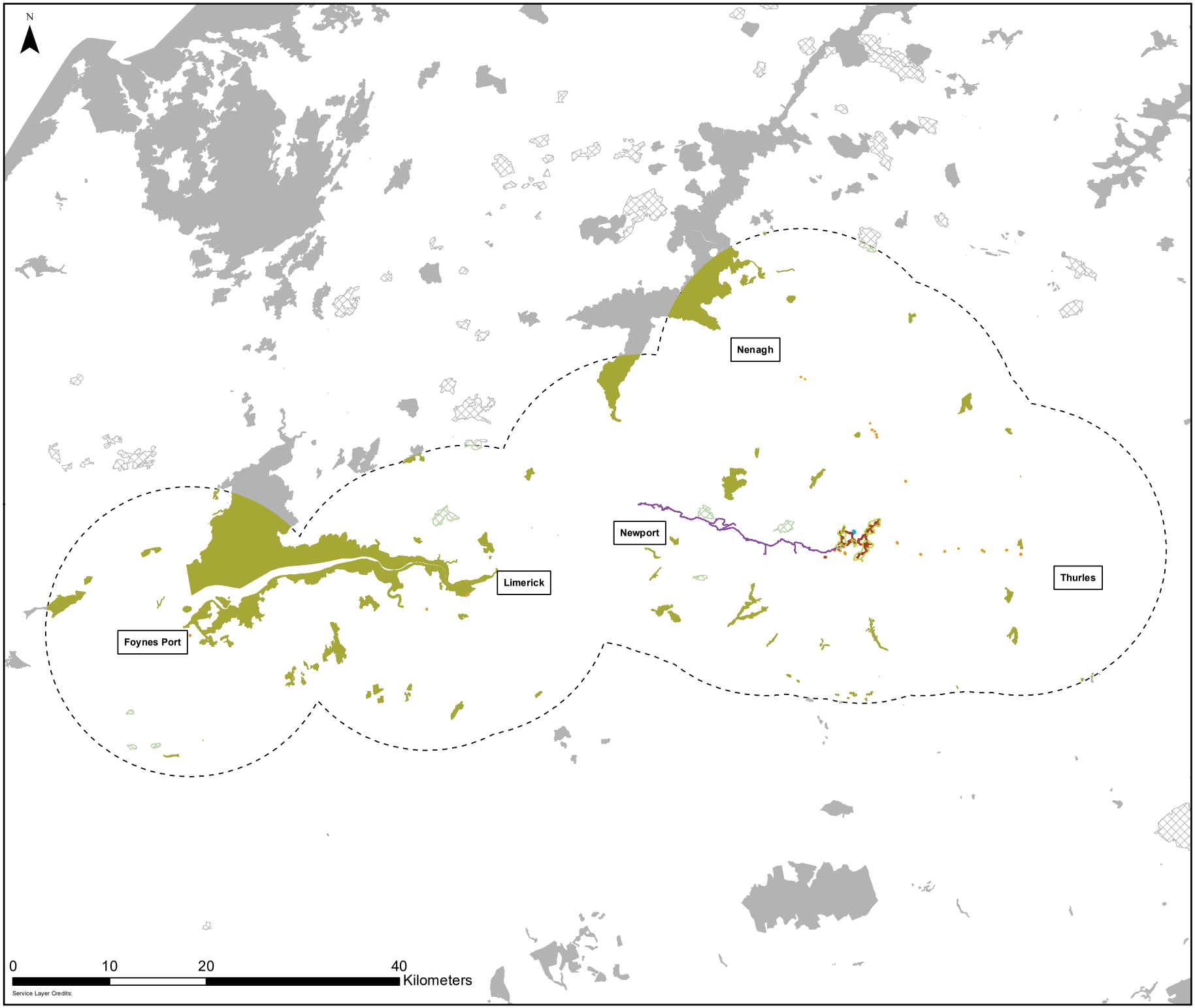

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure CE 8.3: National Sites within the Cumulative Evaluation Study Area

Legend:

- Upperchurch Windfarm 2013 Study Area
- UWF Related Works Construction Works Area
- UWF Grid Connection Construction Works Area
- UWF Replacement Forestry Construction Works Area
- UWF Other Activities Construction Works Boundary
- Proposed Natural Heritage Areas within 15km
- Natural Heritage Areas within 15km
- 15km Buffer (NHA and pNHA sites)

No Other Projects or Activities scoped in for evaluation

For illustrative purposes only. Map not to scale

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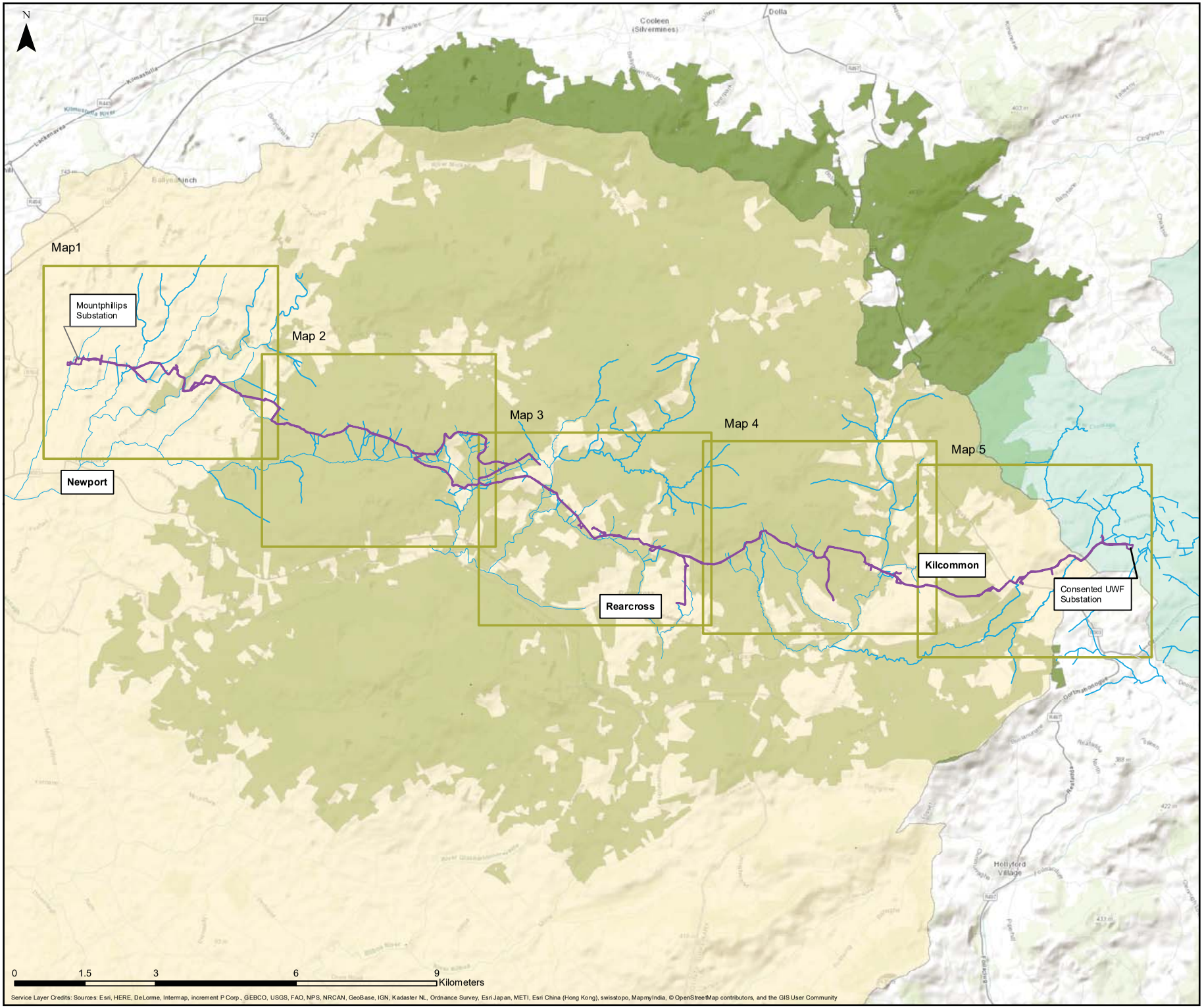

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.4:Aquatic Habitats & Species within the UWF Grid Connection Study Area. Overview Map

Legend:

- UWF Grid Conection Construction Works Area
- Watercourses
- Clodiagh River Catchment
- Mulkear River Catchment
- Slievefelim SPA

For illustrative purposes only. Map not to scale

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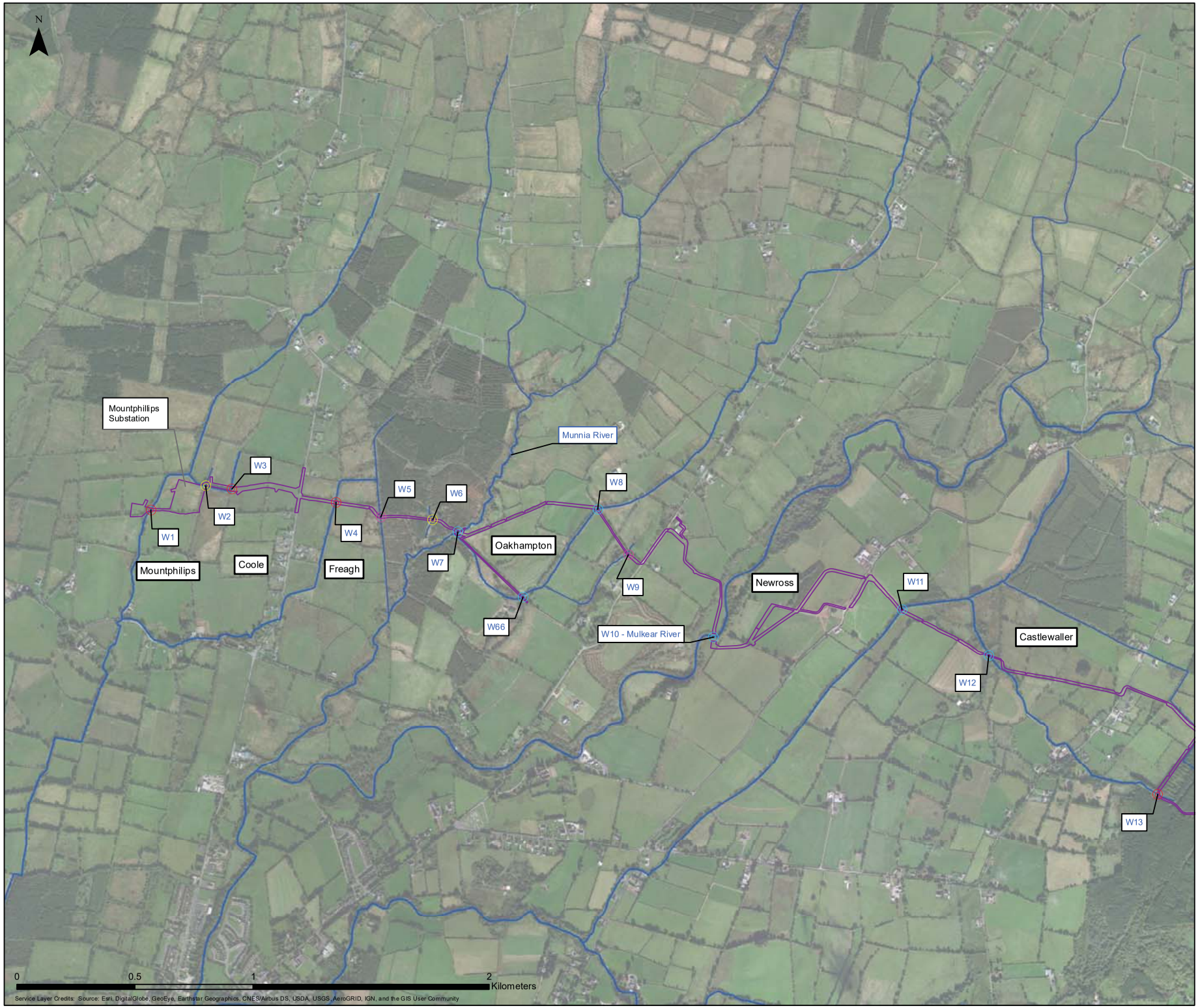

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:

Figure GC 8.4: Aquatic Habitats & Species within the UWF Grid Connection Study Area. Map 1 of 5

Legend:

W1 Grid Connection Water Crossing

Watercourses

UWF Grid Conection Construction Works Area

Watercourse Classification:

Class1

Class 2

Class 3

Class 4

See Chapter 8, Section 8.2.6.4: Tables 8.23, 8.24, and 8.25 for crossing locations fisheries evaluation

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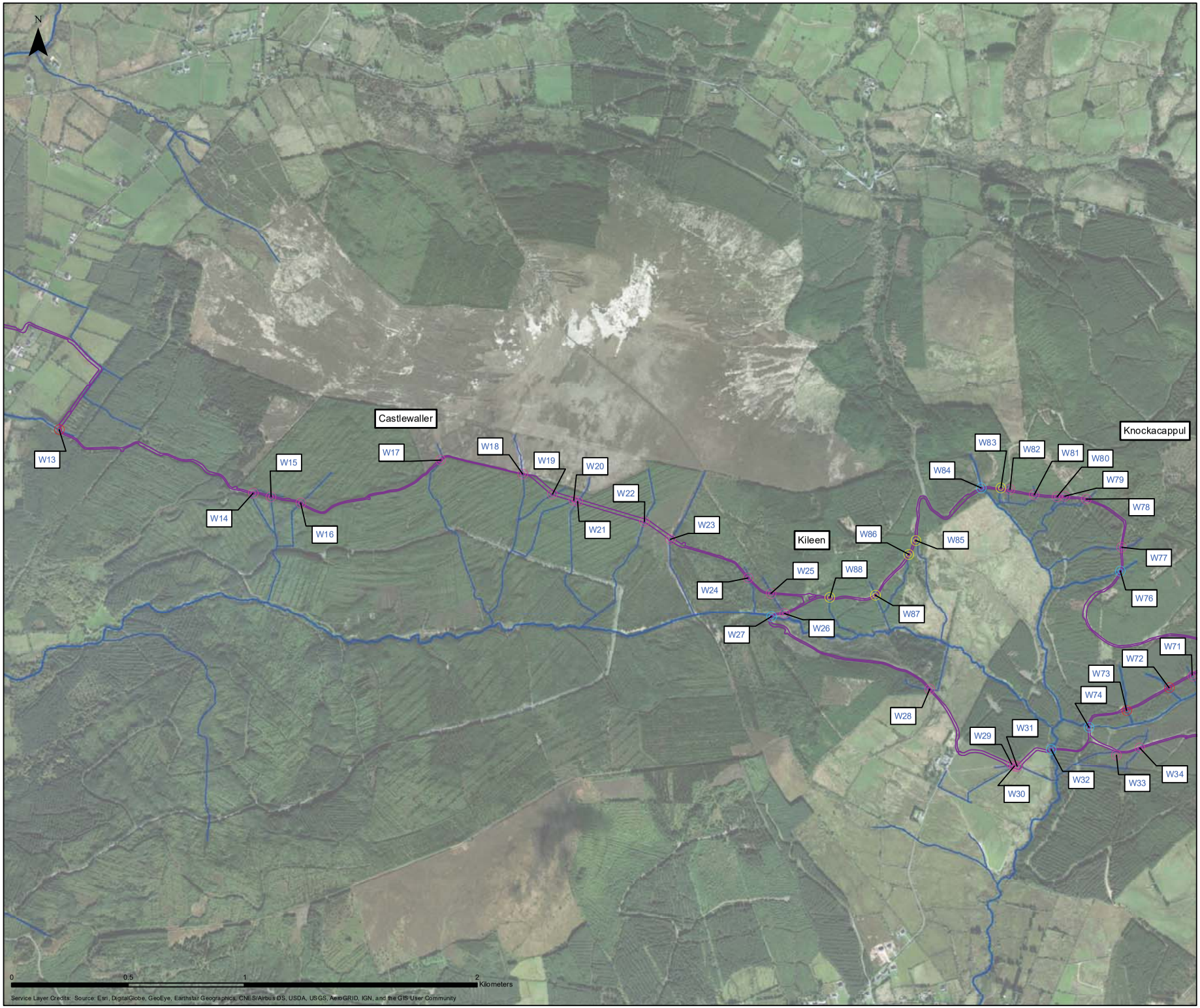

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.4: Aquatic Habitats & Species within the UWF Grid Connection Study Area. Map 2 of 5

Legend:

W1 Grid Connection Water Crossing

Watercourses

UWF Grid Conection Construction Works Area

Watercourse Classification:

Class1

Class 2

Class 3

Class 4

See Chapter 8, Section 8.2.6.4: Tables 8.23, 8.24, and 8.25 for crossing locations fisheries evaluation

For illustrative purposes only. Map not to scale

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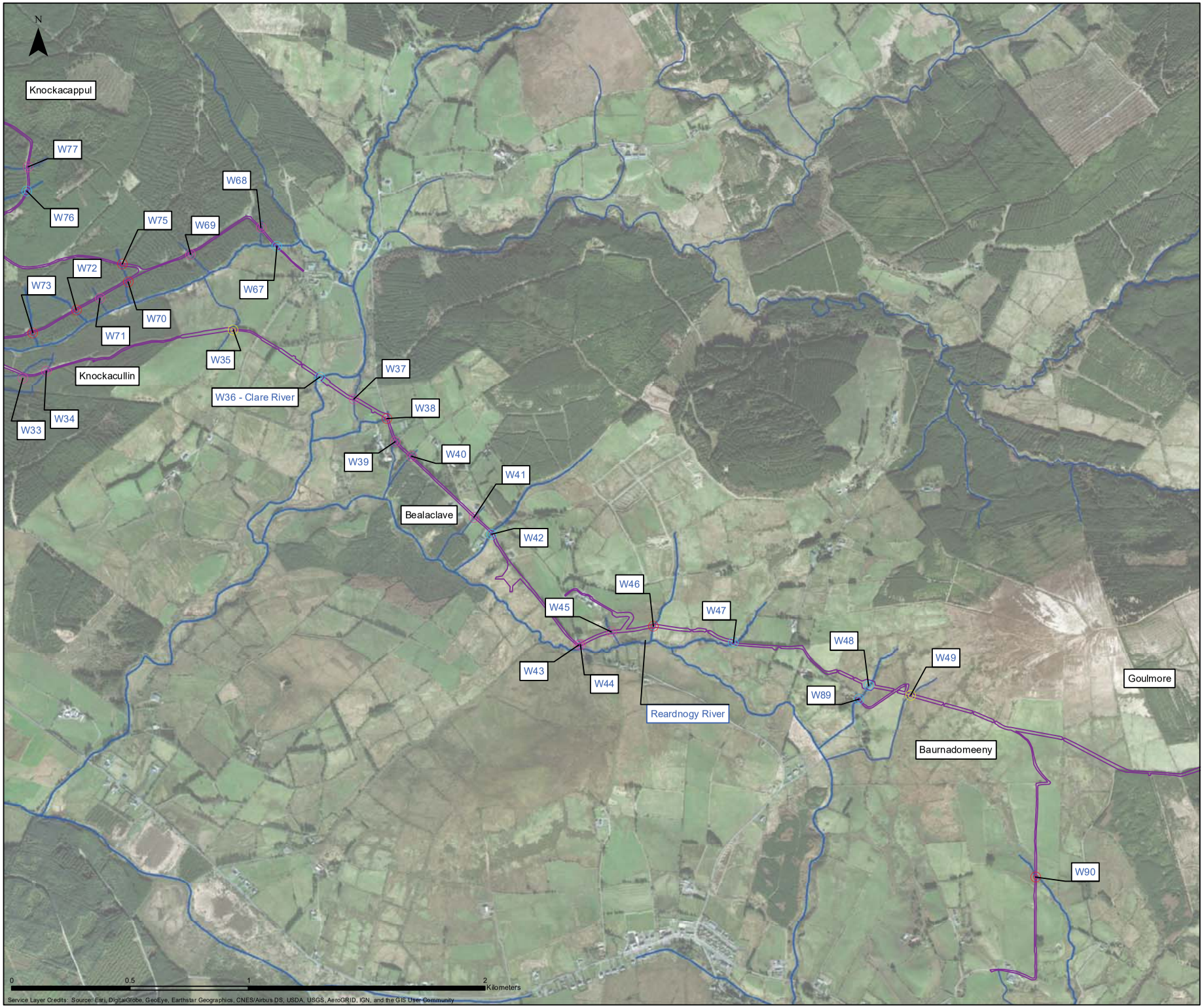

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.4: Aquatic Habitats & Species within the UWF Grid Connection Study Area. Map 3 of 5

Legend:

- W1 Grid Connection Water Crossing
- UWF Grid Conection Construction Works Area
- Watercourses

Watercourse Classification:

- Class1
- Class 2
- Class 3
- Class 4

See Chapter 8, Section 8.2.6.4: Tables 8.23, 8.24, and 8.25 for crossing locations fisheries evaluation

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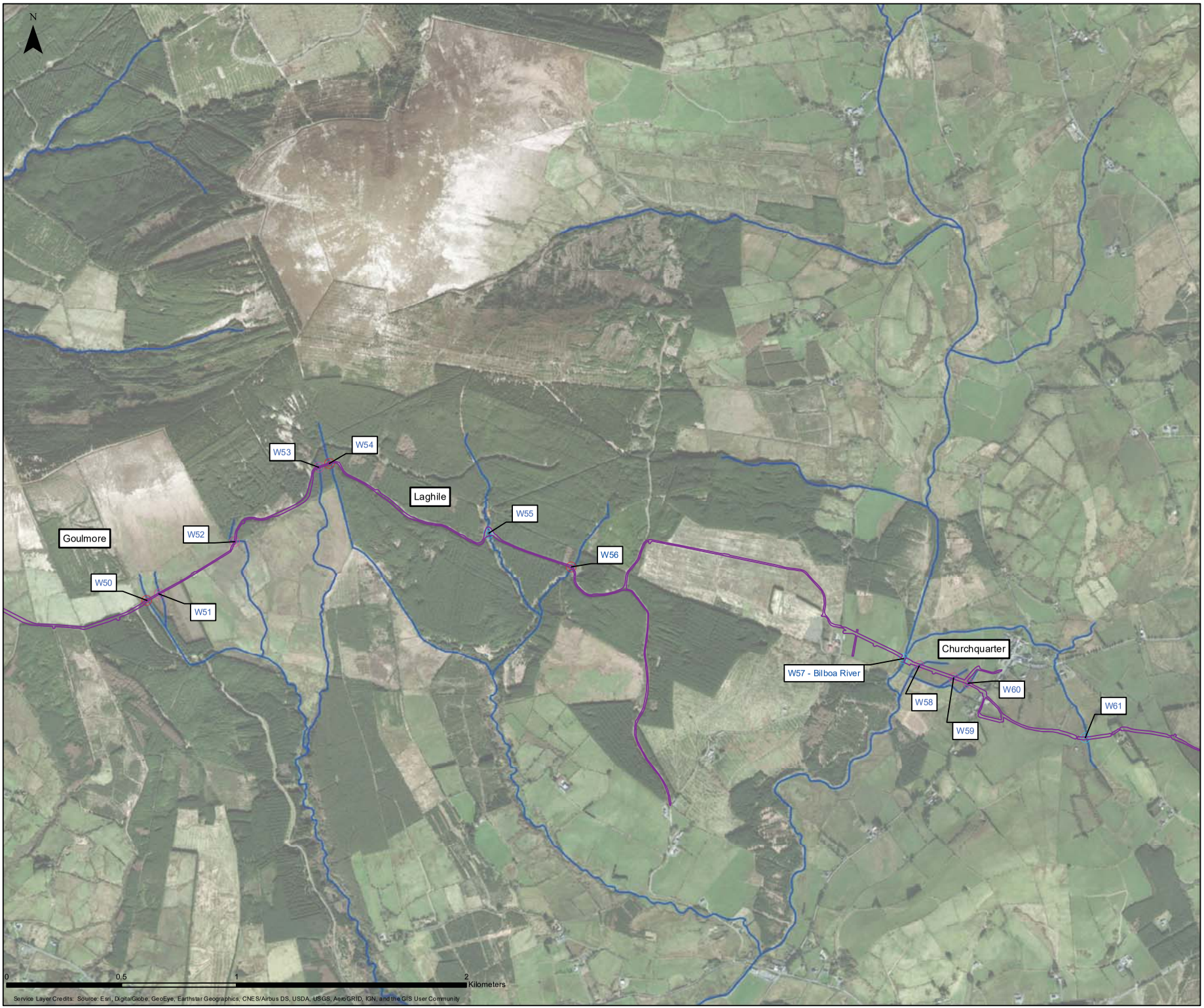

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:

Figure GC 8.4: Aquatic Habitats & Species within the UWF Grid Connection Study Area. Map 4 of 5

Legend:

- W1 — Grid Connection Water Crossing
- UWF Grid Conection Construction Works Area
- Watercourses

Watercourse Classification:

- Class1
- Class 2
- Class 3
- Class 4

See Chapter 8, Section 8.2.6.4: Tables 8.23, 8.24, and 8.25 for crossing locations fisheries evaluation

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Project: Whole Windfarm Project

Title:
Figure GC 8.4: Aquatic Habitats & Species within the UWF Grid Connection Study Area. Map 5 of 5

Legend:

- W1 — Grid Connection Water Crossing
- UWF Grid Conection Construction Works Area
- Watercourses

Watercourse Classification:

- Class1
- Class 2
- Class 3
- Class 4

See Chapter 8, Section 8.2.6.4: Tables 8.23, 8.24, and 8.25 for crossing locations fisheries evaluation

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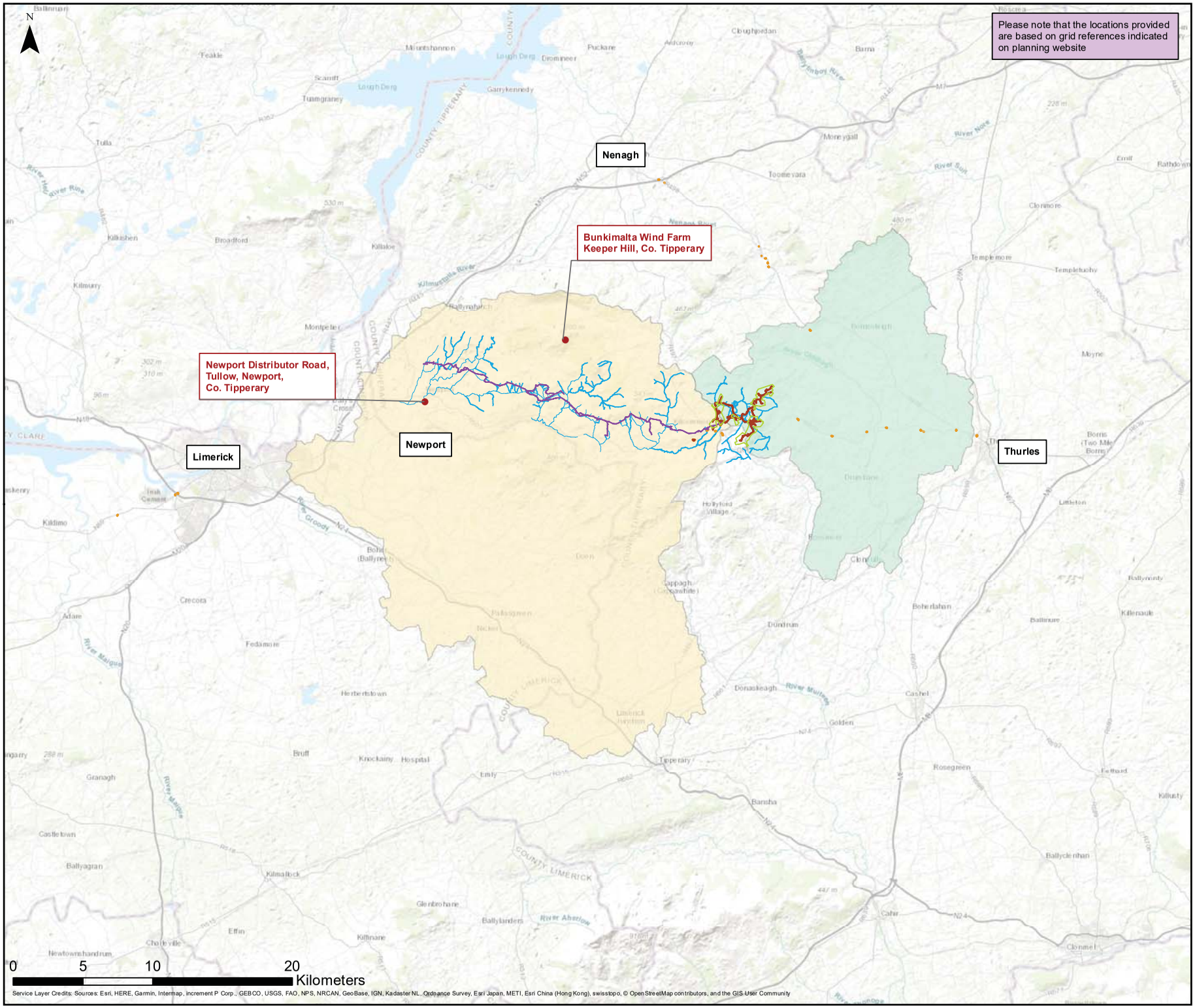

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure CE 8.4: Aquatic Habitats & Species within the Cumulative Evaluation Study Area

Legend:

- Project/Activities
- Upperchurch Windfarm 2013 Study Area
- UWF Related Works Construction Works Area
- UWF Grid Connection Construction Works Area
- UWF Replacement Forestry Construction Works Area
- UWF Other Activities Construction Works Boundary
- Watercourses
- Clodiagh River Catchment
- Mulkear River Catchment

For illustrative purposes only. Map not to scale

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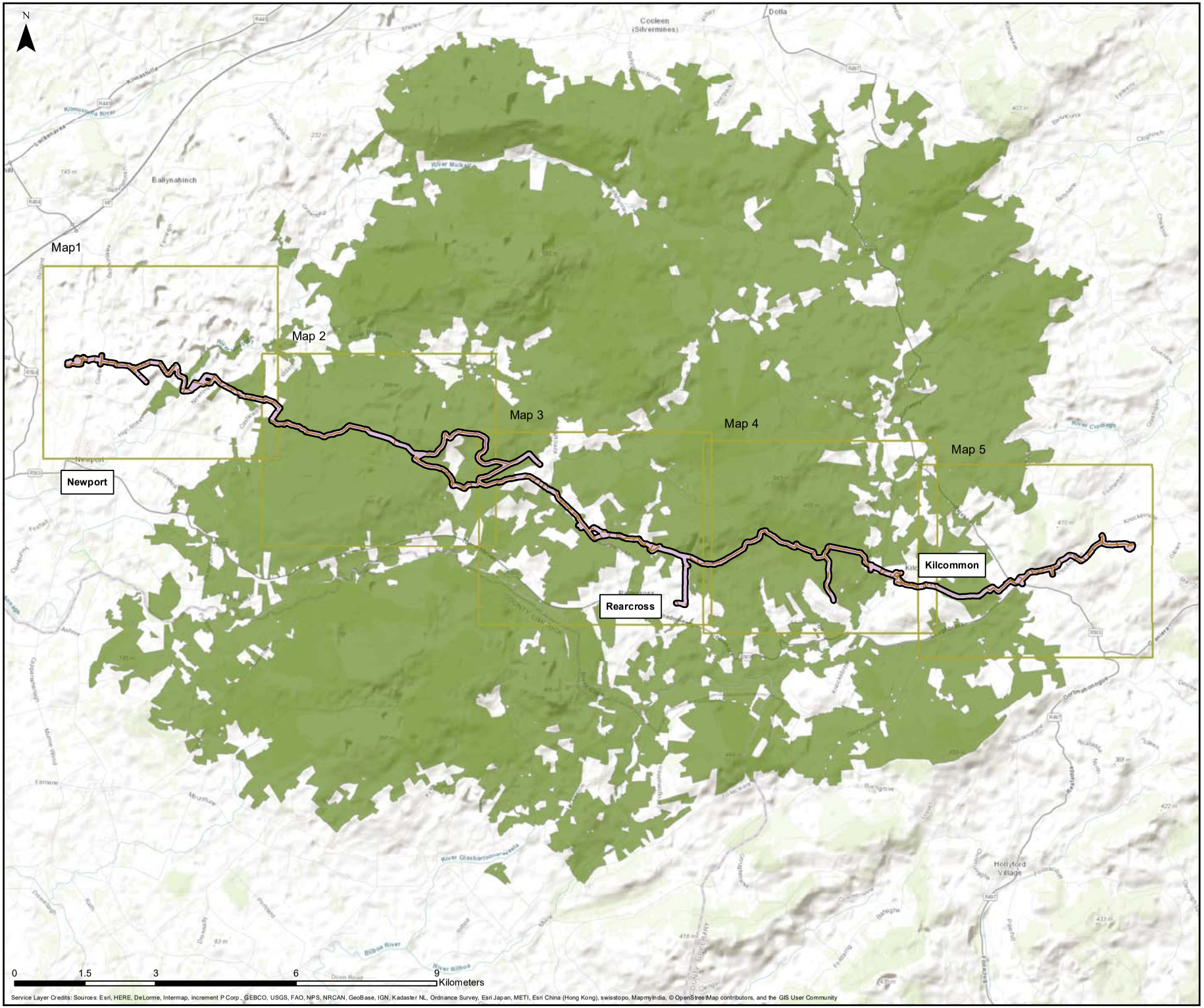

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.5: Terrestrial Habitats within the UWF Grid Connection Study Area. Overview Map

Legend:

- Study Area Boundary (50m)
- Linear Habitats
- Habitats
- Slievefelim SPA

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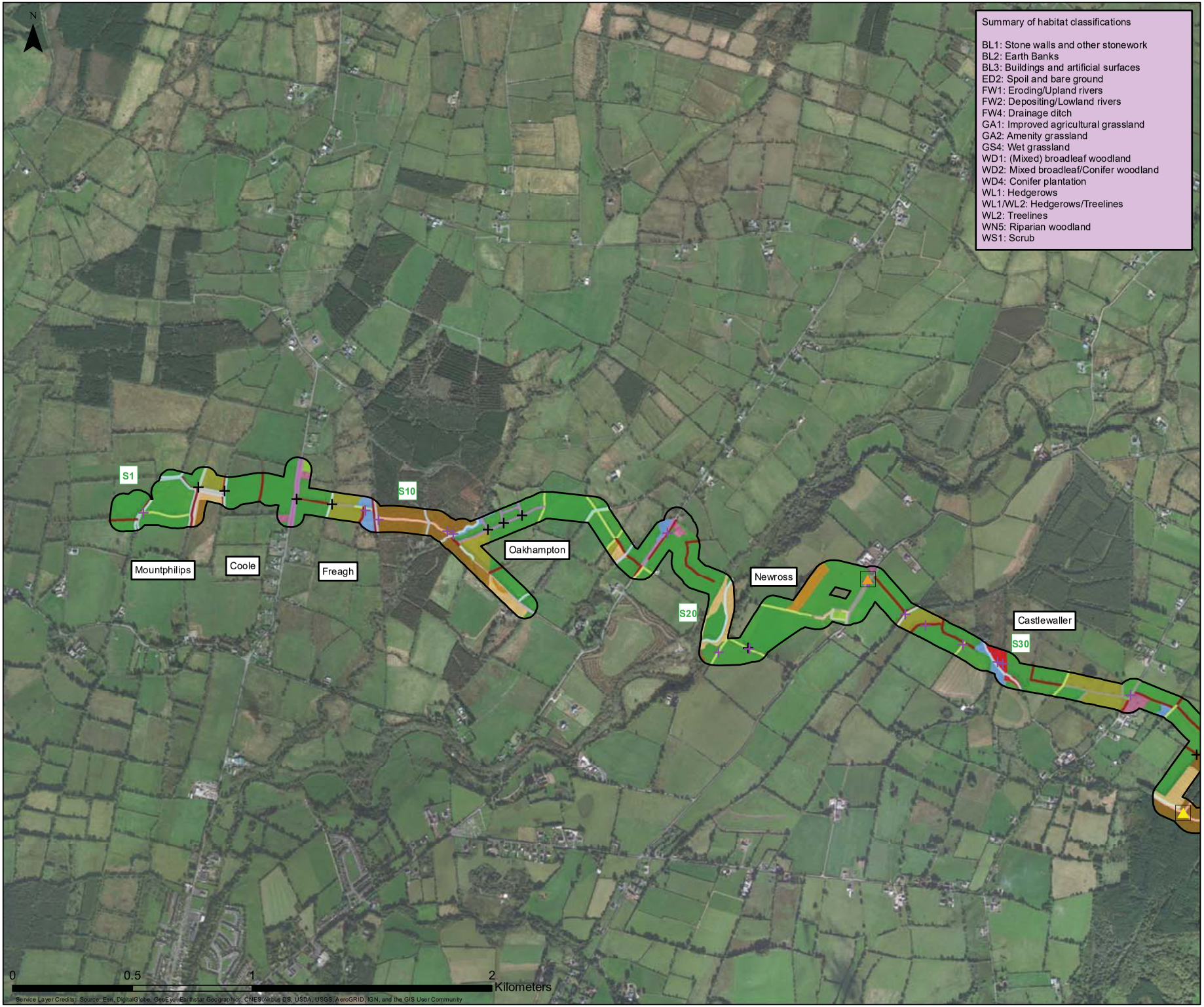

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.5: Terrestrial Habitats within the UWF Grid Connection Study Area. Map 1 of 5

Legend:

- BL3
- ED2
- GA1
- GA2
- GS4
- WD1
- WD2
- WD4
- WL2
- WN5
- WS1
- BL1
- BL2
- BL3
- ED2
- FW1
- FW2
- FW4
- WL1
- WL1/WL2
- WL2
- Study Area Boundary (50m)
- Himalayan Knotweed
- Japanese Knotweed
- Temporary hedge/tree removal and pruning
- Permanent hedge/tree removal
- S1 Section Number

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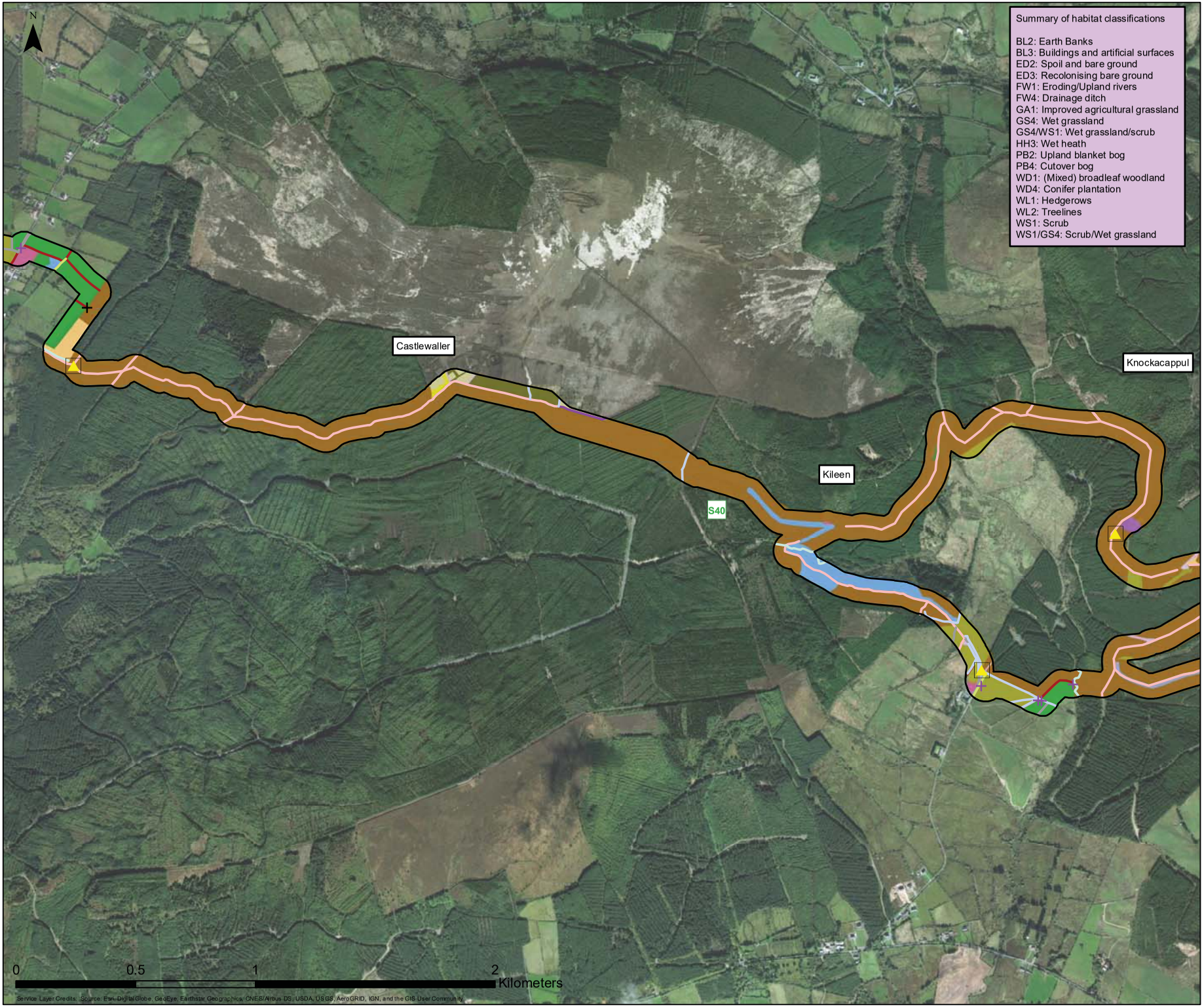

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.5: Terrestrial Habitats within the UWF Grid Connection Study Area. Map 2 of 5

Legend:

- BL3
- ED2
- ED3
- GA1
- GS4
- GS4/WS1
- HH3
- PB2
- PB4
- WD1
- WD4
- WS1
- WS1/GS4
- BL2
- ED2
- FW1
- FW4
- PB4
- WL1
- WL2
- Study Area Boundary (50m)
- Japanese Knotweed
- Temporary hedge/tree removal and pruning
- Permanent hedge/tree removal
- S1 Section Number

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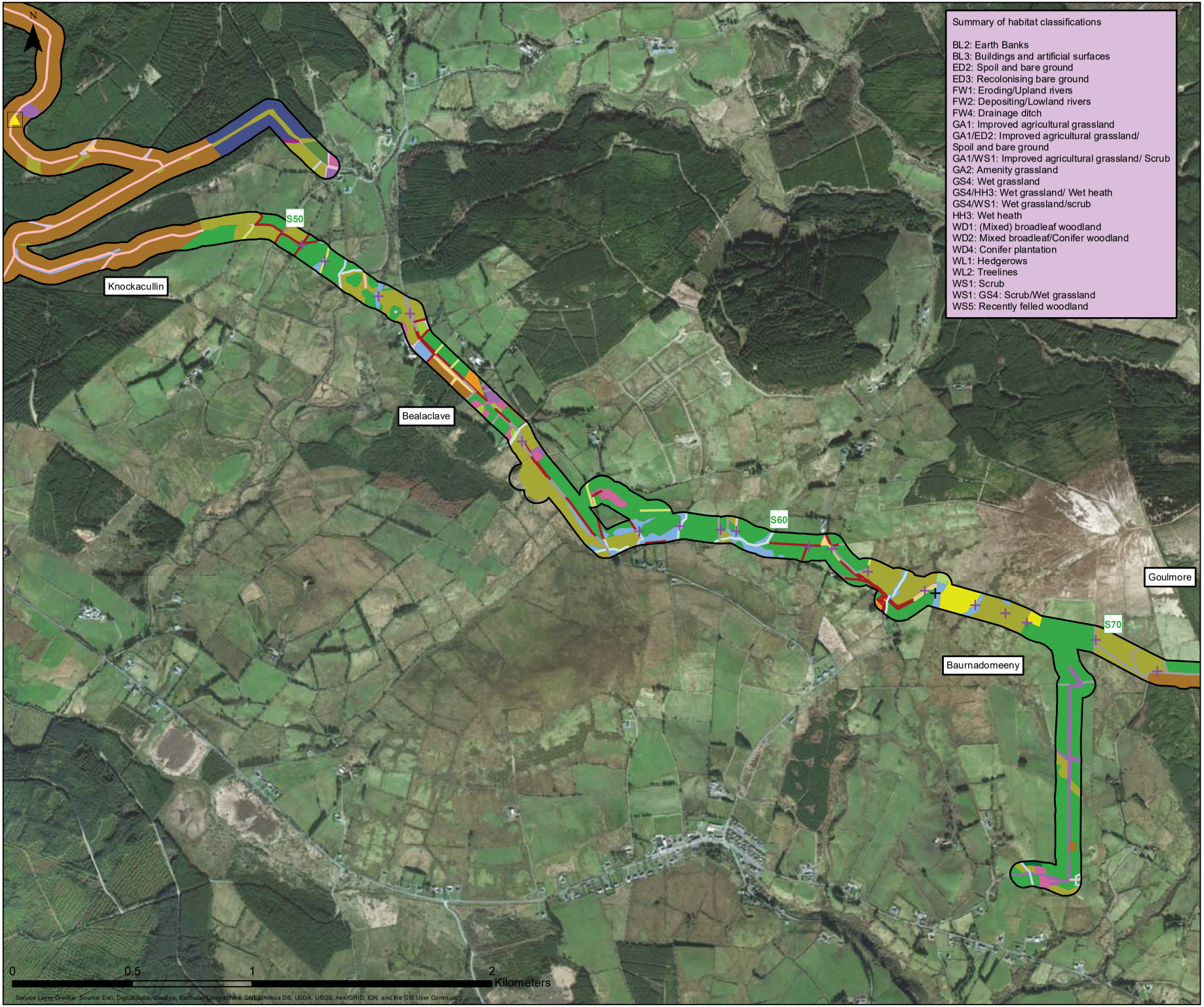

Summary of habitat classifications

BL2: Earth Banks
BL3: Buildings and artificial surfaces
ED2: Spoil and bare ground
ED3: Recolonising bare ground
FW1: Eroding/Upland rivers
FW2: Depositing/Lowland rivers
FW4: Drainage ditch
GA1: Improved agricultural grassland
GA1/ED2: Improved agricultural grassland/ Spoil and bare ground
GA1/WS1: Improved agricultural grassland/ Scrub
GA2: Amenity grassland
GS4: Wet grassland
GS4/HH3: Wet grassland/ Wet heath
GS4/WS1: Wet grassland/scrub
HH3: Wet heath
WD1: (Mixed) broadleaf woodland
WD2: Mixed broadleaf/Conifer woodland
WD4: Conifer plantation
WL1: Hedgerows
WL2: Treelines
WS1: Scrub
WS1: GS4: Scrub/Wet grassland
WS5: Recently felled woodland

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.5: Terrestrial Habitats within the UWF Grid Connection Study Area. Map 3 of 5

Legend:

- BL3
- ED2
- ED3
- FW2
- GA1
- GA1/ED2
- GA1/WS1
- GA2
- GS4
- GS4/HH3
- GS4/WS1
- HH3
- WD1
- WD2
- WD4
- WL1
- WL2
- WS1
- WS1/GS4
- WS5
- BL2
- BL3
- ED2
- FW1
- FW4
- WL1
- WL2
- Study Area Boundary (50m)
- Japanese Knotweed
- Temporary hedge/tree removal and pruning
- Permanent hedge/tree removal
- S1 Section Number

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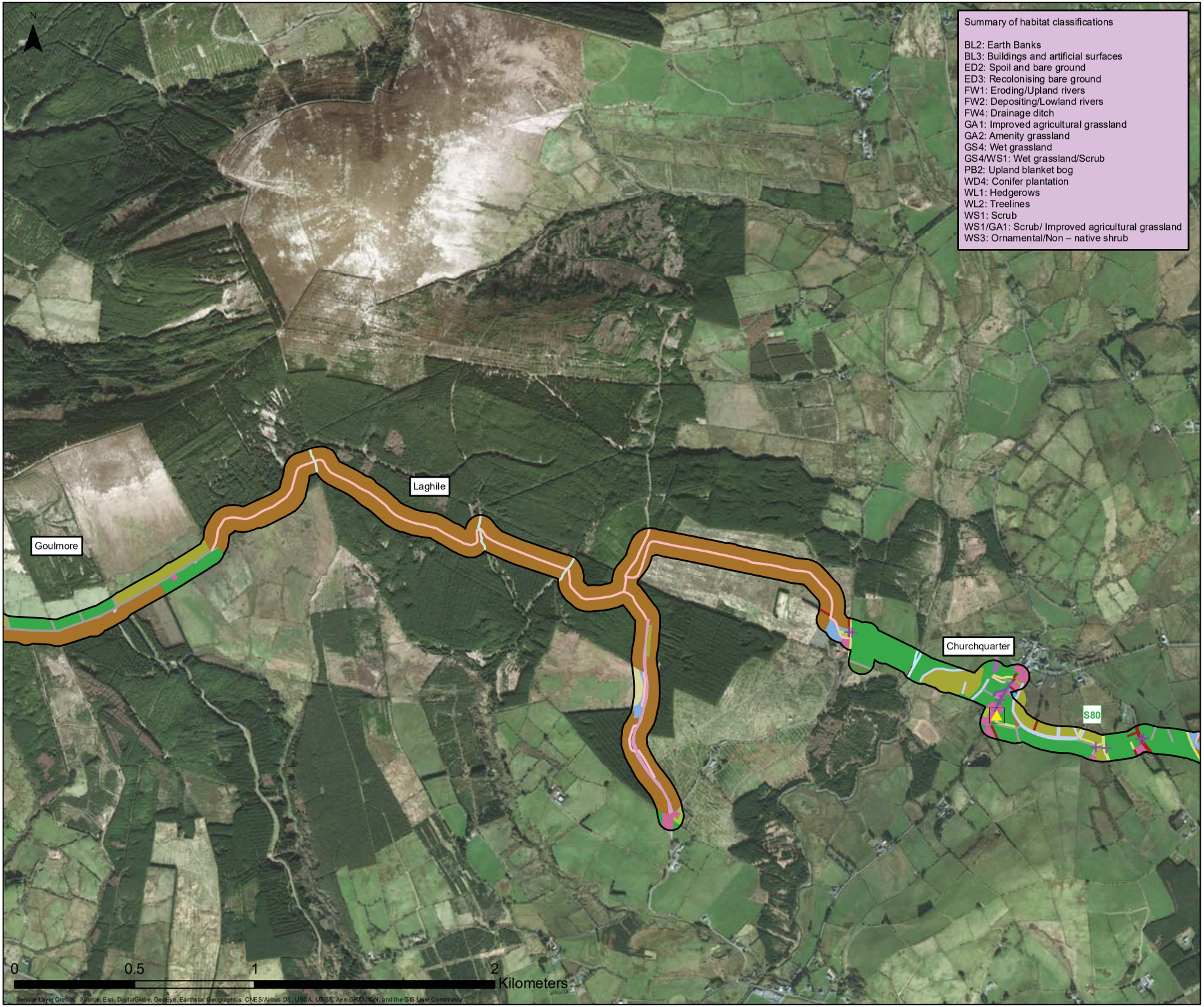

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.5: Terrestrial Habitats within the UWF Grid Connection Study Area. Map 4 of 5

Legend:

- BL2
- BL3
- ED2
- ED3
- GA1
- GA2
- GS4
- GS4/WS1
- PB2
- WD4
- WS1
- WS1/GA1
- Study Area Boundary
- Japanese Knotweed
- Temporary hedge/tree removal and pruning
- S1 Section Number

- BL2
- ED2
- FW1
- FW2
- FW4
- WL1
- WL2
- WS1
- WS3

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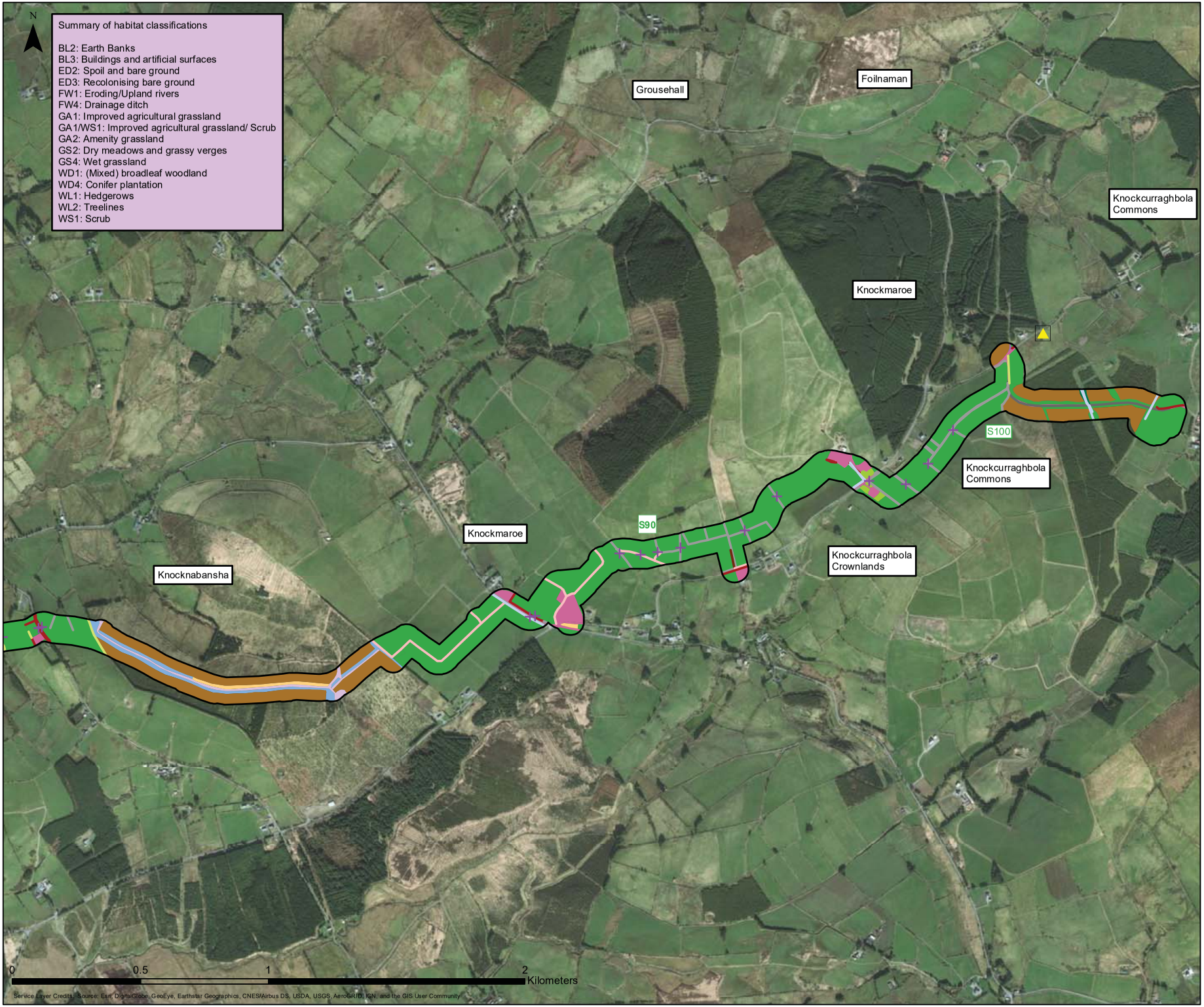

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.5: Terrestrial Habitats within the UWF Grid Connection Study Area. Map 5 of 5

Legend:

- BL3
- ED2
- ED3
- GA1
- GA1/WS1
- GA2
- GS4
- WD1
- WD4
- WS1
- BL2
- BL3
- ED2
- ED3
- FW1
- FW4
- GS2
- WL1
- WL2
- Study Area Boundary (50m)
- Japanese Knotweed
- Temporary hedge/tree removal and pruning
- S1 Section Number

For illustrative purposes only. Map not to scale

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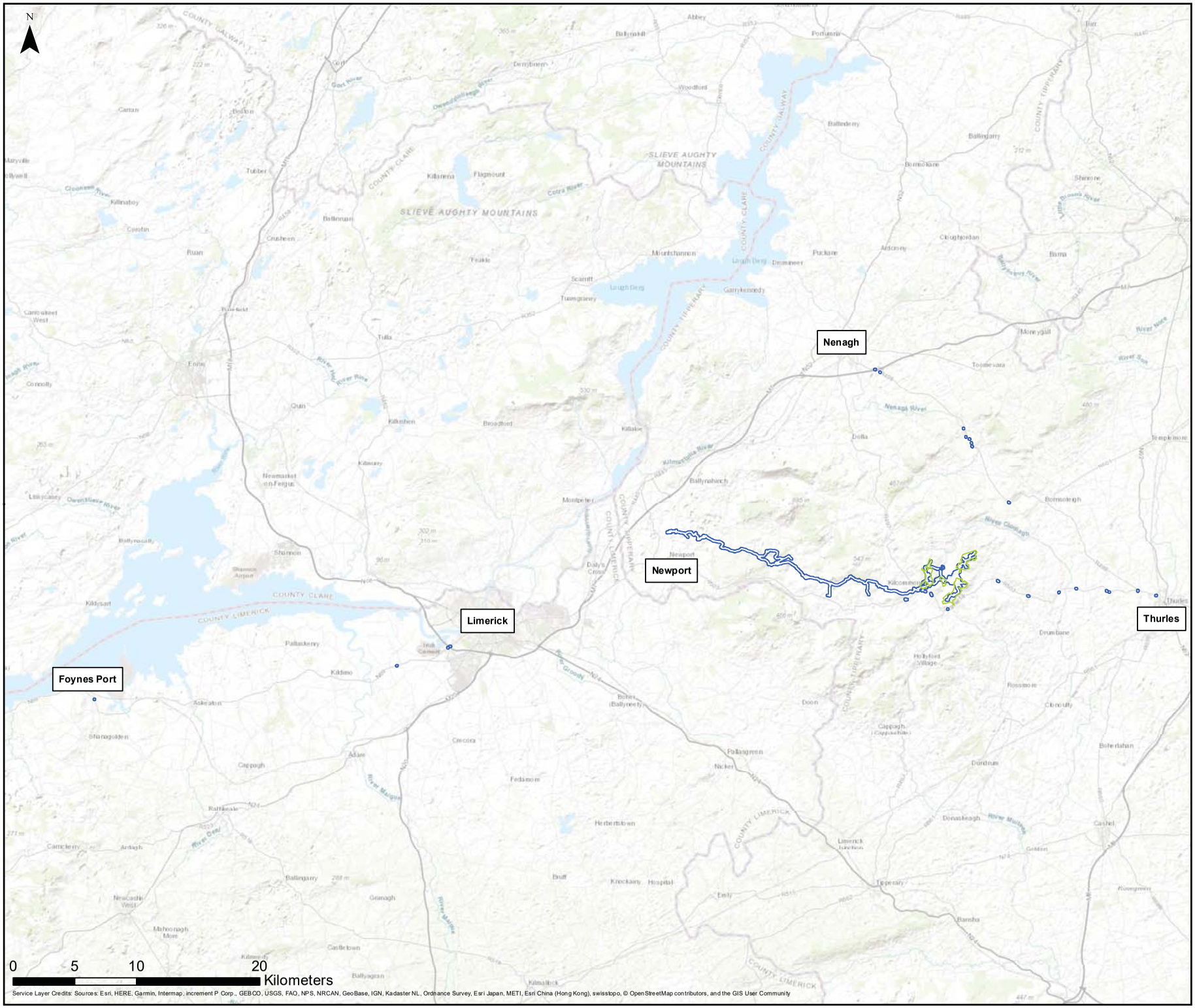

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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure CE 8.5: Terrestrial Habitats within the Cumulative Evaluation Study Area

Legend:

- Upperchurch Windfarm 2013 Study Area
- Habitats 100m Buffer

No Other Projects or Activities scoped in for evaluation

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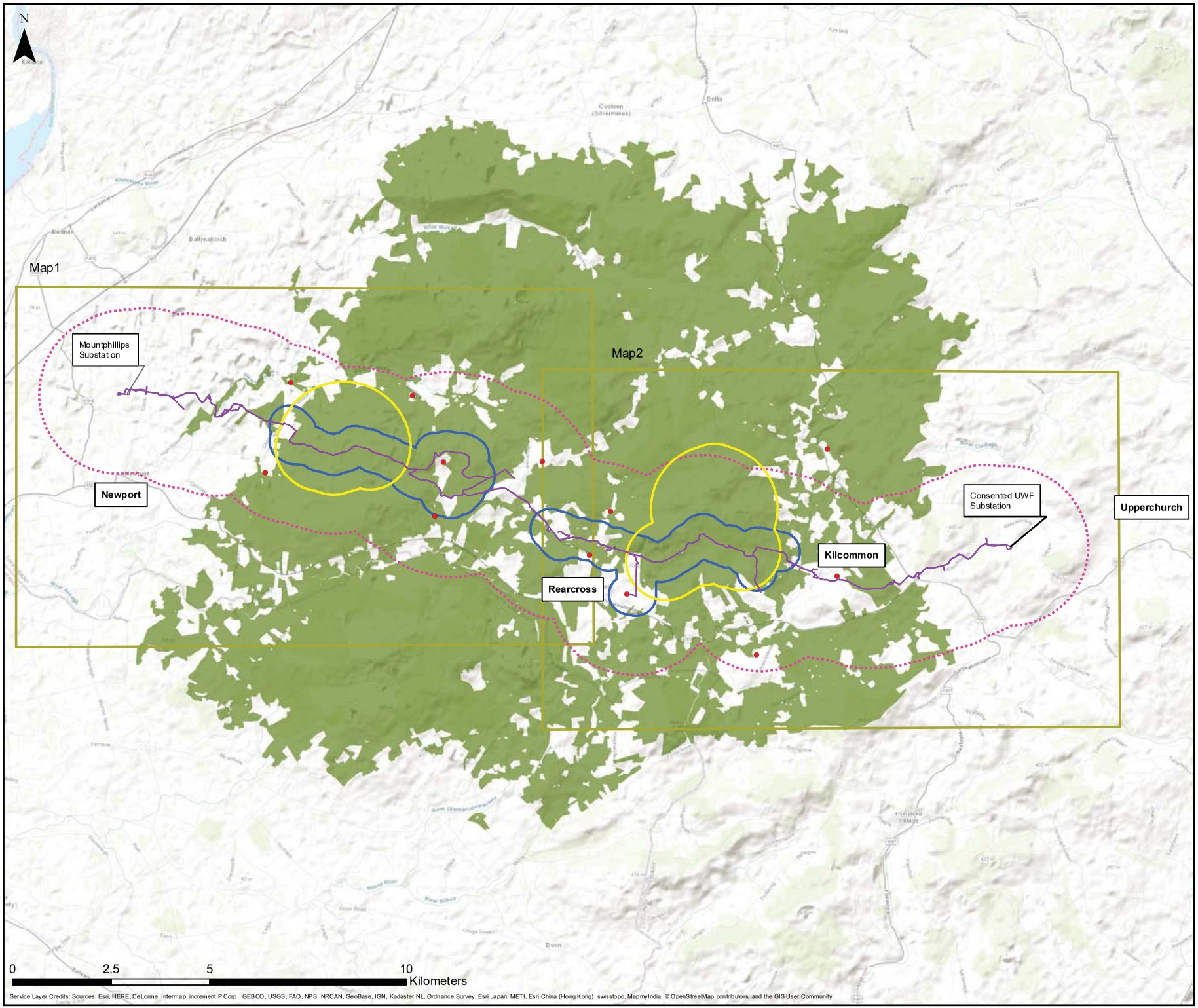

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.6: Hen Harrier within the UWF Grid Connection Study Area. Overview Map

Legend:

- UWF Grid Conection Construction Works Area
- Vantage Points
- Hen Harrier Study Area (2km)
- Winter Roosting Hen Harrier High Sensitivity Zone (1km)
- Breeding Hen Harrier High Sensitivity Zone (500m)
- Slievefelim SPA

For illustrative purposes only. Map not to scale

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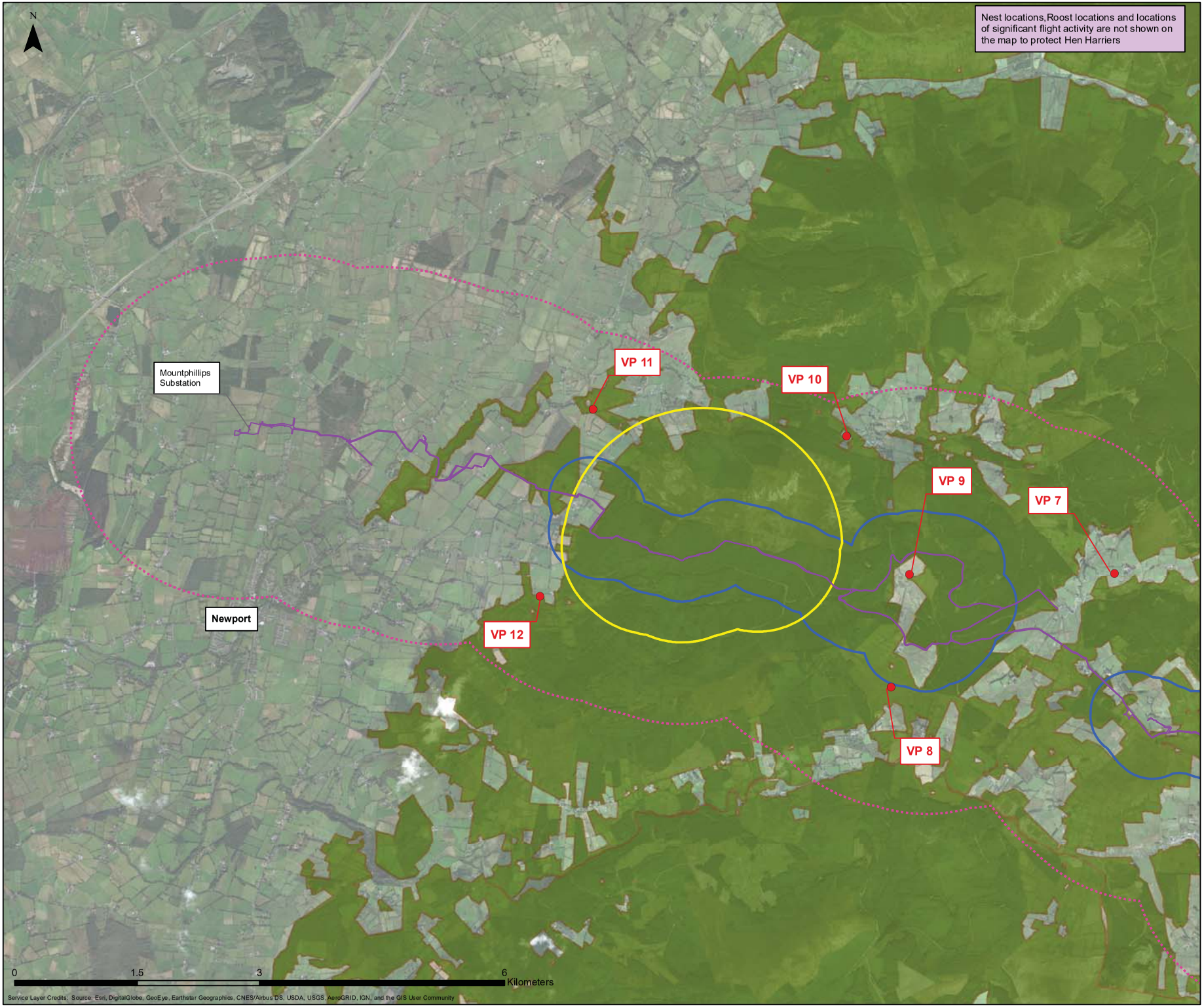

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.6: Hen Harrier within the UWF Grid Connection Study Area.
Map 1 of 2

Legend:

- UWF Grid Conection Construction Works Area
- Vantage Points
- Winter Roosting Hen Harrier High Sensitivity Zone (1km)
- Hen Harrier Study Area (2km)
- Breeding Hen Harrier High Sensitivity Zone (500m)
- Slievefelim SPA

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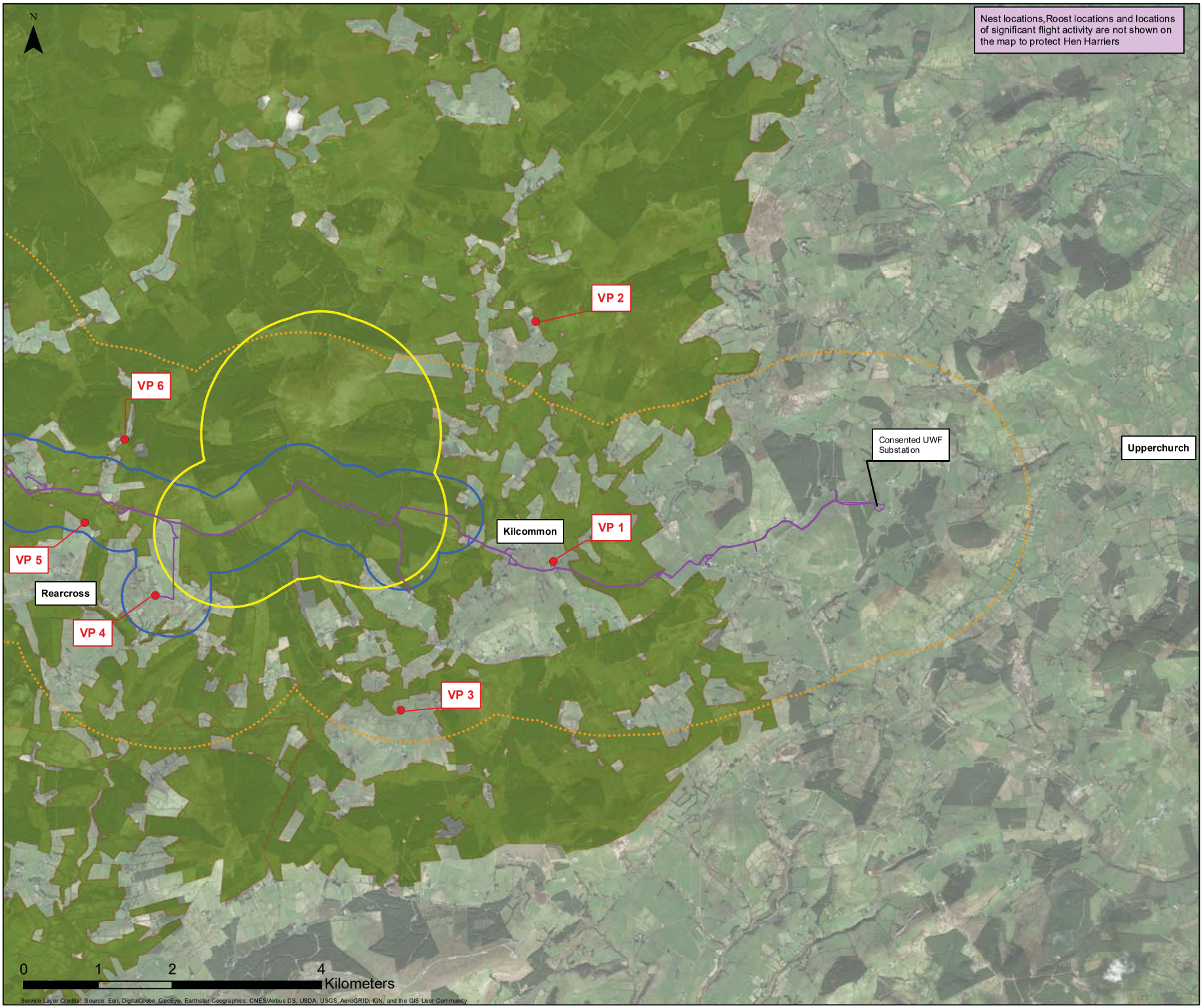

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.6: Hen Harrier within the UWF Grid Connection Study Area.
Map 2 of 2

Legend:

- UWF Grid Conection Construction Works Area
- Vantage Points
- Winter Roosting Hen Harrier High Sensitivity Zone (1km)
- Breeding Hen Harrier High Sensitivity Zone (500m)
- Hen Harrier Study Area (2km)
- Slievefelim SPA

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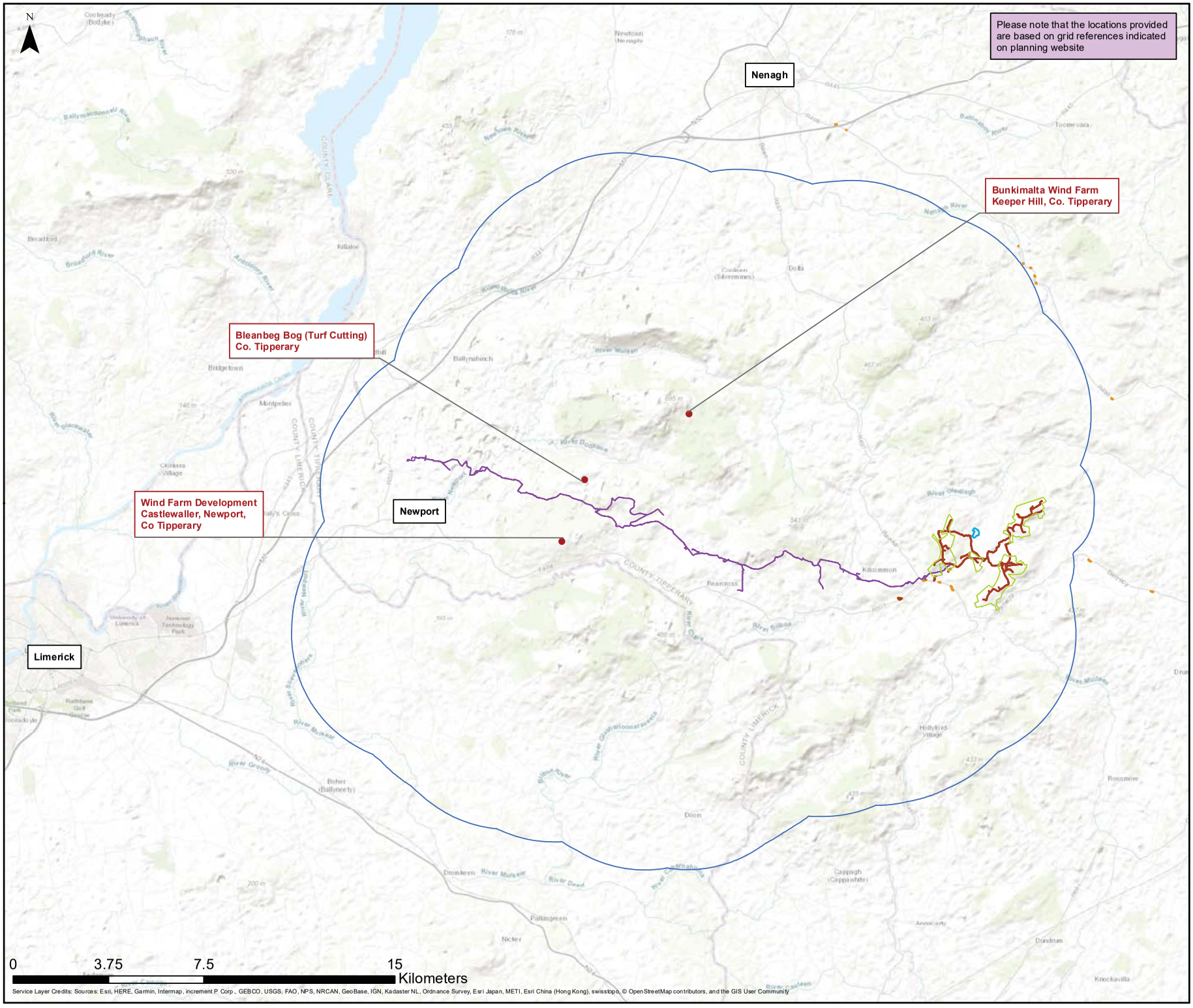

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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure CE 8.6: Hen Harrier within the Cumulative Evaluation Study Area

Legend:

- Projects/Activities
- Slievefelim to Silvermines Mountains SPA plus Consented Wind Farm plus 5 km Buffer (Hen Harrier)
- Upperchurch Windfarm 2013 Study Area
- UWF Related Works Construction Works Area
- UWF Grid Connection Construction Works Area
- UWF Replacement Forestry Construction Works Area
- UWF Other Activities Construction Works Boundary

* Forestry & Agriculture: Please see those map book figures which illustrate terrestrial habitats on aerial photography, for reference purposes with respect to the extent of Forestry and Agricultural lands.

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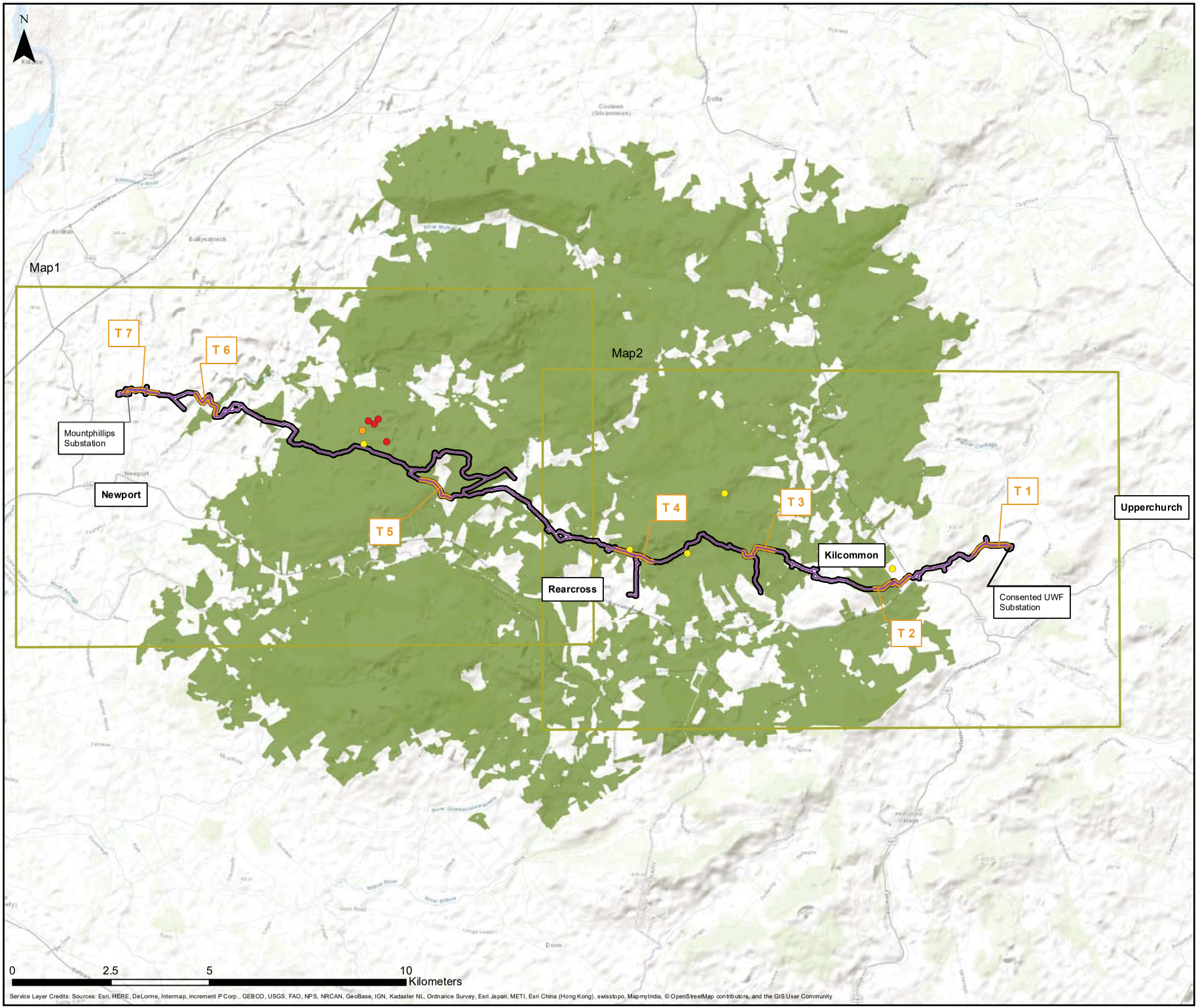

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.7: General Bird Species within the UWF Grid Connection Study Area. Overview Map

Legend:

- UWF Grid Conection Construction Works Area
- CBS Transects
- Study Area Boundary (50m)
- Slievefelim SPA
- T 1 Transect Number

Observations of Note:

- Curlew
- Golden Plover
- Red Grouse

For illustrative purposes only. Map not to scale

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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.7: General Bird Species within the UWF Grid Connection Study Area.
Map 1 of 2

Legend:

- UWF Grid Conection Construction Works Area
- CBS Transects
- Study Area Boundary (50m)
- Slievefelim SPA
- T 1 Transect Number

Observations of Note:

- Curlew
- Golden Plover
- Red Grouse

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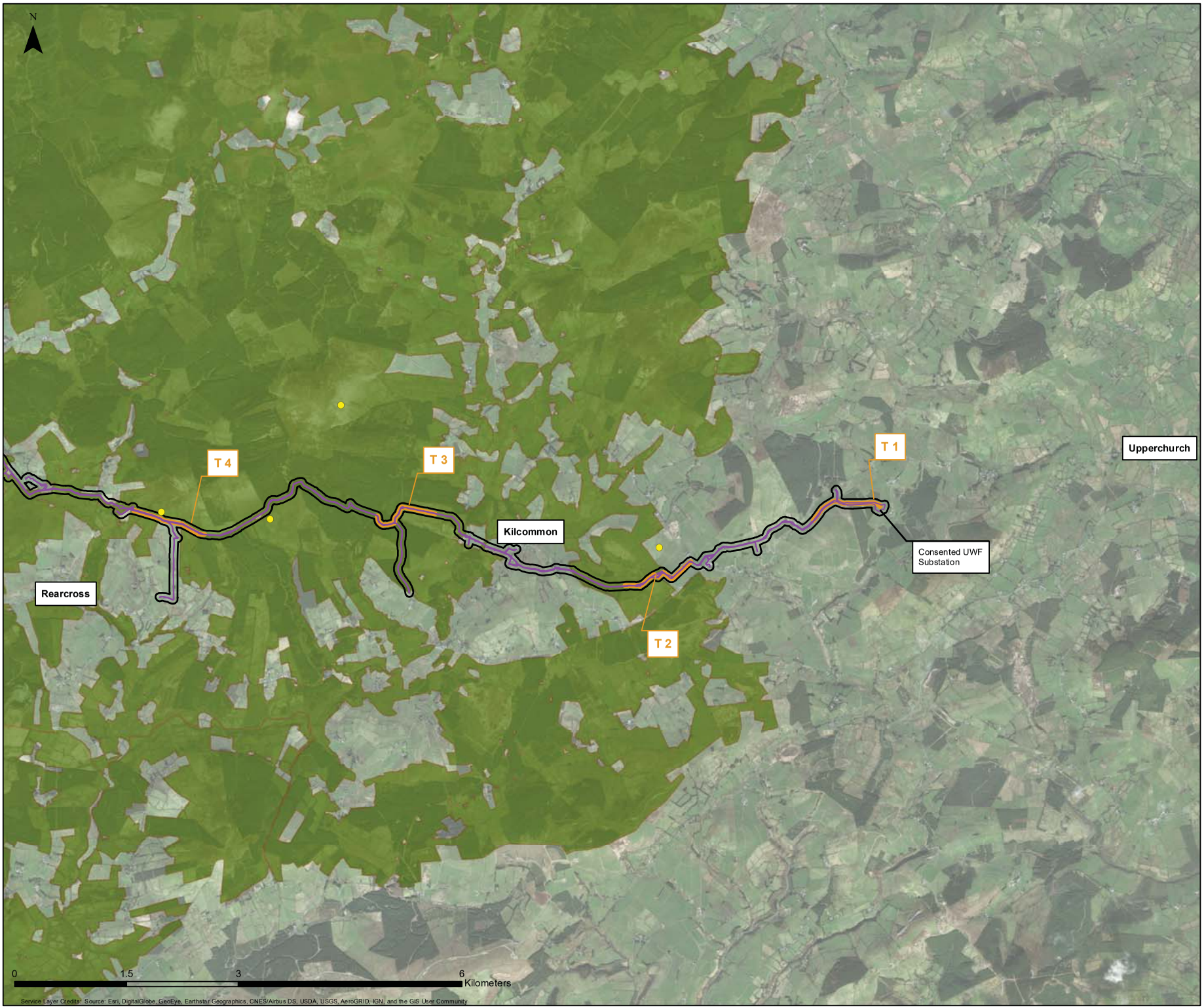

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.7: General Bird Species within the UWF Grid Connection Study Area.
Map 2 of 2

Legend:

- UWF Grid Conection Construction Works Area
- CBS Transects
- Study Area Boundary (50m)
- Slievefelim SPA
- T 1 Transect Number

Observations of Note:

- Golden Plover

For illustrative purposes only. Map not to scale

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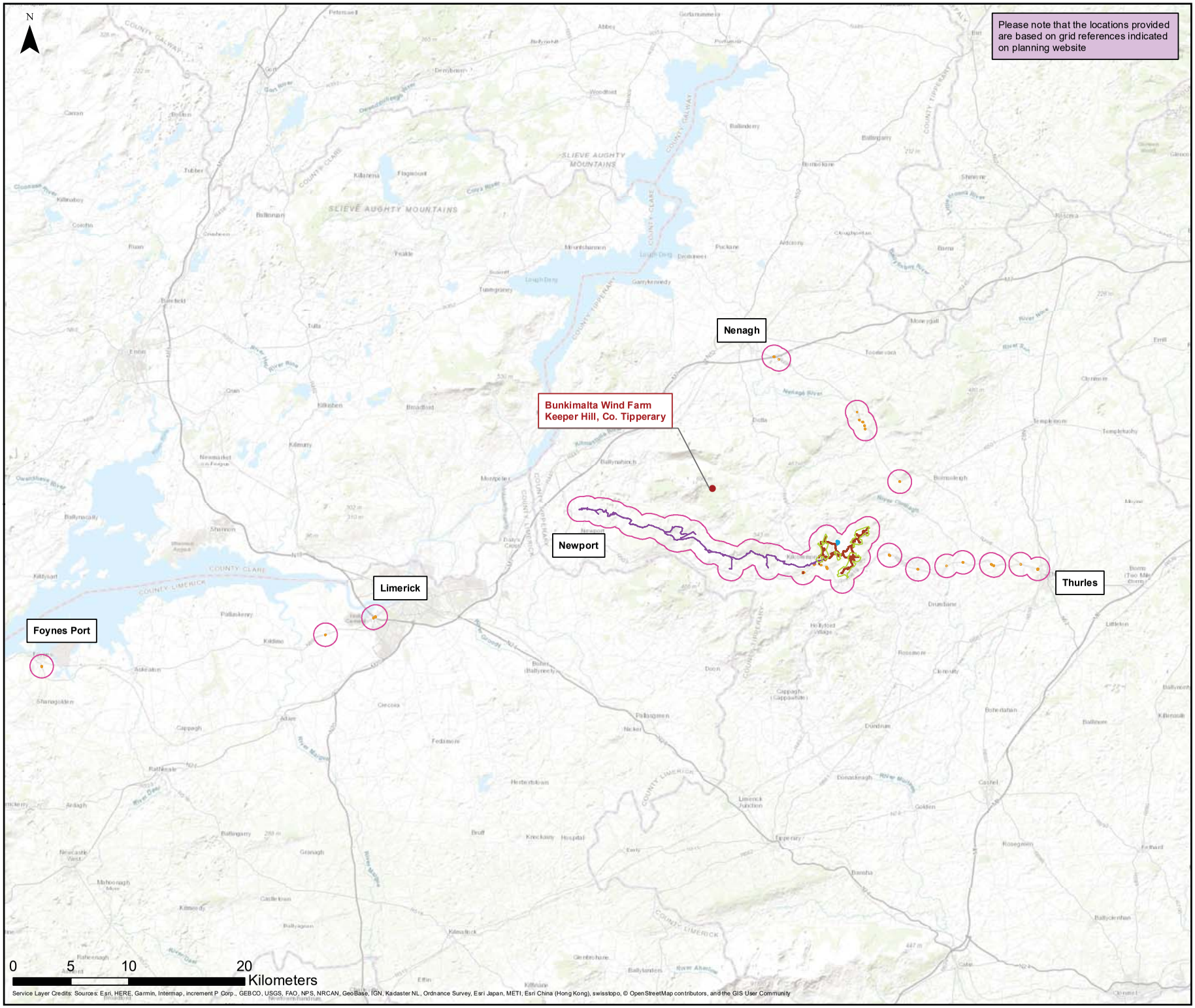

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure CE 8.7: General Bird Species within the Cumulative Evaluation Study Area

Legend:

- Project/Activities
- Upperchurch Windfarm 2013 Study Area
- UWF Related Works Construction Works Area
- UWF Grid Connection Construction Works Area
- UWF Replacement Forestry Construction Works Area
- UWF Other Activities Construction Works Boundary
- 1km Buffer (General Bird Species)

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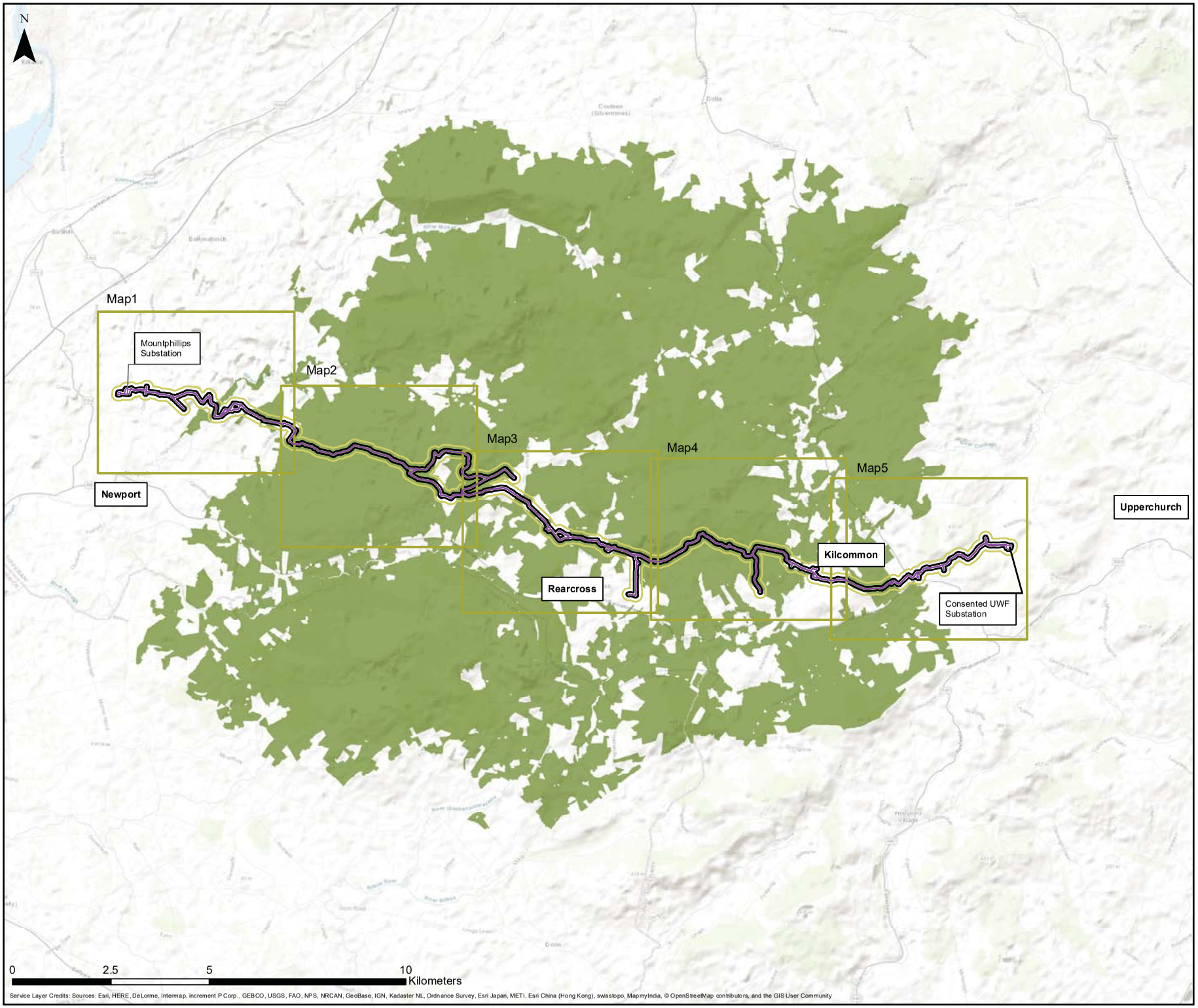

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.8: Bats within the UWF Grid Connection Study Area.
Overview Map

Legend:

- UWF Grid Conection Construction Works Area
- Study Area Boundary (150m)
- Study Area Boundary (50m)
- Slievefelim SPA

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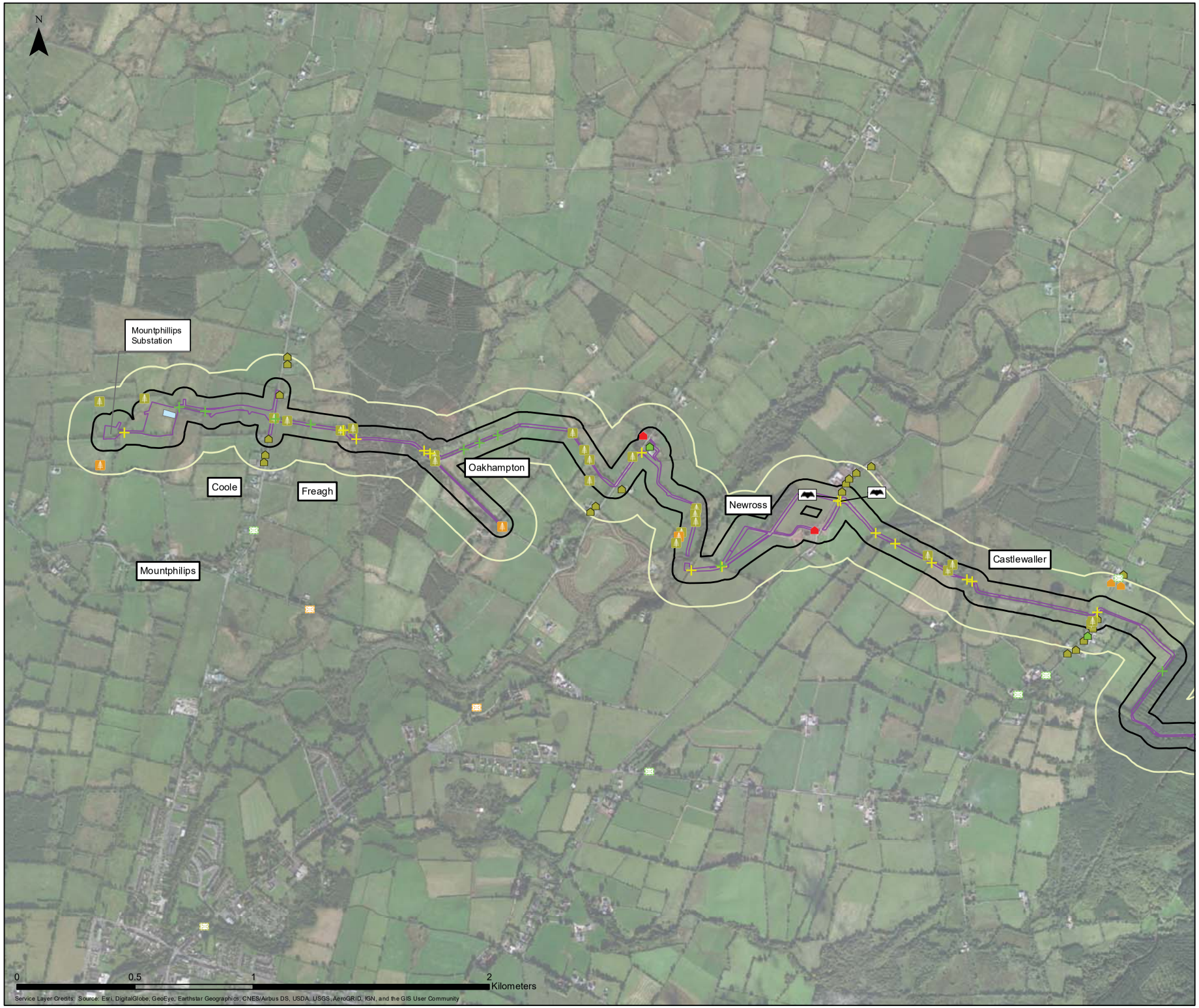

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.8: Bats within the UWF Grid Connection Study Area.
Map 1 of 5

Legend:

- *Bat Crossing Locations*

Bat Roost Suitability: *

Bridges
- Moderate
- Low
- Negligible

Trees
- Moderate
- Low

Buildings
- High
- Moderate
- Low
- Negligible

- UWF Grid Conection Construction Works Area
- Study Area Boundary (50m)
- Study Area Boundary (150m)
- Temporary Construction Compound
- Permanent hedge/tree removal
- Temporary hedge/tree removal and pruning

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

For illustrative purposes only. Map not to scale

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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.8: Bats within the UWF Grid Connection Study Area.
Map 2 of 5

Legend:

- *Bat Crossing Locations*

Bat Roost Suitability: *

Bridges
- Low
- Negligible

Trees
- Low

Buildings
- High
- Moderate
- Low
- Negligible

- Permanent hedge/tree removal
- Temporary hedge/tree removal and pruning
- UWF Grid Conection Construction Works Area
- Study Area Boundary (50m)
- Study Area Boundary (150m)

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

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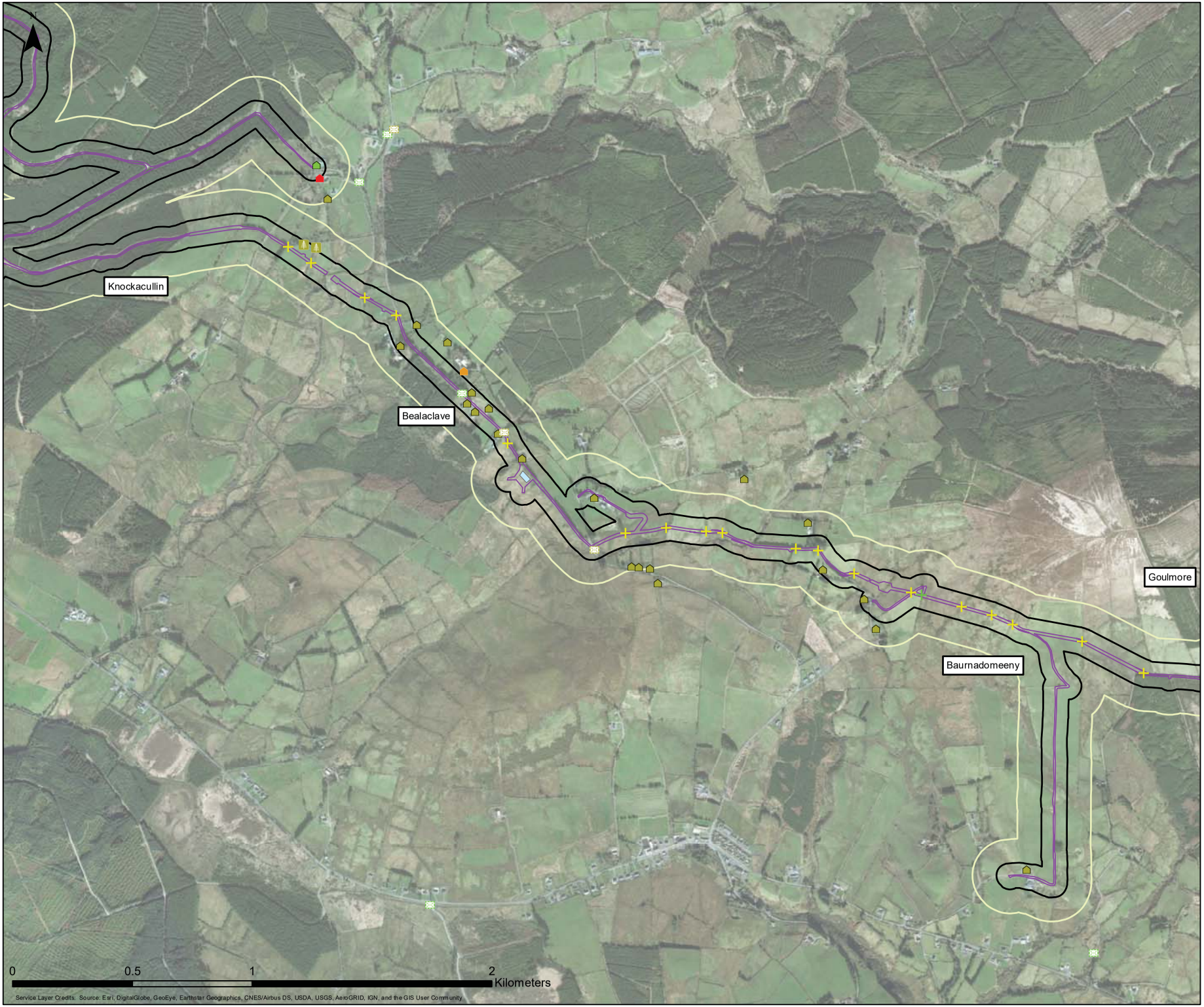

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:

Figure GC 8.8: Bats within the UWF Grid Connection Study Area.
Map 3 of 5

Legend:

Bat Roost Suitability: *

Bridges
- Low
- Negligible

Trees
- Low

Buildings
- High
- Moderate
- Low
- Negligible

- Permanent hedge/tree removal
- Temporary hedge/tree removal and pruning
- UWF Grid Conection Construction Works Area
- Study Area Boundary (50m)
- Study Area Boundary (150m)
- Temporary Construction Compound

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

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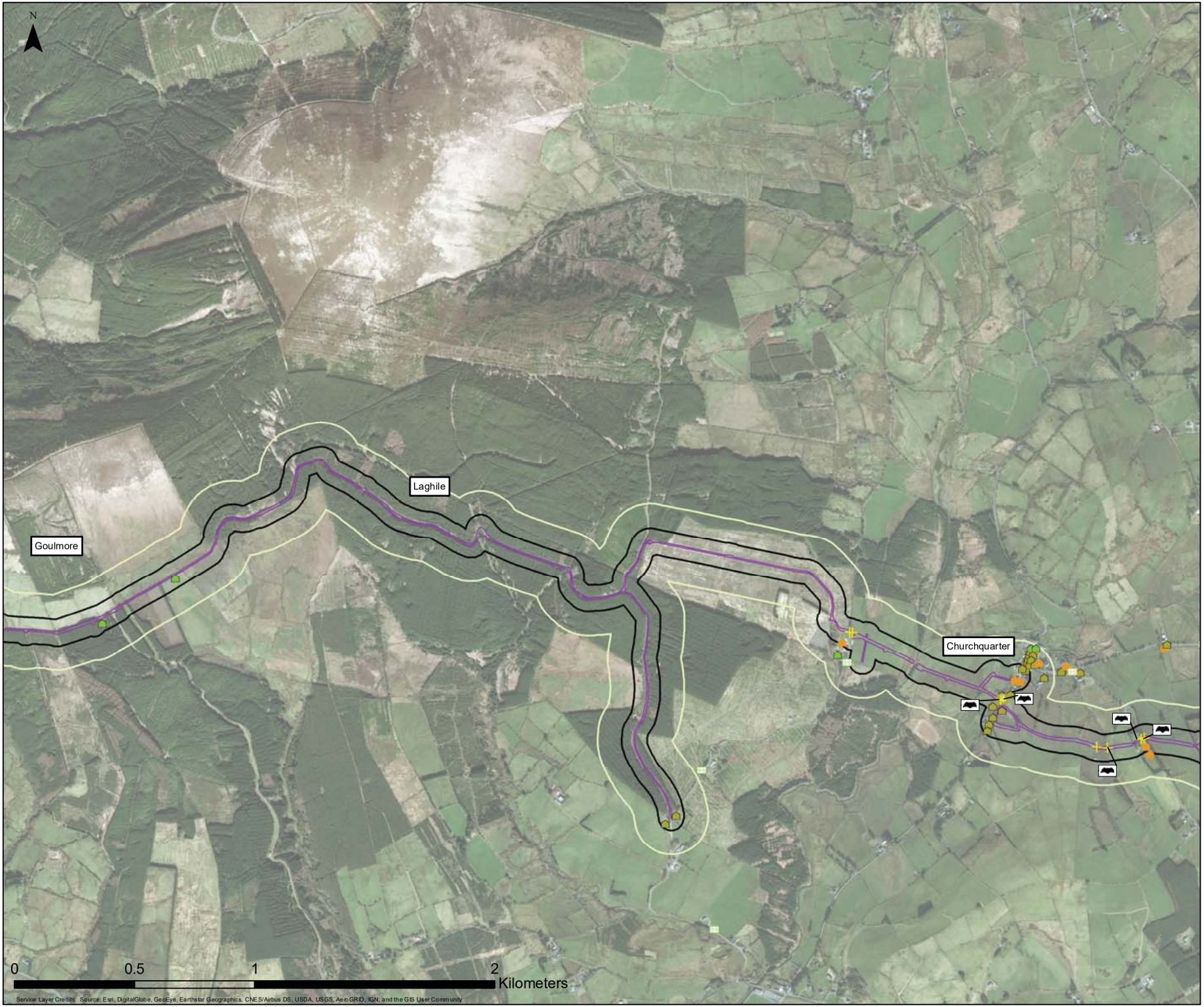

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.8: Bats within the UWF Grid Connection Study Area.
Map 4 of 5

Legend:

Bat Crossing Locations

Bat Roost Suitability: *

Bridges
- Low
- Negligible

Trees
- Low

Buildings
- Moderate
- Low
- Negligible

UWF Grid Conection Construction Works Area

Study Area Boundary (50m)

Study Area Boundary (150m)

Temporary hedge/tree removal and pruning

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

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E: info@inisenv.ie
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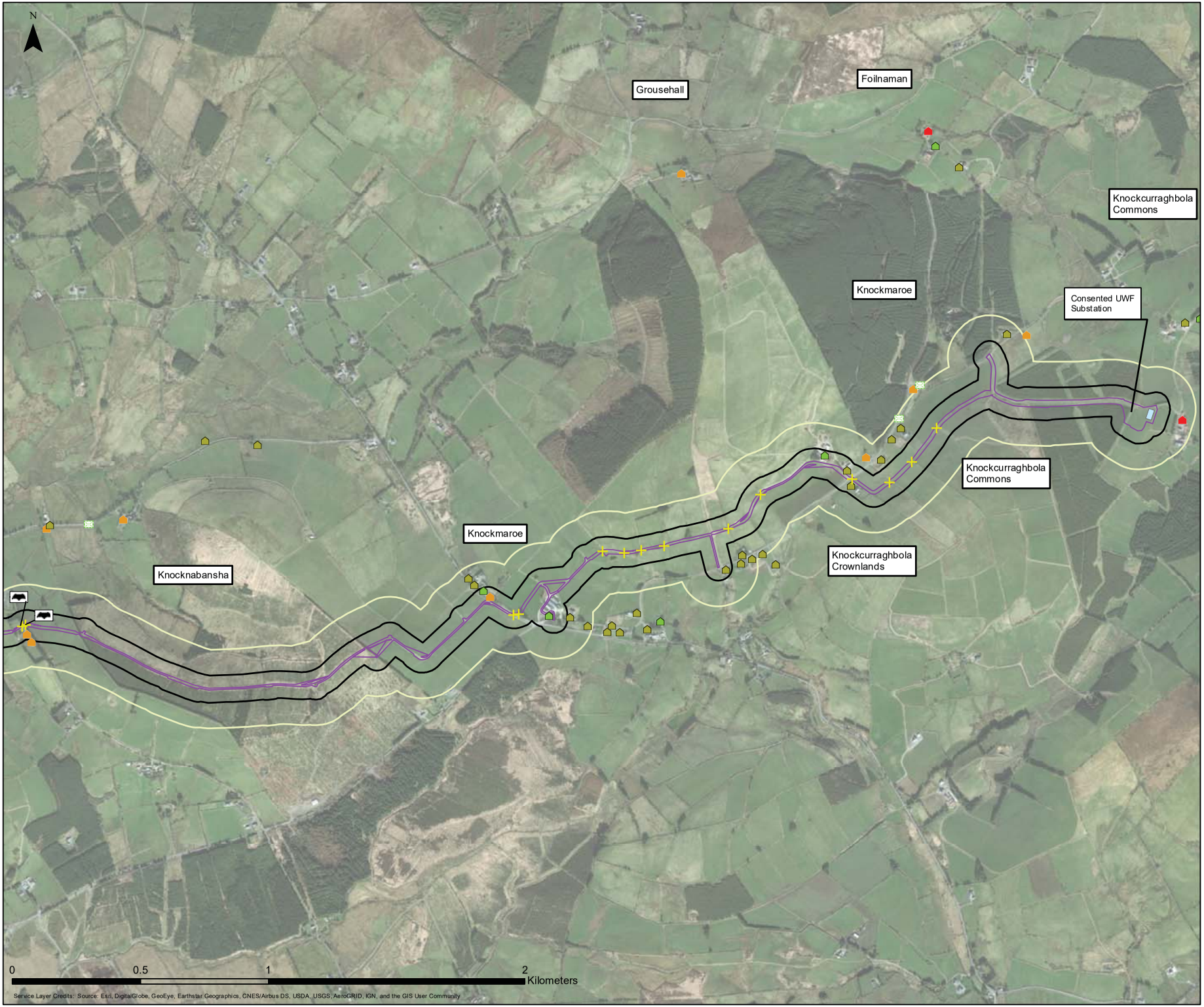

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.8: Bats within the UWF Grid Connection Study Area.
Map 5 of 5

Legend:

Bat Crossing Locations

Bat Roost Suitability: *

Bridges

Negligible

Buildings

High

Moderate

Low

Negligible

UWF Grid Conection Construction Works Area

Study Area Boundary (50m)

Study Area Boundary (150m)

Temporary Construction Compound

Temporary hedge/tree removal and pruning

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

For illustrative purposes only. Map not to scale

Drawn:	Checked:	Authorised:
POC	CC	HW

Date:	Map Reference:
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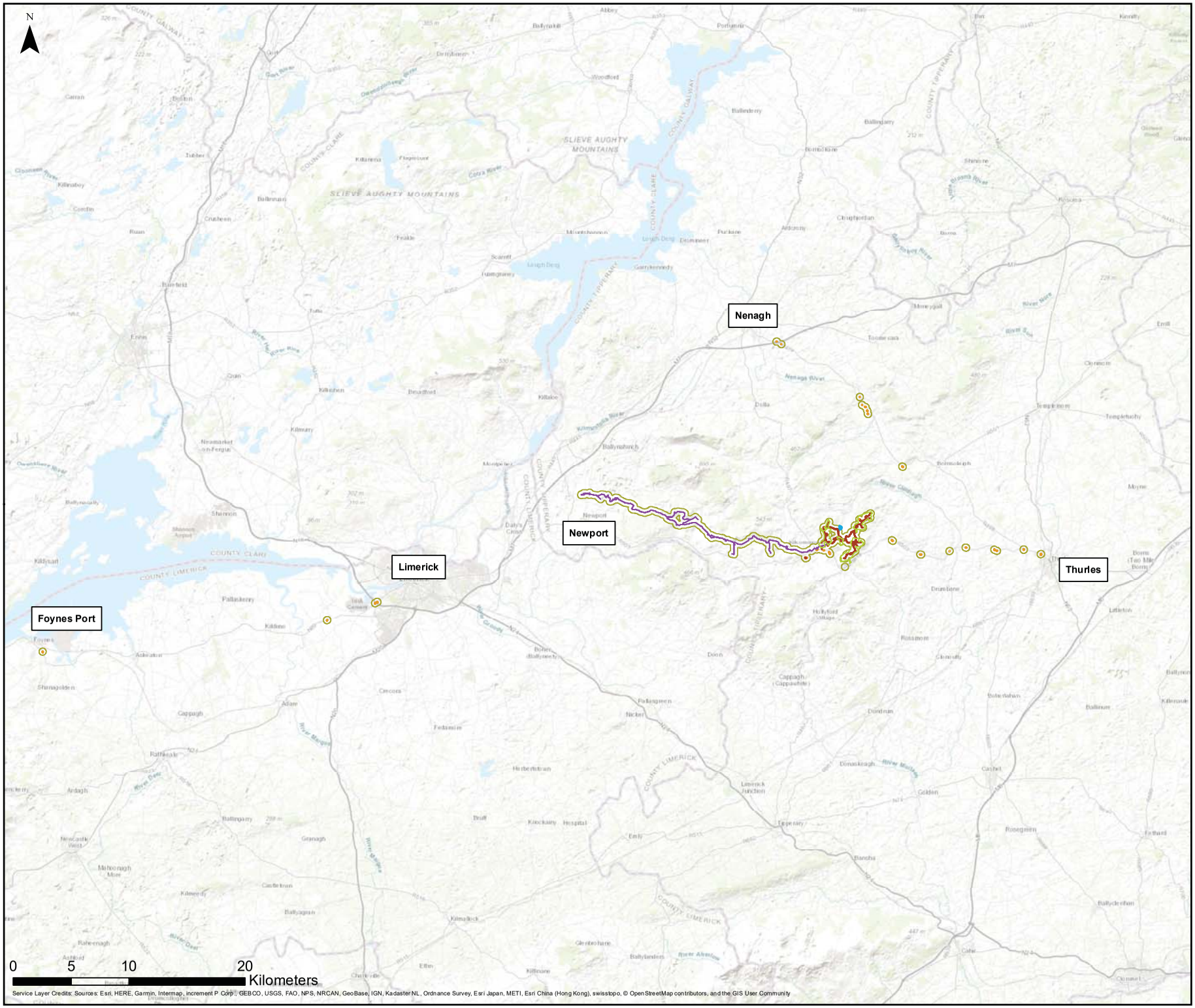

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure CE 8.8: Bats within the Cumulative Evaluation Study Area

Legend:

- Upperchurch Windfarm 2013 Study Area
- UWF Related Works Construction Works Area
- UWF Grid Connection Construction Works Area
- UWF Replacement Forestry Construction Works Area
- UWF Other Activities Construction Works Boundary
- Bats 300m Buffer

No Other Projects or Activities scoped in for evaluation

For illustrative purposes only. Map not to scale

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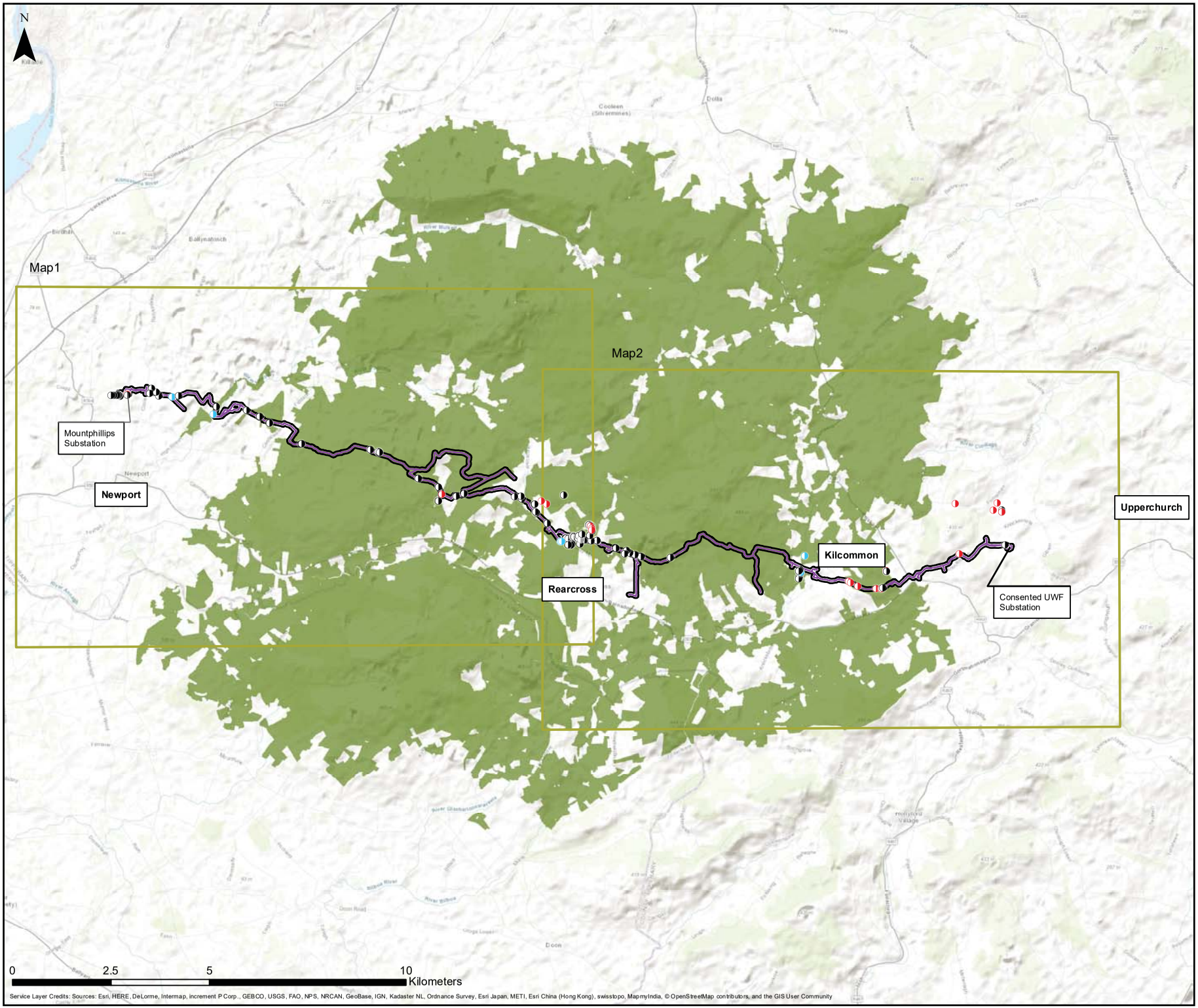

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.9: Non-Volant Mammals within the UWF Grid Connection Study Area Overview Map

Legend:

- UWF Grid Conection Construction Works Area
- Study Area Boundary (50m)
- Slievefelim SPA

Survey Results:*

- Badger
- Fox
- Mink or Otter
- Otter

*Note: Fallow Deer, Pine Martin, Red Squirrel and Irish Hare and Other Mammals were recorded throughout the study. Please refer to appendixfor locations

For illustrative purposes only. Map not to scale

Drawn:	Checked:	Authorised:
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W: www.inisecology.com
W: www.inisenv.ie

INIS Ecology
Suite 11, Shannon Commercial Properties,
Information Age Park, Gort Road,
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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.9: Non-Volant Mammals within the UWF Grid Connection Study Area
Map 1 of 2

Legend:

- UWF Grid Conection Construction Works Area
- Study Area Boundary (50m)
- Slievefelim SPA

Survey Results:*

- Badger
- Fox
- Mink or Otter
- Otter

Note: Fallow Deer, Pine Martin, Red Squirrel and Irish Hare and Other Mammals were recorded throughout the study. Please refer to appendixfor locations

For illustrative purposes only. Map not to scale

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W: www.inisecology.com
W: www.inisenv.ie

INIS Ecology
Suite 11, Shannon Commercial Properties,
Information Age Park, Gort Road,
Ennis, Co. Clare

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.9: Non-Volant Mammals within the UWF Grid Connection Study Area
Map 2 of 2

Legend:

- UWF Grid Conection Construction Works Area
- Study Area Boundary (50m)
- Slievefelim SPA

Survey Results:*

- Badger
- Fox
- Mink or Otter
- Otter

Note: Fallow Deer, Pine Martin, Red Squirrel and Irish Hare and Other Mammals were recorded throughout the study. Please refer to appendixfor locations

For illustrative purposes only. Map not to scale

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Date:	Map Reference:
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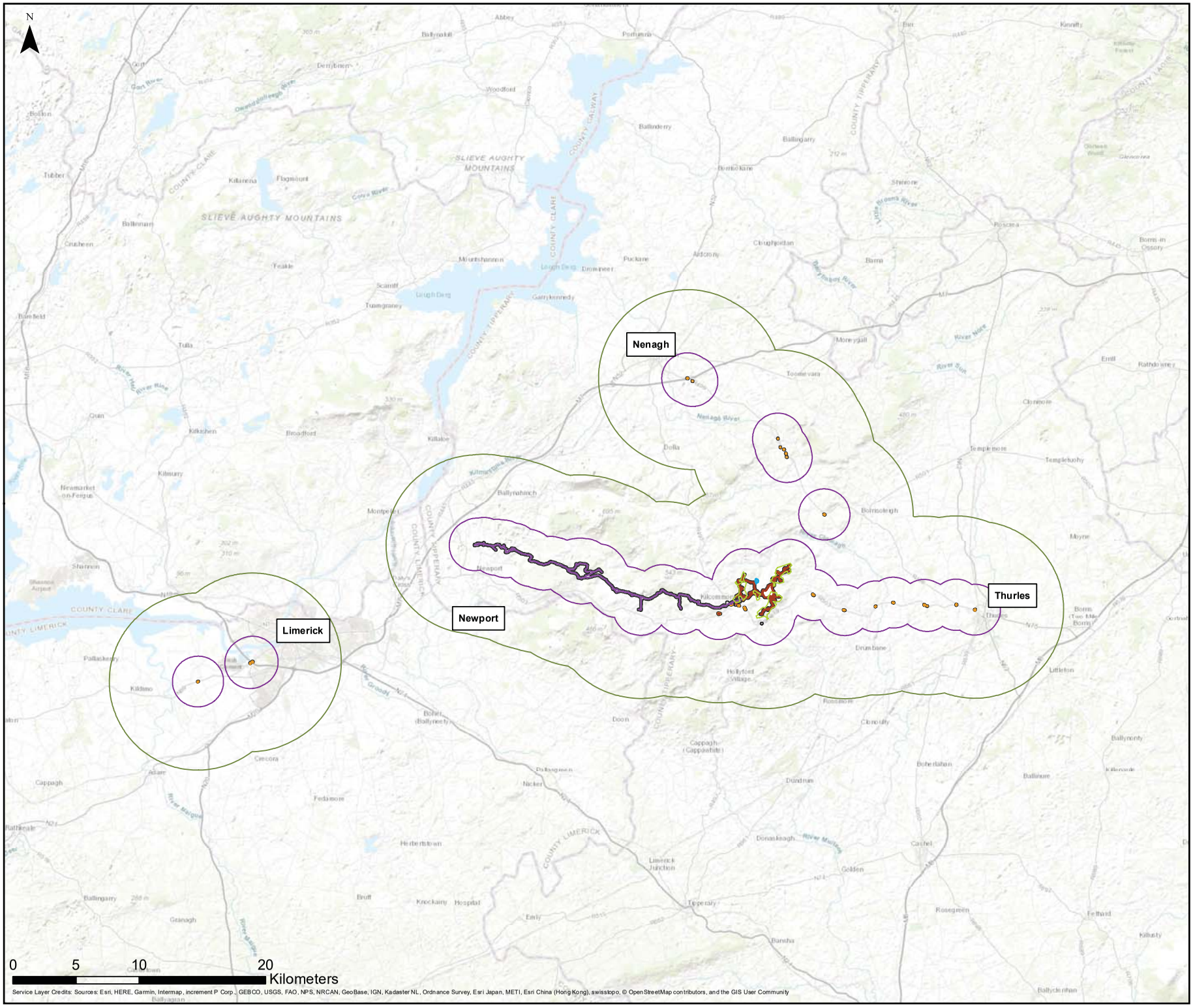

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure CE 8.9: Non-Volant Mammals within the Cumulative Evaluation Study Area

Legend:

- Upperchurch Windfarm 2013 Study Area
- UWF Related Works Construction Works Area
- UWF Grid Connection Construction Works Area
- UWF Replacement Forestry Construction Works Area
- UWF Other Activities Construction Works Boundary
- General Non-Volant Mammals 100m Buffer
- Badger 2km Buffer
- Otter 7km Buffer

* Forestry: Please see those map book figures which illustrate terrestrial habitats on aerial photography, for reference purposes with respect to the extent of Forestry lands.

For illustrative purposes only. Map not to scale

Drawn:	Checked:	Authorised:
POC	CC	HW

Date:	Map Reference:
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E: info@inisenv.ie
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W: www.inisenv.ie

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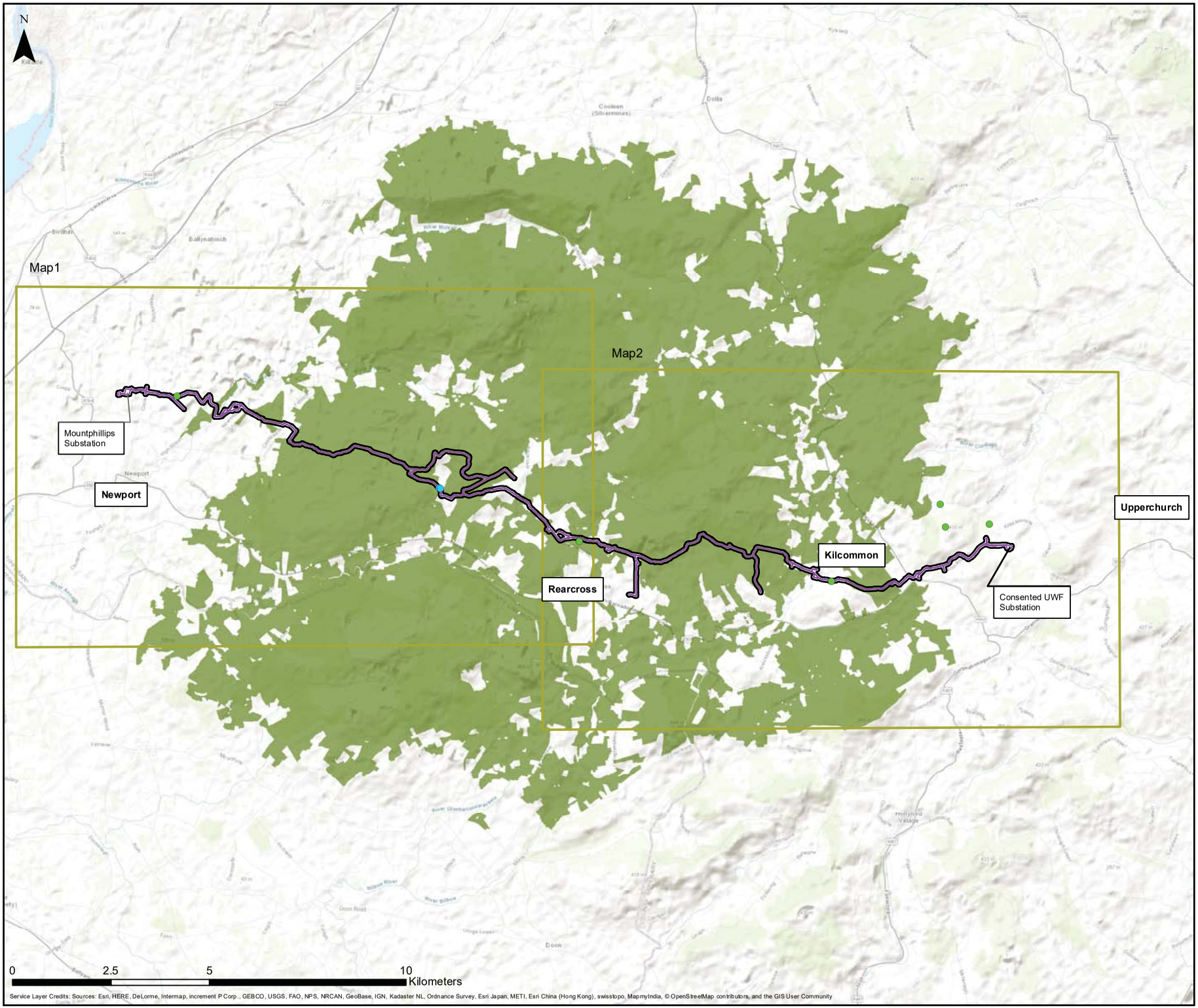

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.10: Amphibians & Reptiles within the UWF Grid Connection Study Area

Legend:

- UWF Grid Conection Construction Works Area
- Study Area Boundary (50m)
- Slievefelim SPA

Survey Results:

- Adult Frog
- Tadpoles

For illustrative purposes only. Map not to scale

Drawn:	Checked:	Authorised:
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W: www.inisecology.com
W: www.inisenv.ie

INIS Ecology
Suite 11, Shannon Commercial Properties,
Information Age Park, Gort Road,
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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.10: Amphibians & Reptiles within the UWF Grid Connection Study Area
Map 1 of 2

Legend:

- UWF Grid Conection Construction Works Area
- Study Area Boundary (50m)
- Slievefelim SPA

Survey Results:

- Adult Frog
- Tadpoles

For illustrative purposes only. Map not to scale

Drawn:	Checked:	Authorised:
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Date:	Map Reference:
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W: www.inisenv.ie

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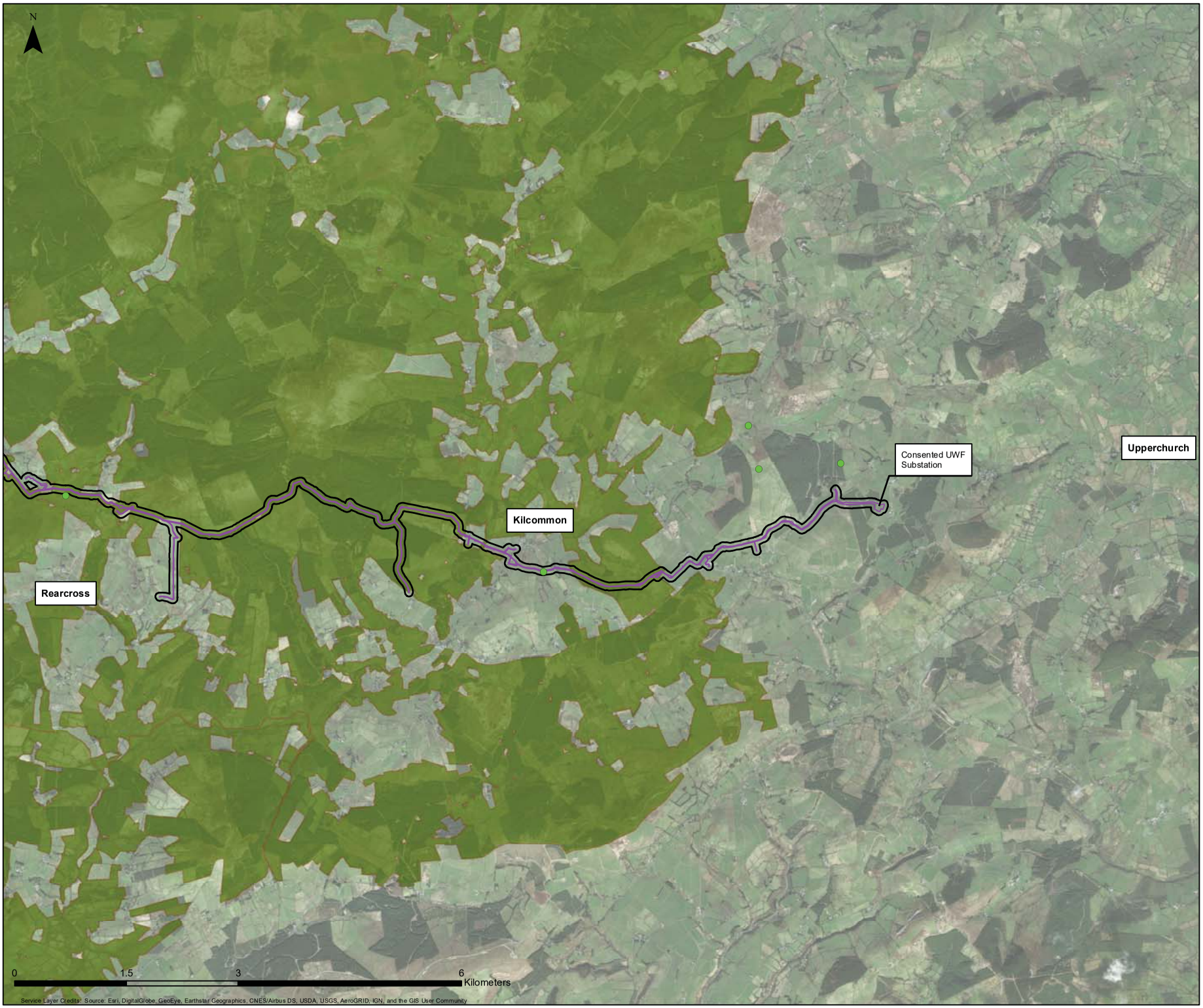

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.10: Amphibians & Reptiles within the UWF Grid Connection Study Area Map 2 of 2

Legend:

- UWF Grid Conection Construction Works Area
- Study Area Boundary (50m)
- Slievefelim SPA

Survey Results:

- Adult Frog
- Tadpoles

Drawn:	Checked:	Authorised:
JP	CC	HW

Date:	Map Reference:
09/02/2018	EDL - A3 - 10 - 03

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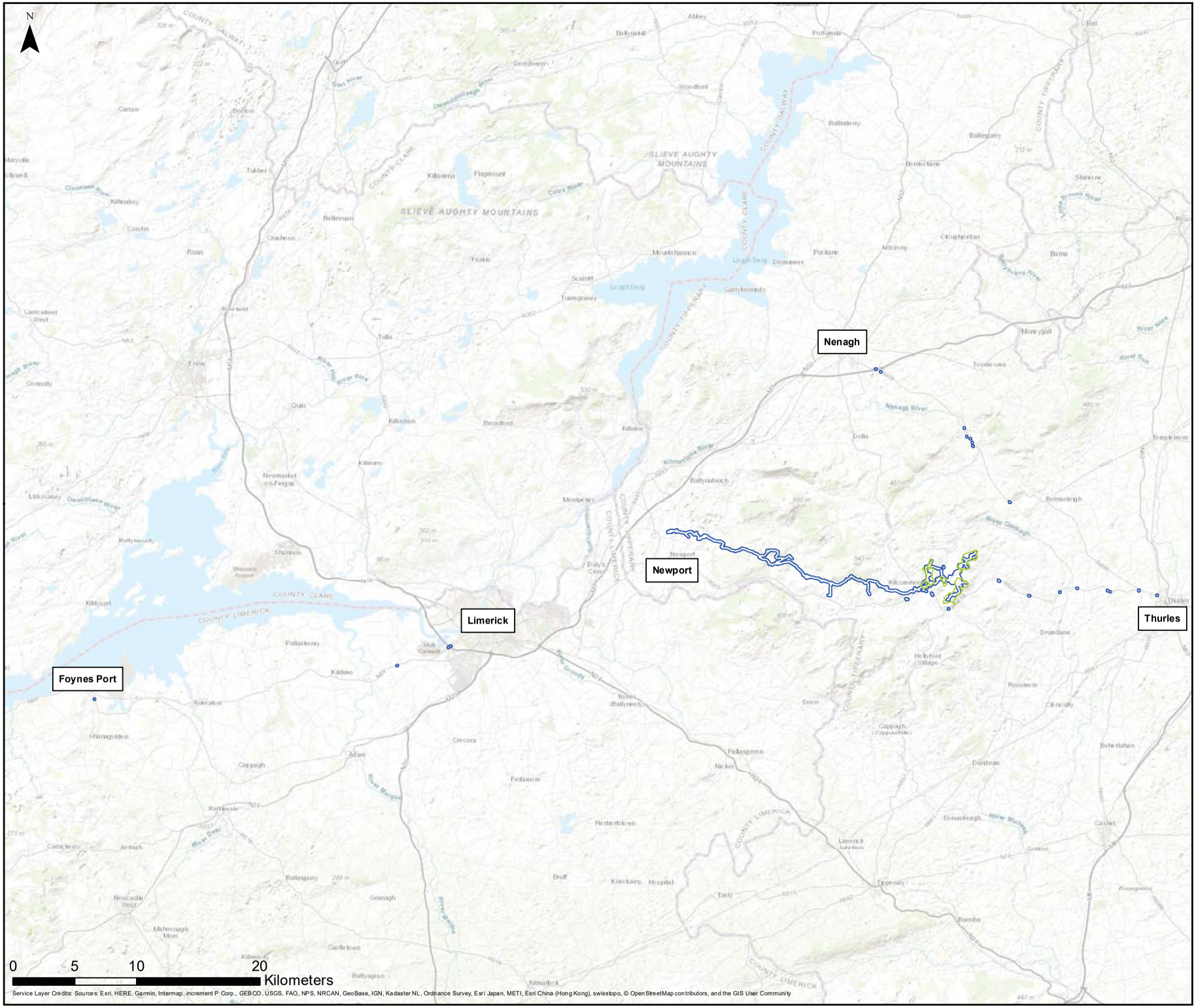

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure CE 8.10: Amphibians & Reptiles within the Cumulative Evaluation Study Area

Legend:

- Upperchurch Windfarm 2013 Study Area
- Amphibians & Reptiles 100m Buffer

No Other Projects or Activities scoped in for evaluation

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Drawn:	Checked:	Authorised:
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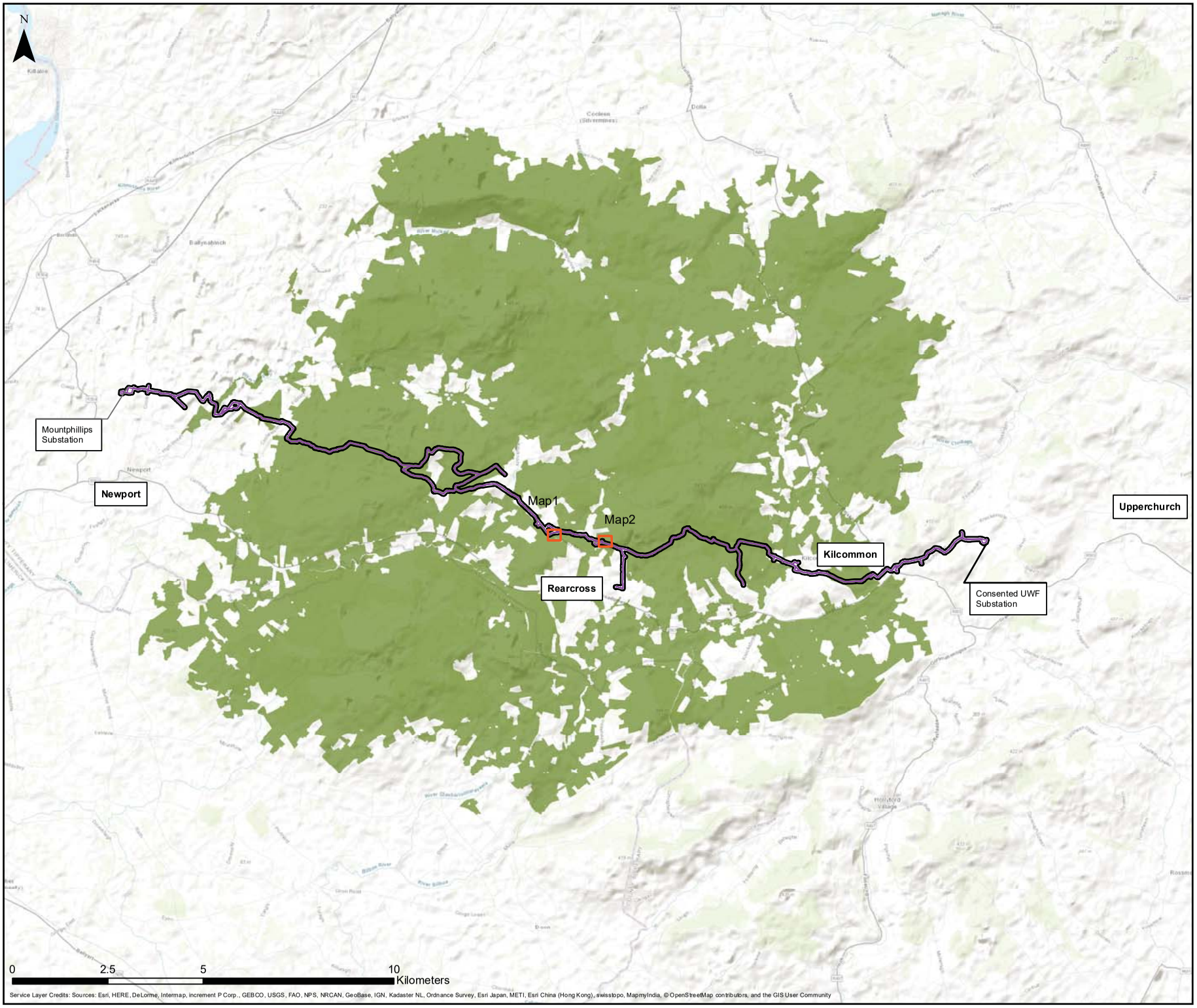

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure GC 8.11: Marsh Fritillary within the UWF Grid Connection Study Area

Legend:

- UWF Grid Conection Construction Works Area
- Study Area Boundary (50m)
- Slievefelim SPA

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Drawn:	Checked:	Authorised:
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W: www.inisecology.com
W: www.inisenv.ie

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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:

Figure GC 8.11: Marsh Fritillary within the UWF Grid Connection Study Area
Map 1 of 2

Legend:

- Study Area Boundary (50m)
- UWF Grid Conection Construction Works Area

Survey Results:

- September 2017 Web Locations
- September 2016 Web Locations
- April 2017 Larvae Locations
- Suitable Marsh Fritillary Habitat
- S1 Section Number

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Drawn:	Checked:	Authorised:
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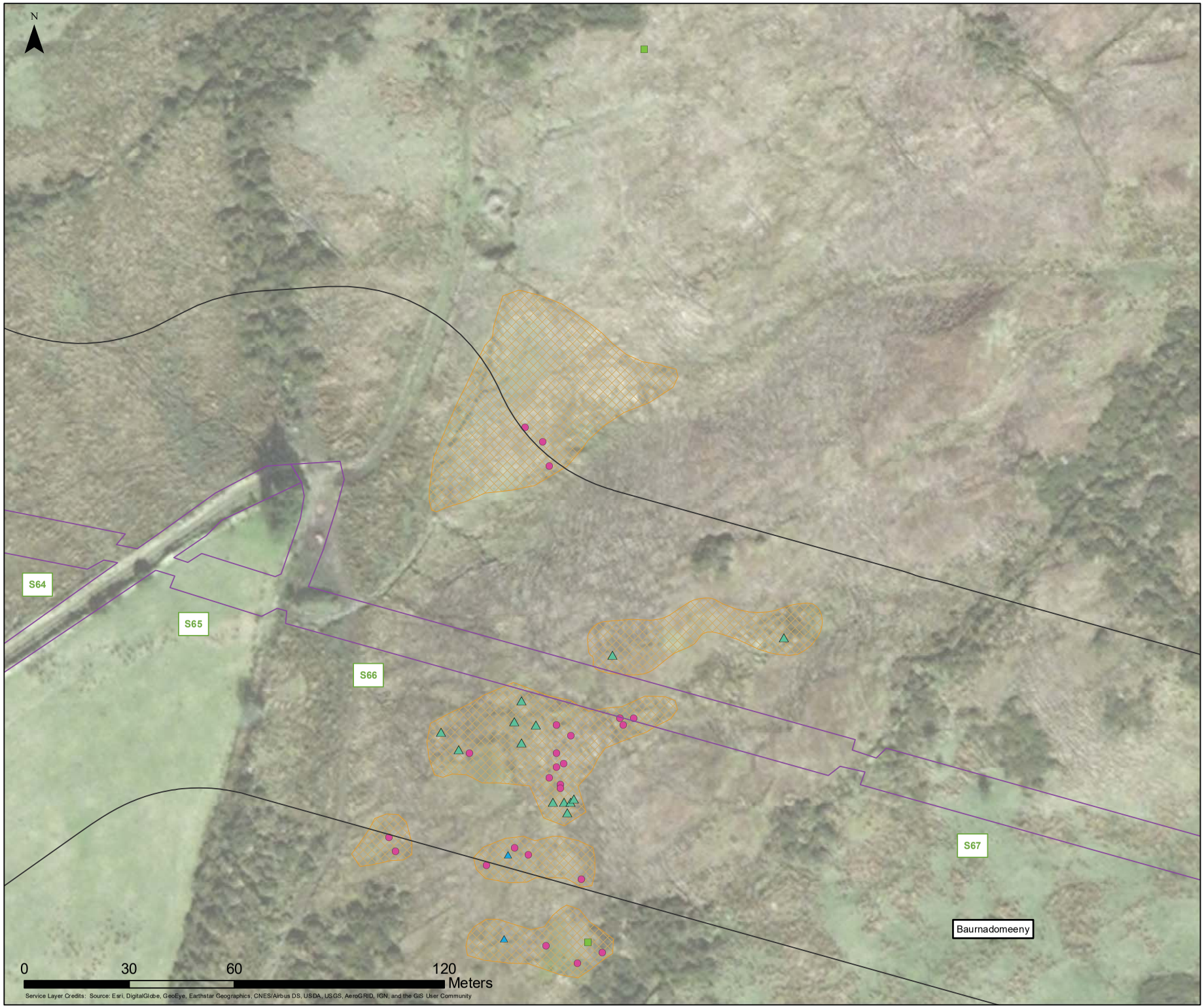

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:

Figure GC 8.11: Marsh Fritillary within the UWF Grid Connection Study Area
Map 2 of 2

Legend:

- Study Area Boundary (50m)
- UWF Grid Conection Construction Works Area

Survey Results:

- September 2017 Web Locations
- September 2016 Web Locations
- April 2017 Larvae Locations
- September 2016 Larvae Locations
- Suitable Marsh Fritillary Habitat
- S1 Section Number

For illustrative purposes only. Map not to scale

Drawn:	Checked:	Authorised:
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E: info@inisenv.ie
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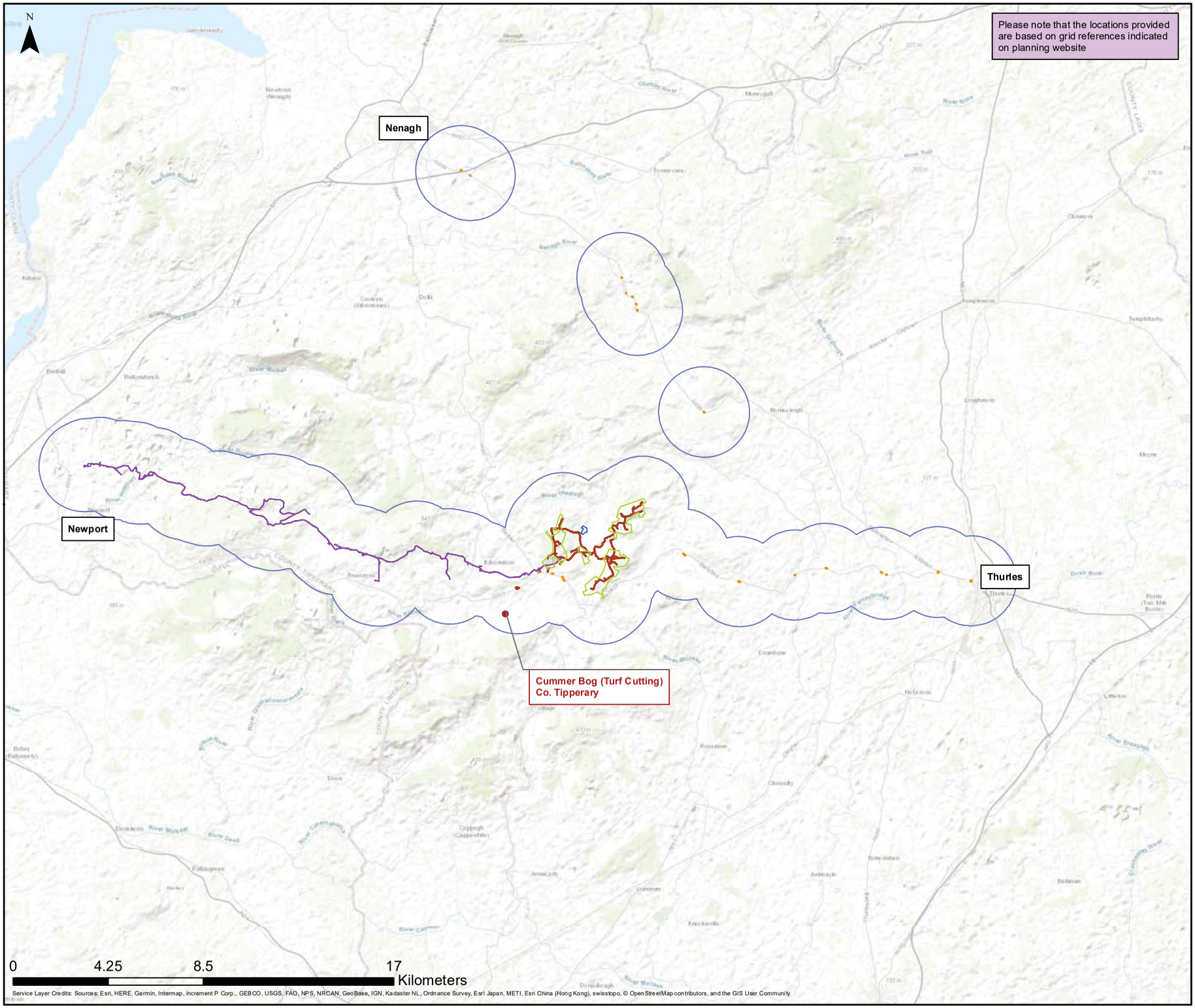

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure CE 8.11: Marsh Fritillary within the Cumulative Evaluation Study Area

Legend:

- Projects/Activities
- Upperchurch Windfarm 2013 Study Area
- UWF Related Works Construction Works Area
- UWF Grid Connection Construction Works Area
- UWF Replacement Forestry Construction Works Area
- UWF Other Activities Construction Works Boundary
- 2km Buffer (Badger, Invertebrates - Marsh Fritillary)

* Forestry & Agriculture: Please see those map book figures which illustrate terrestrial habitats on aerial photography, for reference purposes with respect to the extent of Forestry and Agricultural lands.

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Drawn:	Checked:	Authorised:
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INIS Ecology
Suite 11, Shannon Commercial Properties,
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Whole Upperchurch Windfarm Project

Natura Impact Statement
for
Whole UWF Project Elements 1 to 5

March 2018

Appendix A14: Biodiversity Information

EIAR Appendix 8.1 Detailed Biodiversity Data & Supplementary Information

INIS Environmental Consultants Ltd
Planning and Environmental Consultants

Produced by INIS Environmental Consultants Ltd., Suite 11, Shannon Commercial Properties, Information Age Park, Gort Road, Ennis, Co. Clare
T: +353 (0) 65 6892441, M: +353 (0) 87 2831725,

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Planning and Environmental Consultants

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A8-1 Appendix to Chapter 8: Biodiversity

Appendix 8.1: Detailed Biodiversity Data and Supplementary Information

The data and descriptions in this appendix have informed Chapter 8: Biodiversity of the EIA Report.

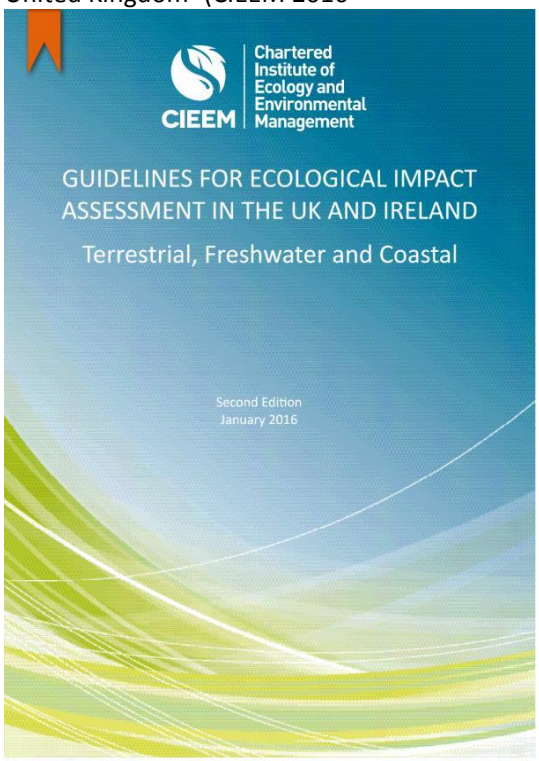
The information presented in this Appendix 8.1 is outlined below and the relevant element(s) of the Whole UWF Project are also identified.

Appendix 8.1 Section	**Section Heading**	**Relevant Individual Project Element**
A8-1.1	Guidance Documents and Criteria	UWF Grid Connection UWF Related Works UWF Replacement Forestry Upperchurch Windfarm UWF Other Activities
A8-1.2	Baseline Information - Scoping and Consultation - Desktop review - Field work - Survey results - Policy context	
A8-1.3	Impact Calculations - Birds - Habitats - Invertebrates	
A8-1.4	Cumulative Impact of the Whole UWF Project	
A8-1.5	References	
A8-1.6	Detailed Biodiversity Mapping	
A8-1.7	Confidential Annex	

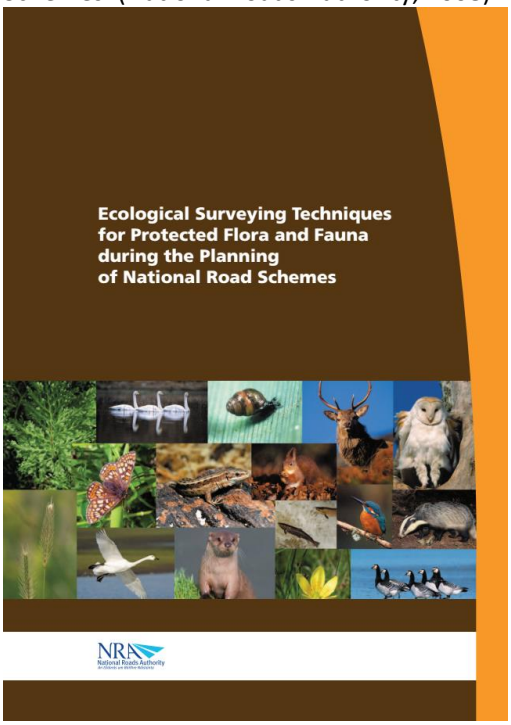
A8-1.1 Guidance Documents and Criteria

The following publications were used for specific guidance and criteria for the Biodiversity Chapter. Front cover sheets of these publications are presented where accessible.

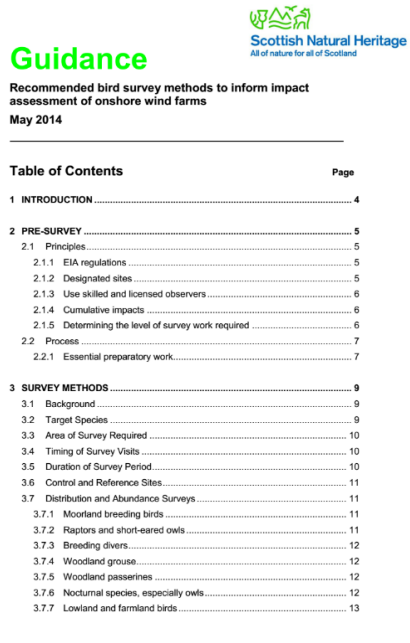
Guidelines for Ecological Impact Assessment in the United Kingdom- (CIEEM 2016



Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. (National Roads Authority, 2008)



Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms. (Scottish Natural Heritage, 2014)



Scottish Natural Heritage
All of nature for all of Scotland

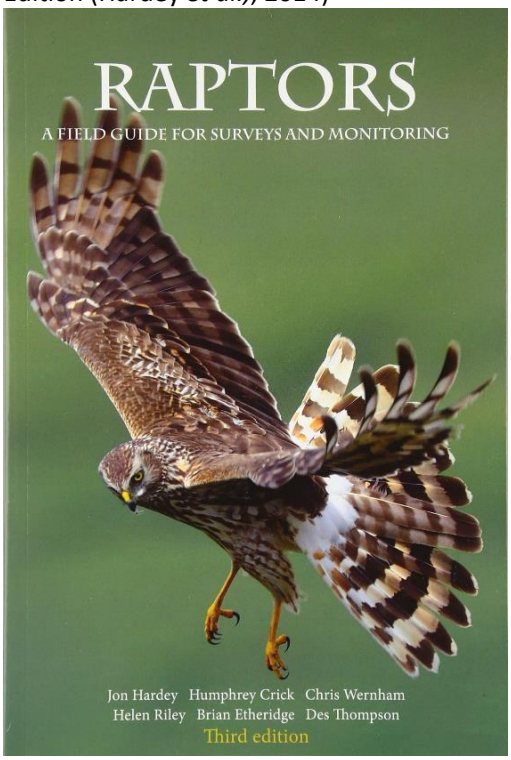
Guidance

Recommended bird survey methods to inform impact assessment of onshore wind farms

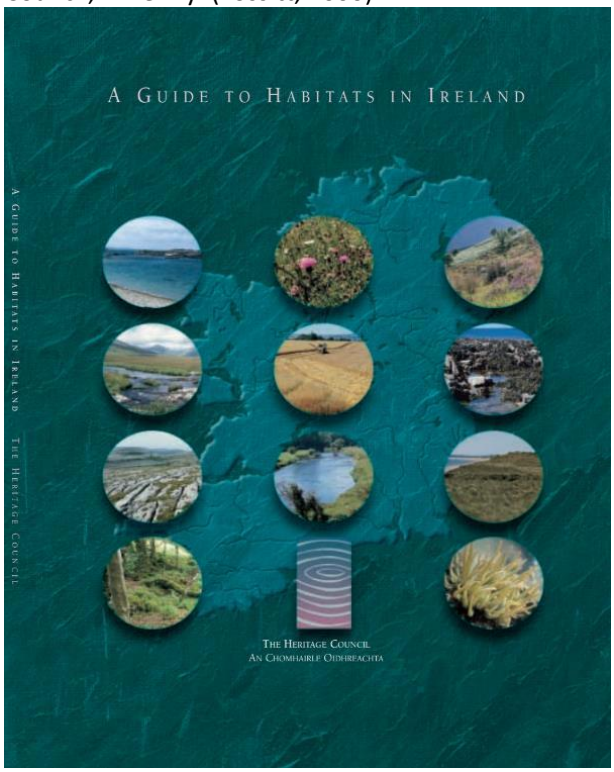
May 2014

Table of Contents Page

Raptors: A Field Guide for surveys and Monitoring, third Edition (Hardey *et al.*,, 2014)



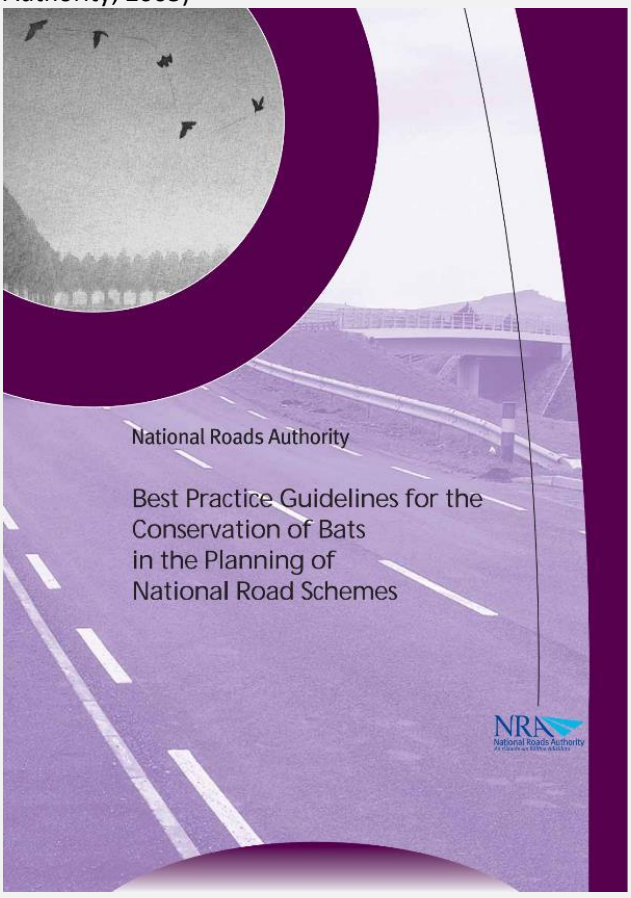
A Guide to The Habitats of Ireland. The Heritage Council, Kilkenny. (Fossitt, 2000)



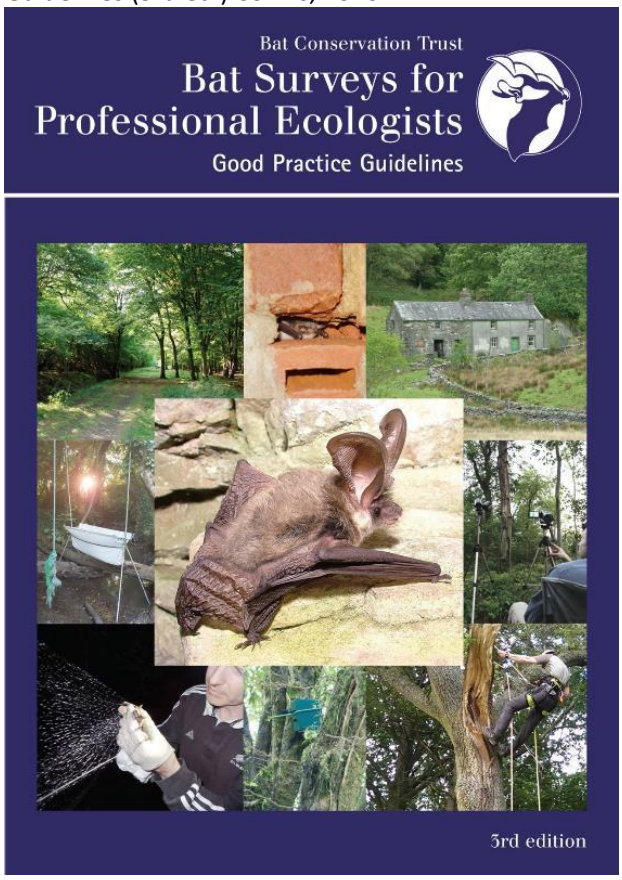
Best Practice Guidance for Habitat Survey and Mapping (Smith *et al.,* 2011)

Guidelines for the Treatment of Bats During the Construction of National Road Schemes (National Roads Authority, 2005)

Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (National Roads Authority, 2005)



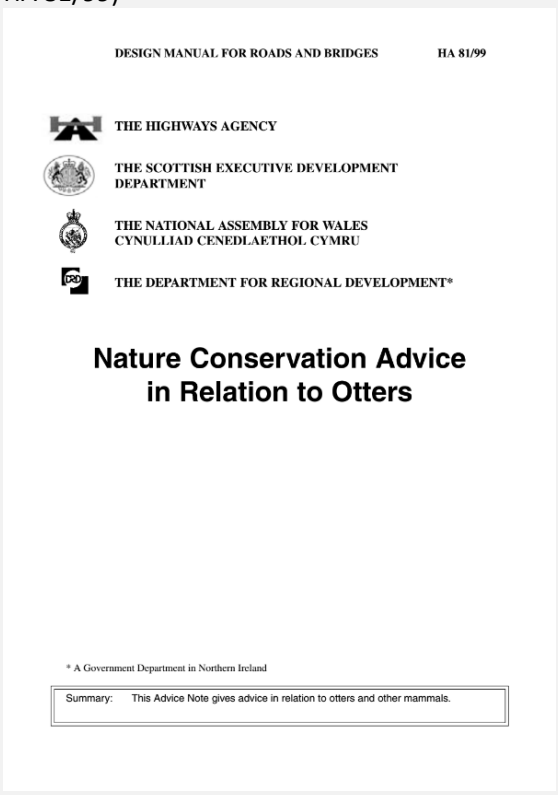
Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd ed.) Collins, 2016



Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes (National Roads Authority, 2005)

Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes (National Roads Authority, 2006)

The Good Roads Guide New Roads Nature Conservation Advice in Relation to Otters (Highways Agency, 1999, HA 81/99)



DESIGN MANUAL FOR ROADS AND BRIDGES HA 81/99

THE HIGHWAYS AGENCY

THE SCOTTISH EXECUTIVE DEVELOPMENT DEPARTMENT

THE NATIONAL ASSEMBLY FOR WALES
CYNULLIAD CENEDLAETHOL CYMRU

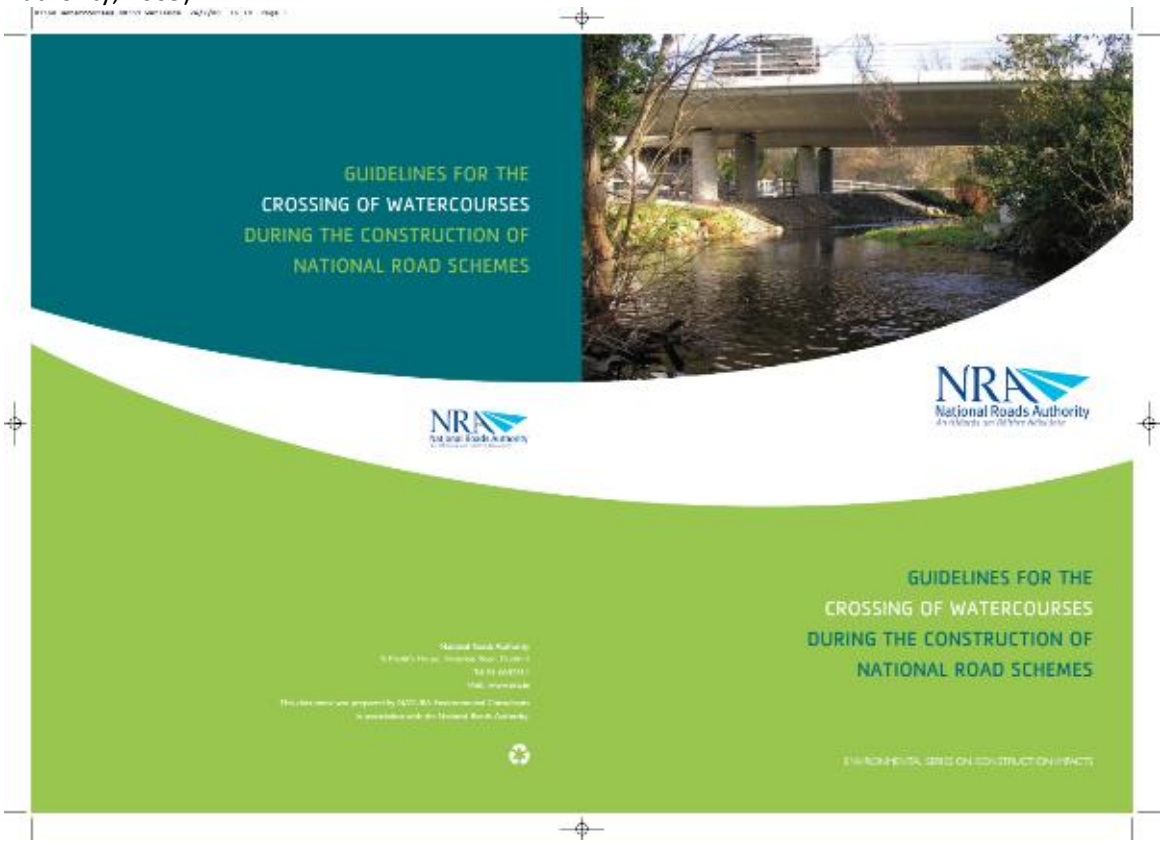
THE DEPARTMENT FOR REGIONAL DEVELOPMENT*

Nature Conservation Advice in Relation to Otters

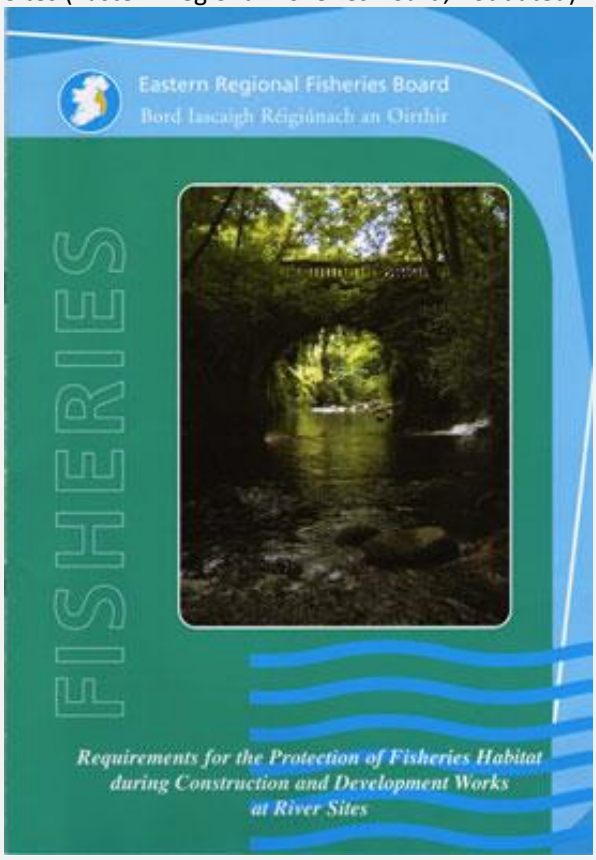
* A Government Department in Northern Ireland

Summary: This Advice Note gives advice in relation to otters and other mammals.

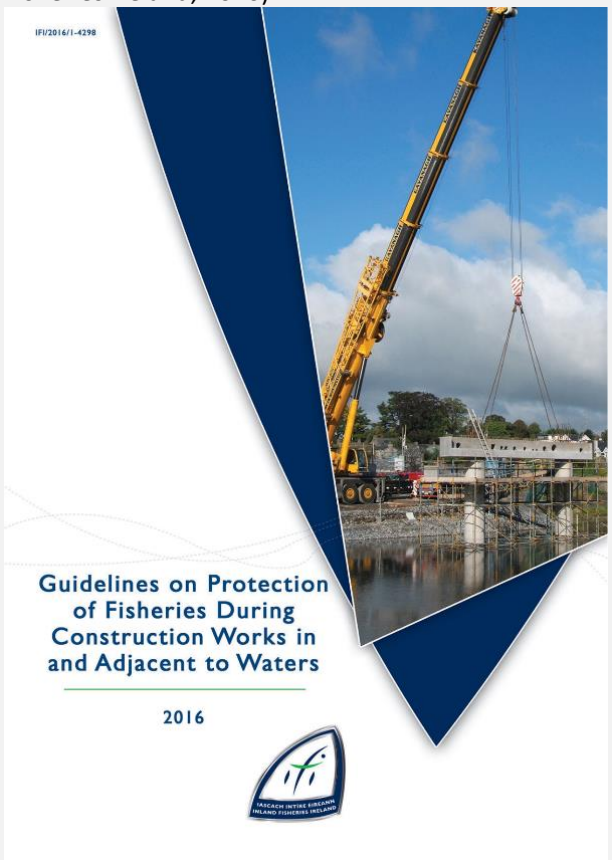
Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (National Roads Authority, 2005)

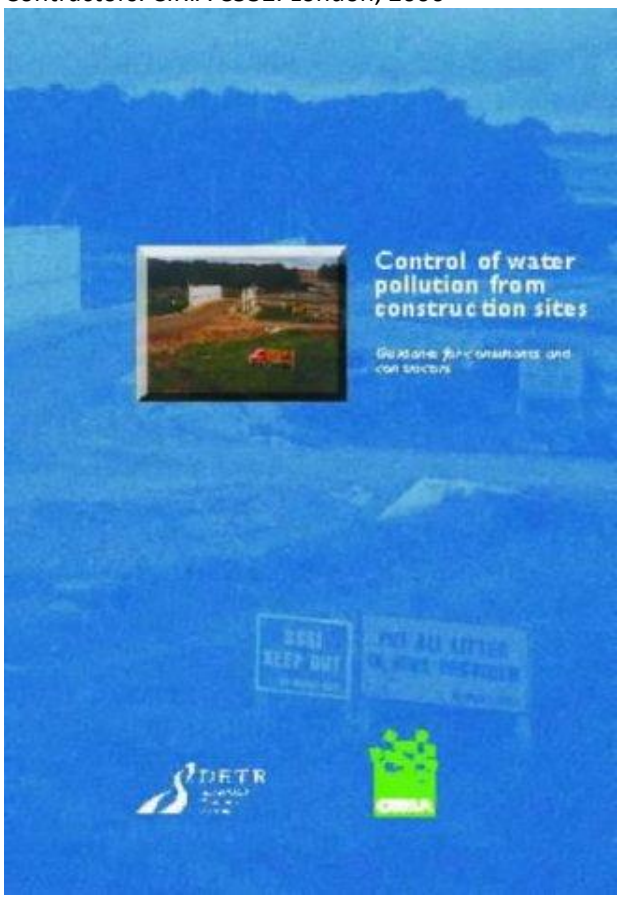


Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board, not dated)



Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016)



CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006  	CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006) 
Water Framework Directive (2000/60/EC).	UK Pollution Prevention Guidelines (PPG).

A8-1.2 Baseline Information

A8-1.2.1 Scoping and Consultation

Consultation (including in relation to scoping) with statutory consultees and other relevant bodies commenced in August 2015. A full list of consultees and a complete chronology of the consultation undertaken is provided hereunder. Further information on scoping is available in Chapter 3 Scoping and Consultation.

Table 1 Chronology of formal Biodiversity related consultation both issued to and received from statutory and non- statutory environmental agencies and organisations

Date	Project Element	Consultees	Action
31/08/15	Mountphilips Substation	DAU NPWS IFI	Posted initial Mountphilips consultation documents to DAU (the Manager), NPWS (Jervis Good) and IFI (Michael Fitzsimons and Frank O'Donoghue).
09/02/16	UWF Grid Connection	DAU NPWS IFI	Posted initial UWF Grid Connection consultation documents to DAU (the Manager), NPWS (Jervis Good) and IFI (Michael Fitzsimons and Frank O'Donoghue).
16/02/16	Mountphilips Substation	DAU NPWS IFI	Posted supplementary Mountphilips consultation documents to DAU (the Manager), NPWS (Jervis Good) and IFI (Michael Fitzsimons and Frank O'Donoghue)
22/02/16	Upperchurch Grid Route/Mountphilips Substation	IFI EDL	Initial consultation meeting between IFI (Michael Fitzsimons and Frank O'Donoghue), INIS (Howard Williams and Sarah Ingham) and Ecopower Developments Ltd (Julie Brett) at the IFI offices in Limerick. Minutes recorded by Sarah Ingham and sent to EDL.
24/02/16	Upperchurch Grid Route/Mountphilips Substation	IFI	Verbal communication from Mr Michael Fitzsimons that IFI were very satisfied with the detailed plans being prepared for all watercourse crossings by Ecopower Developments Ltd. Mr Fitzsimons stressed that Ecopower Developments Ltd/Inis had put a lot of work into site specific mitigation which he was confident would protect all watercourses comprehensively during the construction stage.
24/02/16	Upperchurch Grid Route/Mountphilips Substation	NPWS EDL	Initial consultation meeting between NPWS (Jervis Good and Stefan Jones), INIS (Howard Williams and Sarah Ingham) and EDL (Julie Brett) at the NPWS offices in Blackrock, Cork. Minutes recorded by Sarah Ingham and sent to Ecopower Developments Ltd and NPWS.
29/04/16	Upperchurch Grid Route/Mountphilips Substation	BWI BCI	Posted (by registered post) initial UWF Grid Connection consultation documents to BWI and BCI.

Date	Project Element	Consultees	Action
29/04/16	Upperchurch Grid Route/Mountphilips Substation	DAU NPWS IFI	Posted (by registered post) project amendment consultation documents re changes to UWF Grid Connection route and Mountphilips Switching Station access route to DAU (the Manager), NPWS (Jervis Good) and IFI (Michael Fitzsimons and Frank O'Donoghue).
11/05/16	Upperchurch Grid Route/Mountphilips Substation	Tipperary Co. Co.	Posted (by registered post) initial UWF Grid Connection consultation documents to the Environment Officer and the Heritage Officer, Tipperary Co. Co.
11/05/16	Upperchurch Grid Route/Mountphilips Substation	DAU	Telecon between Sarah Ingham (INIS) and Michael Murphy (DAU) in which Mr. Murphy confirmed receipt of all documentation by both email and post and of his forwarding of same to Dr Jervis Good for review. He advised that there is currently a backlog in Dr Good's work load and that he would formally respond in due course.
19/05/16	Upperchurch Grid Route/Mountphilips Substation	IFI	Onsite meeting between Mr Howard Williams (INIS) and Mr Michael Fitzsimons (IFI) to inspect potential impacts of proposed watercourse crossing methodologies on the aquatic ecology of a number of watercourses along the grid connection route.
26/05/16	Upperchurch Grid Route/Mountphilips Substation	IFI	Formal written response received from Mr Fitzsimons in respect of the onsite meeting, outlining his professional opinions and recommendations regarding particular watercourses crossing methods. IFI concludes from this meeting that all crossings are possible during the open season but that more detailed methodologies should be drafted prior to work commencing.
23/06/16	Upperchurch Grid Route/Mountphilips Substation	NPWS	Meeting between Howard Williams (INIS) and Pat Foley (NPWS Regional Manager) at hotel in Limerick. Consultation documentation supplied to Mr Foley outlining all ecological survey work conducted, the results to date and what further pre-planning survey work we proposed to provide to ensure a comprehensive Ecology assessment for the entire project.
28/10/16	Upperchurch Grid Route/Mountphilips Substation	DAU/NPWS	Received formal response letter from DAU stating that based on the documentation submitted by Inis, *"the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs has no further observations regarding nature conservation considerations"*.

Date	Project Element	Consultees	Action
20/01/17	Upperchurch Grid Route/Mountphilips Substation	NPWS	Onsite meeting between Ms Aine Lynch (NPWS, CR), Ms Julie Brett (EDL) and Howard Williams (INIS). Mr Williams outlined to Ms. Lynch the ecological receptors covered by the surveys, the actual survey effort completed for each of the ecological receptors for the project to date. Mr. Williams also presented the survey effort outstanding and planned for the future of the project prior to the submission of the planning application. In addition to this information, provisional results of all surveys to date were presented to Ms. Lynch by way of GIS mapping of the locations of all ecological receptors/ecologically sensitive areas recorded relative to the location of the Whole Windfarm Project.
27/01/17	Upperchurch Grid Route/Mountphilips Substation	NPWS	Further to this meeting, Ms. Lynch held a telephone consultation with Mr. Williams on Friday 27th January 2017 during which she confirmed that she had subsequently relayed all details of the meeting to Dr Jervis Good, Regional Ecologist.
06/06/17	UWF Related Works, Counties Tipperary and Limerick	DAU NPWS IFI BWI BCI	Scoping document outlining up-to-date project amendments, ecological surveys to date, a brief synopsis of ecological survey results to date, in addition to an overview of potential impacts resulting from the proposed project.
27/7/2017	Whole UWF Project	NPWS	Watercourse crossings, biosecurity, marsh fritillary, drainage at Bleanbeg Bog, forestry felling and replanting as well as proposed mitigation measures for bats and hen harrier foraging habitats.
23/8/2017	Whole UWF Project	IFI	Conference Call between Mr. Howard Williams, Mr. C. Cullen (INIS) and Mr Michael Fitzsimons (IFI) in respect of watercourse evaluations in terms of fisheries importance and proposed crossing methods. Further to the call Mr. Fitzsimons confirmed via email that a review and discussion of proposed crossings had taken place. Mr. Fitzsimons also confirmed that the proposed crossing methodologies are in line with the methodologies discussed during the scoping inspection carried out with Howard Williams.
27/08/17	Whole UWF Project	NPWS	Information meeting between Dr. Jervis Good (NPWS, Divisional Ecologist), and Mr. Howard

Date	Project Element	Consultees	Action
			Williams (INIS). This meeting provided an update of the project for NPWS staff and a discussion on each receptor within the project study area.
13/12/2017	Whole UWF Project	NPWS	Project Overview. Final formal meeting with NPWS. Attendees were Mr Pat Foley (NPWS Deputy Regional Manager), Ms Julie Brett (Ecopower) and Mr Howard Williams and Chris Cullen (Inis). Mr Williams gave a full project overview to Mr Foley. Mr Foley acknowledged this and stated that he would pass on any pertinent details to Dr Good.

Official Consultation Response from IFI (Mr. Michael Fitzsimons, Senior Fisheries Environmental Officer, May 2016)

Mr Howard Williams,
Inís Environmental Consultants Ltd.,
Suite 18, Shannon Commercial Properties,
Information Age Park,
Gort Road,
Ennis, County Clare.

Iascach Intíre Éireann
Inland Fisheries Ireland

27 May, 2016.

Re-Proposed Crossing Methodologies to be used by Ecopower in respect of the UpperChurch Grid Connection Project.

Dear Mr Williams.
I refer to our site inspections on 19 May, 2016 in respect to the above. A number of photographs were taken in relation to the different types of crossing. The photographs, reproduced below are accompanied with recommendations as to the type of crossing methodology that should be employed.

The fundamental driver is to minimise disruption of the aquatic habitat and the immediate riparian habitat. In terms of the aquatic habitat the main potential impact is the generation of silt. This is particularly the case in "open cut" crossings and it could be a knock-on effect on bands of spawning gravel and small fish in particular.

Currently the open season, in waters of "fisheries importance", for in-stream works has been reduced to July, August and September. This is a very tight window. Where it is applicable it is therefore desirable to get infrastructure in place during the open season. This of course does not apply to directional drilling operations it can be done at any time as they are unlikely to interfere with surface waters. The main item with directional drilling is the safe disposal of water which has been used as a lubricant and is carrying significant quantities of silt and debris.

The details in relation to the specific crossings that were inspected are as follows.

Photo 1. 34 W. This is U/S an old farm bridge using two 600 mm approx. concrete pipes. These pipes are too small. There woody debris on the upstream side and the apparent erosion of riverbank indicate that significant blockage of the pipes has occurred. If this bridge is being replaced IFI recommends that a box culvert should be the first choice alternatively large diameter pipes 1.2 m – 1.5 m should provide sufficient conveyance. Generally fisheries recommend between 300mm and 500mm embedment. In a small stream such as we have here probably 300

If the existing bridge is being replaced this would be an ideal location to either divert the channel off from the right bank or, depending on weather conditions, to have a pump over facility. In the event

IIE Luimneach, Páirc Gnó Cill Dhéagláin, Bóthar an Duga, Luimneach.
IFI Limerick, Ashbourne Business Park, Dock Road, Limerick.
+ 353 (0)61 300238 - limerick@fisheriesireland.ie - www.fisheriesireland.ie

of a pump over sandbags, containing washed sand could be used to form a dam to divert water into a prepared temporary channel. Alternatively a pump over system could be established. At all times a suitable splash plate should be in position downstream to ensure that energy dispersal from the waterjet is assured.

If a diversion channel is put in the channel should be lined with Teram, pinned to the banks, and a layer of crushed rock or round washed stone on the bed. There may be a requirement for electro-fishing of the area in between the sandbag dams upstream and downstream. The necessity for this can be determined on site. Prior to closing off the temporary bypass channel electro-fishing should take place so as to remove any fish in the temporary channel.

Photo 2. W34.
It is possible to discern the two relatively small diameter pipes currently used at this bridge. The section of concrete block wall in the left foreground is close to a state of collapse. On completion of the bridge or the directional drilling it would be desirable to use some small rock armour to delineate and tighten the river. It should be done both upstream and downstream

Photo 3. W35a.

This is a photo taken at W35a. This is on the right-hand side of an old bridle path (as you head north). There is very little flow here and no fisheries interest. A pump over and open cut operation would be ideal at this location. It would appear that no particular mitigation measures are required. Equally a directional drilling to go under this watercourse, the bridle path and watercourse W35 on the far side would be ideal.

2

Photo 4. W35.
This is the small watercourse to the left of the bridle path. There is gravel eminently suitable for trout spawning. At higher flows small trout would spawn in this River and juveniles might still be present.

If an open cut was proposed the area will need to be checked for the presence of fish which would need to be removed.

Directional drilling should not cause any problems and can be done at any season.

Photo 4. W36.
This is a larger watercourse circa 2 m in width. It is anticipated that directional drilling would take place at or beside the clump briars at this location on the left bank.
The woodland area would probably easily absorb soiled water from the directional drilling operation. The discharge would need to be monitored to ensure that direct discharges at another location do not take place.
Directional drilling can be done at any time
Dry gravel bank.

If flow levels are low and this season for in stream crossings is still open it should be possible to carry out an open cut and pump over. Ideally the backfill should be tamped to within say 8 inches of the bed level. It should then be filled over with river gravel and the dry bank of gravel shown on the right-hand side would be very suitable. The gravel can be removed down to 6 inches above water level at this location.

3

Photo 5. W34a.
This is a small watercourse that was identified as we were leaving this area.

It appears that there is a small amount of flow on the left-hand channel. The flow is seasonal. There is evidence of erosion under the pipes.
IFI recommend that after the cable is laid that the bed is backfilled with crushed rock to a point level with the lowest pipe.

It may also be necessary to put small amount of light cobble as rock armour against the clay banks on either side.
If this bridge is being replaced a 900mm diam. pipe would be the minimum requirement.

Photo 6. W33.
This is a directional drilling site going through bed rock under the Mulkear River.
On the left bank exposed fractured bedrock could be observed. This may be limestone or it could be a mudstone.

It is anticipated that this riffle area is being caused by bedrock.
The long pool upstream of this riffle is likely to be an important salmon resting area. It would be important to try and have this directional drilling completed before the run of salmon. Noise and vibration could disturb these fish.

Photo 6 a. W33.
This is a clearer photo showing the fractured bedrock on the left bank and the Riffle caused by the bed rock

4

Photos 7 & 8. W32.

These two photographs show a shallow watercourse with very sandy bottom. It is unlikely that this particular watercourse is of fisheries importance. However, applying the precautionary principle an inspection preferably using an electro-fishing gear should be undertaken.

It is likely that this would be crossed using an open cut method. At the location of the cut on both banks but particularly on the high left-hand bank rock armor should be bedded back into the exposed cut and along the foot of the bank upstream and downstream.

Yellow line shows typical open cut direction. Lower sections of the bank should be rock armoured especially as the soil is friable in this area.

Red arrows indicate placement of rock armor upstream and downstream

Conclusion.

The open cut options discussed will be time-dependent in terms of the open season for in stream works. The main thrust of the discussions centred on the prevention of pollution particularly from silt. Also the feasibility of the various options at the different crossing points was discussed. The selection of crossing points was typical of those to be found along the route.

IFI considers that all the crossings are possible during the open season. And directional drilling will facilitate crossing under any watercourse at any time. Main drawback will be the disposal of soiled water used for lubrication and grit removal from the drill line.

More detailed methodologies can be drafted prior to work commencing. Should you require further clarification on any point please do not hesitate to contact me.

Yours sincerely

Michael Fitzsimons

Michael Fitzsimons
pgDip, MSc, LLB(*Hons*), MCIWEM, C.WEM.
Senior Fisheries Environment Officer.

5

Official Consultation Response from DAU (Mr. Michael Murphy, October 2016)

An Roinn Ealaíon, Oidhreachta,
Gnóthaí Réigiúnacha, Tuaithe agus Gaeltachta

Department of Arts, Heritage,
Regional, Rural and Gaeltacht Affairs

28 October 2016 **Our Ref:** G Pre00048/2016

Mr Howard Williams,
INIS Environmental Consultants Ltd
Suite 11
Shannon Commercial Properties
Information Age Park
Gort Road
Ennis
County Clare

Re: Pre-planning notification Reg. Ref. No. G Pre00048/2016 by Inis Environmental Consultants: Preparation of an Ecology report etc for proposed grid connection at Mountphillips, Co Tipperary

A Chara,

I refer to your pre-planning enquiry in relation to the preparation of an ecology report etc for the proposed grid connection at Mountphillips, Co Tipperary

I can confirm that those documents submitted were assessed by NPWS and that following your meeting with Divisional Staff of NPWS that the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs has no further observations regarding nature conservation considerations.

These recommendations are based on the papers submitted to this Department on a pre-planning basis and are made without prejudice to any decision the Minister may take upon sight of a formal planning application.

Is mise le meas,

Michael Murphy

Michael Murphy,
Development Applications Unit
Tel: (053) 911 7516

A8-1.2.2 Desktop Review

A desktop review was conducted to inform scoping and identify features of ecological importance. The desktop review also included an appraisal of all sites designated for nature conservation under International and National legislation within a 15km radius of the Whole UWF Project. This enabled identification of any *possibly* significant impacts on habitats, flora and fauna, either terrestrial and/or aquatic, likely to arise from the construction and operation of the Whole UWF Project. Potential sites of conservation interest were identified by an examination of Ordnance Survey (OSI) mapping (1:50,000 scale), NPWS maps browser and detailed aerial photography (Bing maps).

Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Natural Heritage Areas (NHAs), Proposed Natural Heritage Areas (pNHAs) and records of protected species in the vicinity of the Whole UWF Project were identified. This information was obtained by accessing the website of the National Parks and Wildlife Service (NPWS) of the Department of the Environment, Heritage and Local Government.

A data request was also sent to NPWS GIS division for a full inventory of all protected and rare species recorded within pertinent 10km squares overlapping the Whole UWF Project. This data is presented in Table 2.

The database of the National Biodiversity Data Centre was also consulted to assess the presence of rare plant and faunal species and records of protected species reported within the primary 10km squares in which the Whole UWF Project is located. This data is presented in Table 3 to Table 8.

Due to the conditions of the data request with regard to the presentation of sensitive data as defined (https://www.npws.ie/sites/default/files/general/npws-sensitive-species.pdf), not all records are presented. In addition, the spatial resolution of each record is presented at 10 km scale in line with the condition that "data are provided on the understanding that users will not use the information to the detriment of individual species or habitats, biodiversity or the environment in general."

Information on water quality of the relevant watercourses was obtained from the EPA website and Chapter 11 Water.

Tables are presented overleaf in respect of the 10km grid squares within which the UWF Grid Connection, the Upperchurch Windfarm (UWF), UWF Related Works, UWF Replacement Forestry and elements of the UWF Other Activities (HA21-HA23) are located. Remaining elements of the UWF Other Activities (HA1-HA20) are located entirely on public roads. Plate 1, overleaf illustrates the 10km squares selected for review.

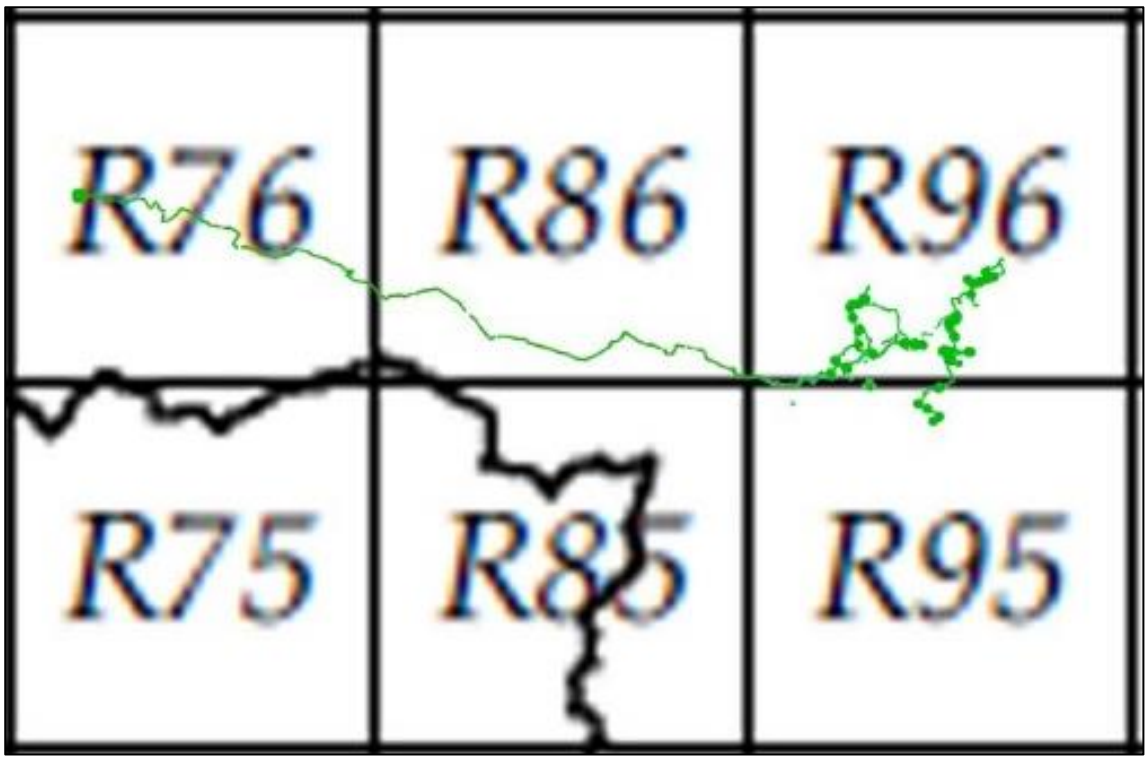


Plate 1: 10km squares selected for desktop review

Table 2 Records of legally protected and rare species, excluding sensitive species, held by the National Parks and Wildlife Service (https://www.npws.ie/maps-and-data/open-data-policy, 22/04/2016)

10 km Grid Square	Scientific Name	Common Name	Date of last record
R76	*Cephaloziella stellulifera*	Heath Threadwort	06/05/2008
R76	*Dama dama*	Fallow Deer	2004 - 2005
R76	*Eurodryas aurinia*	Marsh Fritillary	19/09/2004
R76	*Lampetra fluviatilis*	River Lamprey	Unknown
R76	*Lepus timidus subsp. hibernicus*	Irish Hare	2006 - 2007
R76	*Lutra lutra*	Otter	30/05/1980
R76	*Martes martes*	Pine Marten	2005 - 2006
R76	*Meles meles*	Badger	13/02/2007
R76	*Mustela erminea subsp. hibernica*	Irish Stoat	1969
R76	*Petromyzon marinus*	Sea Lamprey	Unknown
R76	*Rana temporaria*	Common Frog	19/02/2006
R76	*Sorex minutus*	Eurasian Pygmy Shrew	July 1970
R85	*Amblystegium fluviatile*	Brook-side Feather-moss	28/06/2005
R85	*Dama dama*	Fallow Deer	2004 - 2005
R85	*Entosthodon fascicularis*	Hasselquist's Hyssop	28/06/2005
R85	*Lutra lutra*	Otter	02/09/2010
R85	*Martes martes*	Pine Marten	2005 - 2006
R85	*Meles meles*	Badger	15/02/1991
R85	*Mustela erminea subsp. hibernica*	Irish Stoat	01/06/2005
R85	*Philonotis caespitosa*	Tufted Apple-moss	28/06/2005
R85	*Rana temporaria*	Common Frog	03/05/2011
R85	*Sciurus vulgaris*	Red Squirrel	15/02/1991
R86	*Cladonia portentosa*	Reindeer Moss	26/08/2003
R86	*Dama dama*	Fallow Deer	2004 - 2005
R86	*Lepus timidus subsp. hibernicus*	Irish Hare	24/09/1990
R86	*Lutra lutra*	Otter	20/09/2010
R86	*Meles meles*	Badger	24/09/1990
R86	*Rana temporaria*	Common Frog	23/02/2011

10 km Grid Square	Scientific Name	Common Name	Date of last record
R86	*Sphagnum subnitens*	Lustrous Bog-moss	11/06/2005
R95	*Austropotamobius pallipes*	Freshwater Crayfish	07/06/2006
R95	*Dama dama*	Fallow Deer	2004 - 2005
R95	*Lepus timidus subsp. hibernicus*	Irish Hare	28/02/1990
R95	*Lutra lutra*	Otter	20/10/2010
R95	*Meles meles*	Badger	28/02/1990
R96	*Austropotamobius pallipes*	Freshwater Crayfish	03/09/2008
R96	*Bromus racemosus*	Smooth Brome	1969
R96	*Cladonia portentosa*	Reindeer Moss	Unknown
R96	*Dama dama*	Fallow Deer	2004 - 2005
R96	*Lepus timidus subsp. hibernicus*	Irish Hare	08/05/1990
R96	*Lutra lutra*	Otter	30/08/2010
R96	*Meles meles*	Badger	08/05/1990
R96	*Rana temporaria*	Common Frog	13/04/2006
R96	*Sorex minutus*	Eurasian Pygmy Shrew	May 1969

Table 3 Records of legally protected mammal species held by the National Biodiversity Data Centre (www.biodiversityireland.ie, 20/04/2016)

10 km Grid Square	Scientific name	Common name	Record count	Date of last record	EU HD Annex II	EU HD Annex IV	EU HD Annex V	Wildlife Acts
R76	*Lutra lutra*	European Otter	5	30/05/1980	X	X		X
R76	*Martes martes*	Pine Marten	5	21/05/2014			X	X
R76	*Meles meles*	Eurasian Badger	72	17/02/2011				X
R76	*Myotis daubentonii*	Daubenton's Bat	26	23/08/2014		X		X
R76	*Nyctalus leisleri*	Lesser Noctule	1	09/10/2009		X		X
R76	*Pipistrellus pipistrellus sensu lato*	Pipistrelle	2	09/10/2009		X		X
R76	*Pipistrellus pygmaeus*	Soprano Pipistrelle	3	09/10/2009		X		X
R76	*Sciurus vulgaris*	Eurasian Red Squirrel	6	29/12/2015				X
R76	*Sorex minutus*	Eurasian Pygmy Shrew	1	31/07/1970				X
R86	*Lutra lutra*	European Otter	8	20/09/2010	X	X		X
R86	*Myotis daubentonii*	Daubenton's Bat	23	28/08/2009		X		X
R86	*Myotis nattereri*	Natterer's Bat	1	28/10/2011		X		X
R86	*Nyctalus leisleri*	Lesser Noctule	1	28/06/2008		X		X
R86	*Pipistrellus pipistrellus sensu lato*	Pipistrelle	1	28/06/2008		X		X
R86	*Pipistrellus pygmaeus*	Soprano Pipistrelle	1	28/06/2008		X		X
R86	*Martes martes*	Pine Marten	5	21/05/2014			X	X
R86	*Cervus elaphus*	Red Deer	1	31/12/2008				X
R86	*Meles meles*	Eurasian Badger	51	19/03/2009				X
R86	*Sciurus vulgaris*	Eurasian Red Squirrel	2	12/04/2011				X
R95	*Lutra lutra*	European Otter	8	20/08/2012	X	X		X
R95	*Martes martes*	Pine Marten	2	17/07/2009			X	X
R95	*Meles meles*	Eurasian Badger	75	19/05/2009				X
R95	*Myotis daubentonii*	Daubenton's Bat	1	08/08/2009		X		X
R95	*Nyctalus leisleri*	Lesser Noctule	1	08/08/2009		X		X
R95	*Pipistrellus pipistrellus sensu lato*	Pipistrelle	1	08/08/2009		X		X

10 km Grid Square	Scientific name	Common name	Record count	Date of last record	EU HD Annex II	EU HD Annex IV	EU HD Annex V	Wildlife Acts
R95	*Pipistrellus pygmaeus*	Soprano Pipistrelle	2	08/08/2009		X		X
R95	*Sciurus vulgaris*	Eurasian Red Squirrel	2	03/04/2015				X
R96	*Lutra lutra*	European Otter	6	30/08/2010	X	X		X
R96	*Myotis daubentonii*	Daubenton's Bat	1	08/08/2009		X		X
R96	*Nyctalus leisleri*	Lesser Noctule	1	08/08/2009		X		X
R96	*Pipistrellus pipistrellus sensu lato*	Pipistrelle	2	08/08/2009		X		X
R96	*Pipistrellus pygmaeus*	Soprano Pipistrelle	2	08/08/2009		X		X
R96	*Plecotus auritus*	Brown Long-eared Bat	1	08/08/2009		X		X
R96	*Martes martes*	Pine Marten	4	28/05/2014			X	X
R96	*Erinaceus europaeus*	West European Hedgehog	1	12/08/2012				X
R96	*Meles meles*	Eurasian Badger	67	16/09/2008				X
R96	*Sciurus vulgaris*	Eurasian Red Squirrel	3	03/06/2015				X

Table 4 Records of legally protected bird species held by the National Biodiversity Data Centre (www.biodiversityireland.ie, 20/04/2016)

Grid square	Scientific name	Common name	Record count	Date of last record	EU BD Annex I	EU BD Annex II	EU BD Annex III	Wildlife Acts
R76	*Alauda arvensis*	Sky Lark	11	19/04/2014				X
R76	*Alcedo atthis*	Common Kingfisher	7	31/12/2011	X			X
R76	*Anas platyrhynchos*	Mallard	16	31/12/2011		X	X	X
R76	*Anser anser*	Greylag Goose	6	31/12/2011		X	X	X
R76	*Apus apus*	Common Swift	1	31/07/1972				X
R76	*Carduelis cannabina*	Common Linnet	8	31/12/2011				X
R76	*Circus cyaneus*	Hen Harrier	8	31/12/2011	X			X
R76	*Columba oenas*	Stock Pigeon	1	31/07/1972				X
R76	*Columba palumbus*	Common Wood Pigeon	32	31/12/2011		X	X	X
R76	*Crex crex*	Corn Crake	2	31/07/1991	X			X
R76	*Cygnus olor*	Mute Swan	2	31/12/2011				X
R76	*Delichon urbicum*	House Martin	7	31/12/2011				X
R76	*Emberiza citrinella*	Yellowhammer	1	31/07/1972				X
R76	*Falco columbarius*	Merlin	1	07/01/2014	X			X
R76	*Falco tinnunculus*	Common Kestrel	14	31/12/2011				X
R76	*Gallinago gallinago*	Common Snipe	9	31/12/2011		X	X	X
R76	*Hirundo rustica*	Barn Swallow	17	31/12/2011				X
R76	*Lagopus lagopus*	Red Grouse	5	31/12/2011		X	X	X
R76	*Larus canus*	Mew Gull	2	31/12/2011				X
R76	*Larus ridibundus*	Black-headed Gull	7	31/12/2011				X
R76	*Locustella naevia*	Common Grasshopper Warbler	6	31/12/2011				X
R76	*Muscicapa striata*	Spotted Flycatcher	11	31/12/2011				X
R76	*Numenius arquata*	Eurasian Curlew	7	31/12/2011		X		X
R76	*Passer domesticus*	House Sparrow	20	31/12/2011				X
R76	*Phalacrocorax carbo*	Great Cormorant	3	31/12/2011				X
R76	*Phasianus colchicus*	Common Pheasant	16	31/12/2011		X	X	X
R76	*Pluvialis apricaria*	European Golden Plover	2	31/12/2011	X	X	X	X
R76	*Riparia riparia*	Sand Martin	5	31/12/2011				X

Grid square	Scientific name	Common name	Record count	Date of last record	EU BD Annex I	EU BD Annex II	EU BD Annex III	Wildlife Acts
R76	*Scolopax rusticola*	Eurasian Woodcock	1	31/07/1972		X	X	X
R76	*Sturnus vulgaris*	Common Starling	24	31/12/2011				X
R76	*Tyto alba*	Barn Owl	2	31/12/2011				X
R76	*Vanellus vanellus*	Northern Lapwing	3	31/12/2011		X		X
R86	*Falco peregrinus*	Peregrine Falcon	3	31/12/2011	X			X
R86	*Circus cyaneus*	Hen Harrier	5	31/12/2011	X			X
R86	*Falco columbarius*	Merlin	4	31/12/2011	X			X
R86	*Anas platyrhynchos*	Mallard	3	31/12/2011		X	X	X
R86	*Columba palumbus*	Common Wood Pigeon	14	31/12/2011		X	X	X
R86	*Phasianus colchicus*	Common Pheasant	11	31/12/2011		X	X	X
R86	*Lagopus lagopus*	Red Grouse	8	07/01/2016		X	X	X
R86	*Anas crecca*	Eurasian Teal	1	31/07/1972		X	X	X
R86	*Lymnocryptes minimus*	Jack Snipe	2	31/12/2011				
R86	*Gallinago gallinago*	Common Snipe	10	31/12/2011		X	X	X
R86	*Scolopax rusticola*	Eurasian Woodcock	3	31/07/1991		X	X	X
R86	*Numenius arquata*	Eurasian Curlew	5	31/12/2011				
R86	*Alauda arvensis*	Sky Lark	11	31/12/2011				X
R86	*Carduelis cannabina*	Common Linnet	9	31/12/2011				X
R86	*Delichon urbicum*	House Martin	6	31/07/1991				X
R86	*Falco tinnunculus*	Common Kestrel	11	31/12/2011				X
R86	*Hirundo rustica*	Barn Swallow	9	31/12/2011				X
R86	*Locustella naevia*	Common Grasshopper Warbler	2	31/12/2011				X
R86	*Muscicapa striata*	Spotted Flycatcher	4	31/12/2011				X
R86	*Passer domesticus*	House Sparrow	14	31/12/2011				X
R86	*Riparia riparia*	Sand Martin	1	31/12/2011				X
R86	*Sturnus vulgaris*	Common Starling	14	31/12/2011				X
R86	*Emberiza citrinella*	Yellowhammer	4	31/07/1991				X
R95	*Alauda arvensis*	Sky Lark	6	31/12/2011				X

Grid square	Scientific name	Common name	Record count	Date of last record	EU BD Annex I	EU BD Annex II	EU BD Annex III	Wildlife Acts
R95	*Alcedo atthis*	Common Kingfisher	1	31/07/1972	X			X
R95	*Anas platyrhynchos*	Mallard	7	31/12/2011		X	X	X
R95	*Apus apus*	Common Swift	7	31/07/1991				X
R95	*Carduelis cannabina*	Common Linnet	11	31/12/2011				X
R95	*Circus cyaneus*	Hen Harrier	7	31/12/2011	X			X
R95	*Columba oenas*	Stock Pigeon	3	31/07/1991				X
R95	*Columba palumbus*	Common Wood Pigeon	17	31/12/2011		X	X	X
R95	*Crex crex*	Corn Crake	1	31/07/1972	X			X
R95	*Delichon urbicum*	House Martin	7	31/12/2011				X
R95	*Emberiza citrinella*	Yellowhammer	1	31/07/1972				X
R95	*Falco peregrinus*	Peregrine Falcon	1	28/07/2012				X
R95	*Falco tinnunculus*	Common Kestrel	8	31/12/2011				X
R95	*Gallinago gallinago*	Common Snipe	7	31/12/2011		X	X	X
R95	*Hirundo rustica*	Barn Swallow	13	31/12/2011				X
R95	*Lagopus lagopus*	Red Grouse	1	31/07/1972		X	X	X
R95	*Larus argentatus*	Herring Gull	2	31/07/1991				X
R95	*Larus ridibundus*	Black-headed Gull	1	31/12/2011				X
R95	*Locustella naevia*	Common Grasshopper Warbler	1	31/07/1972				X
R95	*Muscicapa striata*	Spotted Flycatcher	5	31/12/2011				X
R95	*Numenius arquata*	Eurasian Curlew	1	31/07/1972		X		X
R95	*Passer domesticus*	House Sparrow	7	31/12/2011				X
R95	*Phasianus colchicus*	Common Pheasant	13	31/12/2011		X	X	X
R95	*Riparia riparia*	Sand Martin	3	31/07/1991				X
R95	*Scolopax rusticola*	Eurasian Woodcock	1	31/07/1972		X	X	X
R95	*Sturnus vulgaris*	Common Starling	11	31/12/2011				X
R95	*Vanellus vanellus*	Northern Lapwing	2	31/07/1991		X		X
R96	*Alcedo atthis*	Common Kingfisher	2	31/07/1991	X			X
R96	*Circus cyaneus*	Hen Harrier	11	18/04/2015	X			X
R96	*Falco columbarius*	Merlin	2	31/07/1991	X			X

Grid square	Scientific name	Common name	Record count	Date of last record	EU BD Annex I	EU BD Annex II	EU BD Annex III	Wildlife Acts
R96	*Crex crex*	Corn Crake	1	31/07/1972	X			X
R96	*Columba livia*	Rock Pigeon	4	31/12/2011		X		X
R96	*Anas platyrhynchos*	Mallard	3	31/07/1991		X	X	X
R96	*Columba palumbus*	Common Wood Pigeon	24	31/12/2011		X	X	X
R96	*Phasianus colchicus*	Common Pheasant	14	31/12/2011		X	X	X
R96	*Lagopus lagopus*	Red Grouse	4	31/07/1991		X	X	X
R96	*Fulica atra*	Common Coot	1	31/07/1972		X	X	X
R96	*Gallinago gallinago*	Common Snipe	9	31/12/2011		X	X	X
R96	*Numenius arquata*	Eurasian Curlew	7	31/12/2011		X		X
R96	*Vanellus vanellus*	Northern Lapwing	2	31/07/1991		X		X
R96	*Alauda arvensis*	Sky Lark	13	31/12/2011				X
R96	*Carduelis cannabina*	Common Linnet	15	31/12/2011				X
R96	*Columba oenas*	Stock Pigeon	1	31/07/1972				X
R96	*Delichon urbicum*	House Martin	12	31/12/2011				X
R96	*Falco tinnunculus*	Common Kestrel	14	31/12/2011				X
R96	*Hirundo rustica*	Barn Swallow	17	31/12/2011				X
R96	*Larus canus*	Mew Gull	3	31/07/1991				X
R96	*Locustella naevia*	Common Grasshopper Warbler	3	31/12/2011				X
R96	*Muscicapa striata*	Spotted Flycatcher	5	31/12/2011				X
R96	*Oenanthe oenanthe*	Northern Wheatear	2	31/07/1991				X
R96	*Passer domesticus*	House Sparrow	22	31/12/2011				X
R96	*Riparia riparia*	Sand Martin	3	31/12/2011				X
R96	*Sturnus vulgaris*	Common Starling	19	31/12/2011				X
R96	*Tachybaptus ruficollis*	Little Grebe	1	31/07/1972				X
R96	*Emberiza citrinella*	Yellowhammer	3	31/07/1991				X
R96	*Larus argentatus*	Herring Gull	2	31/12/2011				X
R96	*Larus ridibundus*	Black-headed Gull	8	31/12/2011				X

Table 5 Records of legally protected amphibian species held by the National Biodiversity Data Centre (www.biodiversityireland.ie, 20/04/2016)

Grid square	Scientific name	Common name	Record count	Date of last record	EU HD Annex V	Wildlife Acts
R76	*Rana temporaria*	Common Frog	9	19/02/2006	X	X
R86	*Rana temporaria*	Common Frog	1	26/03/2006	X	X
R96	*Rana temporaria*	Common Frog	12	01/05/2006	X	X

Table 6 Records of legally protected butterfly species held by the National Biodiversity Data Centre (www.biodiversityireland.ie, 20/04/2016)

Grid square	Scientific name	Common name	Record count	Date of last record	ED HD Annex II
R76	*Euphydryas aurinia*	Marsh Fritillary	6	31/12/1984	X
R86	*Euphydryas aurinia*	Marsh Fritillary	1	31/12/2010	X
R95	*Euphydryas aurinia*	Marsh Fritillary	7	31/12/2010	X

Table 7 Records of legally protected bryophyte species held by the National Biodiversity Data Centre (www.biodiversityireland.ie, 20/04/2016)

Grid square	Scientific name	Common name	Record count	Date of last record	EU HD Annex IV
R86	*Leucobryum glaucum*	Large White-moss	1	21/08/1979	IV

Table 8 Records of legally protected crustacean species held by the National Biodiversity Data Centre (www.biodiversityireland.ie, 20/04/2016)

Grid square	Scientific name	Common name	Record count	Date of last record	EU HD Annex II	Wildlife Acts
R95	*Austropotamobius pallipes*	Freshwater White-clawed Crayfish	6	07/06/2006	X	X
R96	*Austropotamobius pallipes*	Freshwater White-clawed Crayfish	8	03/09/2008	X	X

Table 9 Records of non-native invasive species held by the National Biodiversity Data Centre (www.biodiversityireland.ie, 20/04/2016)

Grid square	Species group	Scientific name	Common name	Record count	Date of last record	Medium Impact	High Impact	Wildlife Acts
R76	Flowering plant	Acer pseudoplatanus	Sycamore	1	21/10/2008	X		
R76	Flowering plant	Gunnera tinctoria	Giant-rhubarb	1	17/09/2008		X	
R76	Flowering plant	Heracleum mantegazzianum	Giant Hogweed	4	31/05/2009		X	
R76	Terrestrial mammal	Cervus nippon	Sika Deer	1	12/01/2009		X	X
R76	Terrestrial mammal	Dama dama	Fallow Deer	6	30/04/2009			
R76	Terrestrial mammal	Mustela vison	American Mink	1	01/06/2015		X	
R76	Terrestrial mammal	Myodes glareolus	Bank Vole	2	17/11/2010	X		
R76	Terrestrial mammal	Oryctolagus cuniculus	European Rabbit	1	06/04/1990	X		
R76	Terrestrial mammal	Sciurus carolinensis	Eastern Grey Squirrel	1	31/12/2001		X	
R86	Flowering plant	Fallopia japonica	Japanese Knotweed	1	28/06/2014		X	
R86	Flowering plant	Heracleum mantegazzianum	Giant Hogweed	1	18/09/2008		X	
R86	Flowering plant	Impatiens glandulifera	Indian Balsam	1	17/09/2008		X	
R86	Terrestrial mammal	Sciurus carolinensis	Eastern Grey Squirrel	1	31/12/2001		X	
R86	Terrestrial mammal	Dama dama	Fallow Deer	11	28/11/2011		X	X
R86	Terrestrial mammal	Oryctolagus cuniculus	European Rabbit	1	24/09/1990	X		
R95	Conifer	Pseudotsuga menziesii	Douglas Fir	1	04/09/2007	X		
R95	Flowering plant	Acer pseudoplatanus	Sycamore	2	24/09/2007	X		
R95	Flowering plant	Fallopia japonica	Japanese Knotweed	2	22/04/2010		X	
R95	Flowering plant	Heracleum mantegazzianum	Giant Hogweed	1	04/09/2007		X	
R95	Flowering plant	Leycesteria formosa	Himalayan Honeysuckle	1	04/09/2007	X		

Grid square	Species group	Scientific name	Common name	Record count	Date of last record	Medium Impact	High Impact	Wildlife Acts
R95	Flowering plant	Prunus laurocerasus	Cherry Laurel	1	24/09/2007		X	
R95	Flowering plant	Quercus rubra	Red Oak	1	04/09/2007	X		
R95	Mollusc	Cornu aspersum	Common Garden Snail	1	19/07/1971	X		
R95	Terrestrial mammal	Crocidura russula	Greater White-toothed Shrew	3	24/08/2012	X		
R95	Terrestrial mammal	Dama dama	Fallow Deer	2	31/12/2008		X	X
R95	Terrestrial mammal	Myodes glareolus	Bank Vole	1	24/08/2012	X		
R95	Terrestrial mammal	Oryctolagus cuniculus	European Rabbit	1	28/02/1990	X		
R96	Flowering plant	Acer pseudoplatanus	Sycamore	4	22/09/2008	X		
R96	Mollusc	Cornu aspersum	Common Garden Snail	3	19/09/1977	X		
R96	Mollusc	Potamopyrgus antipodarum	Jenkins' Spire Snail	1	19/09/1977	X		
R96	Mollusc	Tandonia sowerbyi	Keeled Slug	1	19/09/1977	X		
R96	Terrestrial mammal	Cervus nippon	Sika Deer	1	11/09/2013		X	X
R96	Terrestrial mammal	Dama dama	Fallow Deer	2	25/10/2011		X	X
R96	Terrestrial mammal	Crocidura russula	Greater White-toothed Shrew	1	14/11/2010	X		
R96	Terrestrial mammal	Myodes glareolus	Bank Vole	1	14/11/2010	X		
R96	Terrestrial mammal	Oryctolagus cuniculus	European Rabbit	1	08/05/1990	X		

A8-1.2.2.1 Bats

National landscape suitability maps for Irish bat species (Lundy *et al.,* 2010) were reviewed using the Map Viewer of the National Biodiversity Data Centre. The suitability index for the 'all bats combined' layer varies across the Whole UWF Project; areas of high suitability are found in the environs of Mountphilips at the western extremity of the UWF Grid Connection, moderate suitability and low suitability along the centre of the UWF Grid Connection route and finally moderate suitability within the environs of UWF Related Works, UWF Replacement Forestry and the Upperchurch Windfarm. Overall, the landscape suitability follows a consistent west to east pattern of decreasing suitability for all species, which roughly corresponds with the changes in altitude.

With regard to the UWF Other Activities, areas comprising very high suitability are to be found at the western end of the Whole UWF Project near Foynes and Limerick. Further elements of UWF Other Activities near Thurles are in areas of high suitability, while the haulage route between Thurles and Limerick crosses areas of moderate and high suitability. Due to the small scale of works for the UWF Other Activities (predominantly street furniture removal), no source pathway linkages were identified for Bats, and these locations were therefore excluded from further desktop review.

Records of known bat roosts within 10km of the UWF Grid Connection were obtained from the Bat Conservation Ireland database on the 5th September 2016. Eighteen roosts were identified, but all were located more than 5km from the UWF Grid Connection; most were from the banks of the River Shannon, and a small number were from the towns of Murroe (Glenstal Abbey), Ballyvoureen and Silvermines in County Tipperary. This study zone also includes the UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm Locations.

There were a number of activity records of Daubenton's bat, common pipistrelle, soprano pipistrelle and Leisler's bat within 10km of the Whole UWF Project, with a few records of Natterer's bat and brown long-eared bat. Project Elements 1-4 are located just outside the geographical range of the lesser horseshoe bat, as the closest desktop records of this species were at Annacotty, Co. Limerick and Doonass, Co. Clare, approximately 8-10km to the west of the UWF Grid Connection.

Landscape suitability in respect of Bats as available from the above cited source is illustrated overleaf in Plate 2.

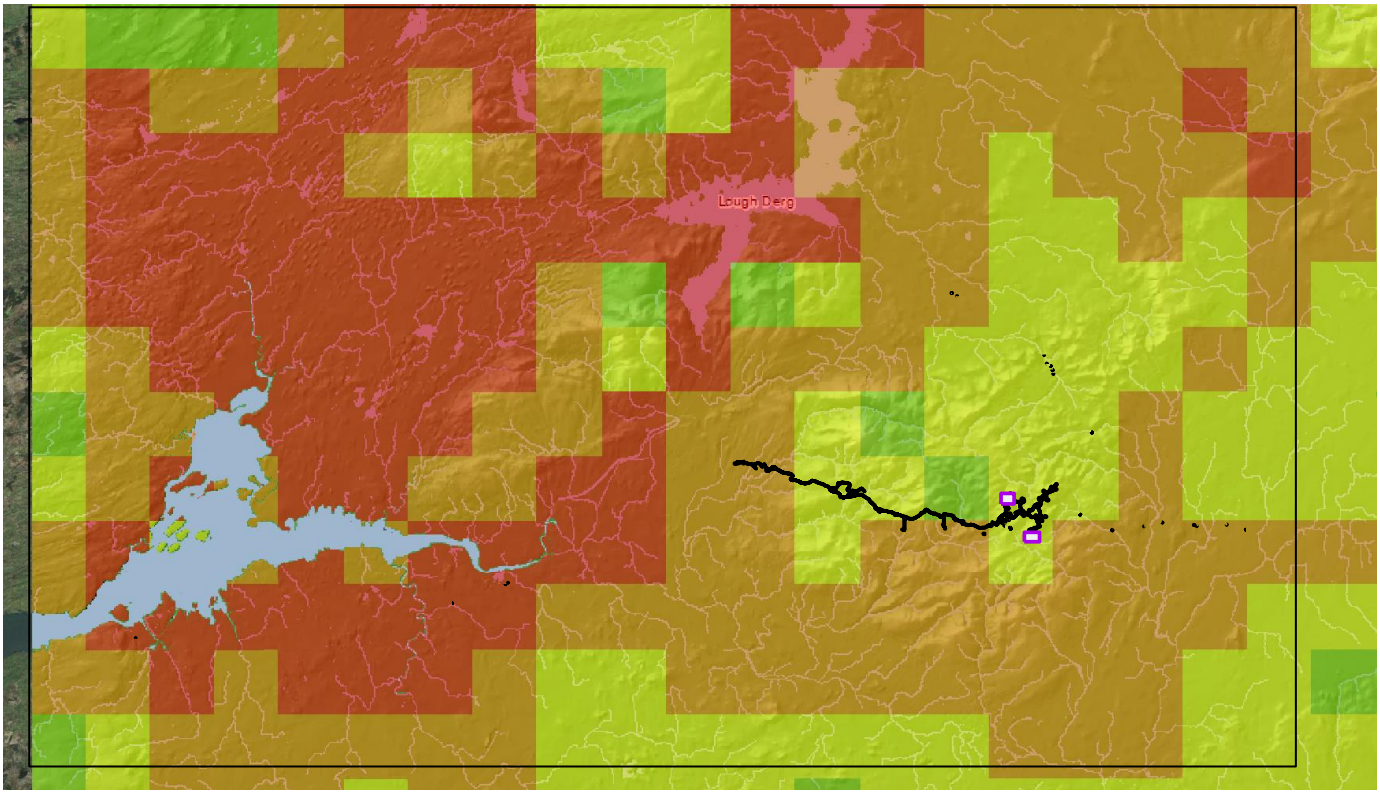


Plate 2: Bat Suitability Areas as per National Bat Suitability Landscape Mapping
(Those areas shown in red have the highest habitat suitability index, and those in green, the lowest suitability index. However, squares highlighted as less favourable may still have local areas of abundance).

A8-1.2.3 Fieldwork

A8-1.2.3.1 Fieldwalking (Scoping)

An initial scoping visit was conducted by INIS ecologists Mr. Howard Williams CEnv MCIEEM MRSB CBiol MIFM, Ms. Sarah Ingham MSc ACIEEM and Mr. Domhnall Finch MSc GradCIEEM on December 8th 2015, in collaboration with the Ecopower Developments Ltd project design team and other sub consultants. The entire route of the UWF Grid Connection was travelled by the team as part of this scoping exercise. The purpose of this visit was to gain an on-site overview of the UWF Grid Connection, as well as an opportunity for the specialists of the disciplines in ecology, hydrology and archaeology to consult with one another and with the developer's design team to ensure the least intrusive route would be applied for this project.

A8-1.2.3.2 Habitat Surveys

Existing habitat information was reviewed to identify potentially sensitive habitats following a data request made to the NPWS. A further walkover of the UWF Grid Connection in January 2016 also allowed potentially sensitive areas to be identified prior to commencing habitat surveys.

All habitat surveys undertaken for the Whole UWF Project followed best practice guidance (Smith *et al.*, 2011) and utilised the habitat classification presented in Fossitt (2000). All habitats within a 50-m buffer of work locations were surveyed and classified to level 3. All surveys were carried out in good weather with no constraints.

Table 10 Dates of habitat surveys undertaken on all elements of the Whole UWF Project during 2016 and 2017.

Project Element	2016	2017	2018
UWF Grid Connection	11th to 13th January 22nd and 23rd March 6th April 7th June 15th August 2nd September 22nd September	5th and 6th April 3rd August	
UWF Other Activities		24th and 25th June	17th, 18th and 19th January
UWF Related Works		13th July	
UWF Replacement Forestry		6th September	

With regard to previous habitat surveys within the Upperchurch Windfarm (Ecopower Developments Ltd., 2013), the methodology also followed best practice guidance (Smith *et al.*, 2011) and utilised the habitat classification presented in Fossitt (2000). The results of Habitat surveys are presented in Section 8.2.3.5.

A8-1.2.3.3 Hen Harrier

Following scoping and formal consultation with NPWS as described, it was established that, based on likely sensitivities, and source-pathways linkages in respect of disturbance and displacement, the primary objective of Hen Harrier surveys should be to identify all Hen Harrier breeding and winter roosting sites in suitable habitat within a 2km radius of proposed works (i.e. any likely source stimulus in terms of disturbance or displacement –with the distance of 2km being the radius stipulated by SNH guidance). This approach was formulated in consultations with NPWS and is supported in SNH guidance. By virtue of the prior appraisal of Upperchurch Windfarm, breeding occupancy and presence of winter roosts has already been established for those areas of habitat within and proximal to the Upperchurch Windfarm, which includes the UWF Related Works, and elements of the UWF Other Activities. Remaining elements of the UWF Other Activities were scoped out for further appraisal in terms of impact pathways on breeding or winter roosting Hen Harrier, due to distance from Hen Harrier habitat, location on public roads and the minimal nature of works involved (e.g. the lifting and re-instatement of street furniture). The proposed telecom relay pole at Knockmaroe was scoped out as a source-impact-pathway for collision mortality as there are no records of Hen Harrier collision and/or mortality with structures of this size and nature. As no breeding habitat is present at the Mountphilips substation location, then this was scoped out as a likely source of disturbance/displacement to breeding birds, in addition the distance to nearest Hen Harrier habitat and absence of records of collision mortality with buildings/structures such as sub-stations imply collision mortality is not a risk. UWF Replacement Forestry was also scoped out as no breeding or winter roosting habitat is present. Survey effort therefore was concentrated on the UWF Grid Connection, in particular areas of high habitat suitability (as per SNH Guidance) within 2km, and which by default coincide with the SPA designation present.

Accordingly, the methodology selected was that published by SNH in respect of breeding raptor surveys (Hardey *et al.,* 2013), which describes the survey techniques to establish breeding occupancy by Hen Harrier. This method corresponds to that utilized to date in National Surveys for the species in the republic (e.g. Ruddock *et al.,* 2012, 2015) and also research into the species (Irwin *et al.,* 2015 and Wilson *et al.,* 2015).

Existing records of Hen Harrier usage of the area, dating back to 2003, were collated to establish suitable nesting or roosting habitat. Satellite imagery was additionally reviewed to identify areas of potentially suitable breeding habitat. NPWS Conservation Rangers and local bird experts with knowledge of existing and historical Hen Harrier nest record locations were consulted for further information.

For breeding season surveys to establish nesting attempts, 12 vantage points were ground-truthed (for visibility) and fixed. These vantage points were used during the 2016 (March to June inclusive) and 2017 (March to August inclusive) breeding seasons. Additional effort in the months of July and August was added to surveys in 2017 as some nesting attempts occurred later than the previous year.

For winter roost surveys 7 of the preceding 12 vantage points were employed during the winter 2016/17 period. The rationale for decreasing the number of VPs from 12 in the breeding period to 7 during the winter period was based on the requirement to focus survey efforts on suitable roosting habitat within the study area – of which there is less. Additional Survey effect was carried out in September, October and November 2017.

In terms of collision mortality there are no source impact pathways identified as effects from the telecom relay pole (part of UWF Related Works) are scoped out and the windfarm is already consented; similarly the substation element of the UWF Grid Connection is not considered to pose a collision risk with remaining elements of the UWF Grid Connection at ground level or below.

Although therefore not a formal flight activity survey to inform a collision risk model; as an approach to standardise effort, each VP received six hours of survey effort per month as per Best Practice (SNH, 2014).

Results of Hen Harrier surveys are presented in Section 8.2.3.2.

Breeding Season Vantage Points

All observations were restricted to hours of daylight (range 06.45-20.35). All 12 vantage points focused on suitable nesting habitat and historical nest locations within 2km of the UWF Grid Connection.

The grid references for VP locations (ITM) are presented in Table 11.

Locations of Vantage points are included in **Figures CG 8.6, RW 8.6, RF 8.6 and CE 8.6 of Volume C3 EIA Report Figures.**

Table 11 Fixed vantage point locations (UWF Grid Connection)

Vantage Point	ITM Grid Reference
1	590503 E 659845 N
2	590263 E 663064 N
3	588454 E 657845 N
4	585164 E 659385 N
5	584216 E 660366 N
6	584744 E 661484 N
7	583015 E 662754 N
8	580275 E 661364 N
9	580495 E 662744 N
10	579726 E 664434 N
11	576626 E 664763 N
12	575976 E 662474 N

Winter Roost Vantage Points

Winter surveys were stratified to coincide with dawn and dusk periods, as per Best Practice guidance (SNH, 2014 and guidance for the Irish Winter Hen Harrier Roost Survey (IWHHRS) from O'Donoghue, 2010), to establish the locations of communal roosts. Dawn surveys commenced one hour before sunrise and continued for two hours after (range of earliest start to latest finish: 06.10-11.00) and dusk surveys commenced two hours prior to sunset and continued for one hour after (range of earliest start to latest finish: 13.58-20.30). Grid references of vantage points utilised as provided in Table 12.

Table 12 Fixed vantage points selected for winter roost surveys (UWF Grid Connection)

Vantage Point	ITM Grid Reference
2	590263 E 663064 N
3	588454 E 657845 N
5	584216 E 660366 N
6	584744 E 661484 N
10	579726 E 664434 N
11	576626 E 664763 N
12	575976 E 662474 N

Data Recorded During Vantage Point Surveys

For each vantage point watch (both breeding and winter period) the following parameters were recorded:

- Vantage Point number;
- Date of watch;
- Watch period;
- Weather conditions including visibility, wind-force and direction and precipitation;
- Notes – any notes on other birds of prey or potentially disturbing activity etc.

When a Hen Harrier was observed, the following information was recorded:

- Sighting number during that watch;
- Time of sighting;
- Sex of Hen Harrier;
- Approximate height of flight (in meters);
- Habitat over which bird was flying – see Table 13 for habitat codes used;
- The activity of the bird – see Table 14 for activity codes used;
- The duration of the activity;
- Notes – any more information on behaviour of bird(s), nesting location estimates, roosting location estimates.

Table 13 Habitat codes recorded during VP watches

Code	Habitats
G	Grazing
RG	Rough Grazing
HB	Heath or bog
DE	Deciduous woodland or scrub
GO	Gorse
CF	Clear fell
NF2	New forestry plantation trees 20-30cm high
NF3	New forestry plantation trees c 1m high
NF4	New forestry plantation trees > 2m high
2nd F1/F2	Second rotation forestry plantation trees 20-30cm high
2nd F3	Second rotation forestry plantation trees c 1m high
2nd F4	Second rotation forestry plantation trees > 2m high
F	Post thicket forestry

Table 14 Activity and behaviour codes recorded during watches

Code	Behaviour or activity
S	Soaring
D	Displaying
H	Hunting
Fl	Flying
C	Circling
P	Perching

Table 15 Details of timing, duration and weather conditions for vantage point surveys undertaken during the breeding season in 2016

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
1	11/03/2016	GP	None	8	10	1	SW	10	09:10	12:10	10800
1	15/03/2016	GP	None	2	10	2	E	10	13:40	16:40	10800
2	15/03/2016	GP	None	2	10	3	E	9	10:30	13:30	10800
2	21/03/2016	GP	None	8	5	1	NW	11	14:30	17:30	10800
3	11/03/2016	GP	None	8	10	2	SW	13	13:15	16:15	10800
3	13/03/2016	GP	None	8	10	1	SE	13	15:15	18:15	10800
4	12/03/2016	GP	None	6	10	2	S	10	08:15	11:15	10800
4	21/03/2016	GP	None	8	5	1	NW	9	11:30	14:30	10800
4	21/03/2016	GP	None	8	5	1	NW	9	11:30	14:30	10800
5	12/03/2016	GP	Light	8	10	2	S	11	11:30	14:30	10800
5	13/03/2016	GP	None	7	10	2	SE	15	12:00	15:00	10800
6	12/03/2016	GP	None	8	10	2	S	12	14:35	17:35	10800
6	21/03/2016	GP	Mist	8	2	1	NW	8	08:00	11:00	10800
6	21/03/2016	GP	None	8	2	0	NW	8	08:00	11:00	10800
6	21/03/2016	GP	None	8	2	0	NW	8	08:00	11:00	10800
6	21/03/2016	GP	None	8	2	0	NW	8	08:00	11:00	10800
6	21/03/2016	GP	None	8	2	0	NW	8	08:00	11:00	10800
7	13/03/2016	GP	None	8	10	2	SE	9	08:45	11:45	10800
7	14/03/2016	GP	None	2	10	2	E	14	14:40	17:40	10800
8	15/03/2016	RMD	None	7	5	1	SE	10	15:30	18:30	10800
8	16/03/2016	RMD	None	5	2	1	SE	7	09:30	12:30	10800
9	16/03/2016	RMD	None	8	2	1	SE	11	12:30	18:30	21600
9	16/03/2016	RMD	None	8	2	1	SE	11	12:30	18:30	21600
10	14/03/2016	RMD	None	0	5	3	E	5	07:45	14:15	21600
11	15/03/2016	GP	None	1	5	1	SE	8	09:30	15:30	21600
12	14/03/2016	RMD	None	0	5	1	SE	10	11:00	17:00	21600
12	14/03/2016	RMD	None	0	5	1	SE	10	11:00	17:00	21600
1	04/04/2016	GP	light	6	5	1	SW	12	09:45	12:45	10800
1	04/04/2016	GP	none	6	5	1	SW	12	09:45	12:45	10800
1	04/04/2016	GP	none	6	5	1	SW	12	09:45	12:45	10800
1	04/04/2016	GP	none	6	5	1	SW	12	09:45	12:45	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
1	21/04/2016	GP	none	7	10	1	E	12	10:10	13:10	10800
2	07/04/2016	GP	none	3	10	1	NW	9	07:15	10:50	16800
2	07/04/2016	GP	none	3	10	1	NW	9	07:15	10:50	16800
2	07/04/2016	GP	none	3	10	1	NW	9	07:15	10:50	16800
2	07/04/2016	GP	none	3	10	1	NW	9	07:15	10:50	16800
2	07/04/2016	GP	none	3	10	1	NW	9	07:15	10:50	16800
2	07/04/2016	GP	none	3	10	1	NW	9	07:15	10:50	16800
2	09/04/2016	GP	light	4	10	1	SE	12	14:00	17:00	10800
2	09/04/2016	GP	none	4	10	1	SE	12	14:00	17:00	10800
2	09/04/2016	GP	none	4	10	1	SE	12	14:00	17:00	10800
3	08/04/2016	GP	light	6	5	3	SW	9	07:15	10:50	16800
3	04/04/2016	GP	light	7	5	1	SW	15	13:45	16:45	10800
4	05/04/2016	GP	light	6	10	1	W	11	11:30	17:30	21600
4	05/04/2016	GP	light	6	10	1	W	11	11:30	17:30	21600
5	05/04/2016	GP	light	8	2	1	W	10	08:15	11:15	10800
5	05/04/2016	GP	none	8	2	1	W	10	08:15	11:15	10800
5	05/04/2016	GP	none	8	2	1	W	10	08:15	11:15	10800
5	05/04/2016	GP	none	8	2	1	W	10	08:15	11:15	10800
5	17/04/2016	GP	none	6	10	2	SW	10	10:35	13:35	10800
6	06/04/2016	GP	showers	8	5	4	SW	9	08:15	11:15	10800
6	07/04/2016	GP	light	6	5	3	W	13	14:20	17:20	10800
6	07/04/2016	GP	light	6	5	3	W	13	14:20	17:20	10800
6	07/04/2016	GP	light	6	5	3	W	13	14:20	17:20	10800
6	25/04/2016	GP	none	3	10	3	NW	14	16:40	19:40	10800
6	25/04/2016	GP	none	3	10	3	NW	14	16:40	19:40	10800
6	25/04/2016	GP	none	3	10	3	NW	14	16:40	19:40	10800
6	25/04/2016	GP	none	3	10	3	NW	14	16:40	19:40	10800
7	07/04/2016	GP	light	8	5	3	W	11	11:10	14:10	10800
7	25/04/2016	GP	light	8	10	3	N	12	09:15	12:15	10800
8	06/04/2016	RMD	showers	8	8	2	W	6	12:35	18:35	21600
9	06/04/2016	RMD	showers	8	8	2	W	7	09:30	12:30	10800
9	07/04/2016	RMD	showers	8	10	1	NW	7	09:30	12:30	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
10	17/04/2016	RMD	none	5	10	2	SW	10	14:00	17:30	12600
10	25/04/2016	RMD	none	8	10	3	NW	12	13:30	16:30	10800
11	05/04/2016	GP	showers	7	10	1	SW	7	10:15	16:15	21600
12	04/04/2016	RMD	showers	7	3	1	S	9	11:30	17:30	21600
12	04/04/2016	RMD	showers	7	3	1	S	9	11:30	17:30	21600
12	04/04/2016	RMD	showers	7	3	1	S	9	11:30	17:30	21600
12	04/04/2016	RMD	showers	7	3	1	S	9	11:30	17:30	21600
12	04/04/2016	RMD	showers	7	3	1	S	9	11:30	17:30	21600
1	06/05/2016	GP	none	3	10	1	N	15	11:30	14:30	10800
1	10/05/2016	GP	mist	8	2	1	E	12	09:50	12:50	10800
2	06/05/2016	GP	none	4	10	1	N	10	08:15	11:15	10800
2	06/05/2016	GP	none	4	10	1	N	10	08:15	11:15	10800
2	18/05/2016	GP	mist	6	10	1	N	12	10:00	13:00	10800
3	04/05/2016	GP	none	8	10	3	S	11	14:00	17:00	10800
3	06/05/2016	GP	none	1	10	1	N	17	14:45	17:45	10800
4	04/05/2016	GP	none	8	10	3	S	11	07:30	10:30	10800
4	19/05/2016	GP	none	4	10	3	W	15	12:40	15:40	10800
5	04/05/2016	GP	none	8	10	3	S	11	10:45	13:45	10800
5	12/05/2016	GP	mist	8	1	2	NE	12	08:30	11:30	10800
6	05/05/2016	GP	none	7	10	1	S	15	15:10	18:10	10800
6	13/05/2016	GP	none	1	10	2	NE	15	13:20	16:20	10800
6	13/05/2016	GP	none	1	10	2	NE	15	13:20	16:20	10800
7	05/05/2016	GP	none	7	10	2	S	11	12:00	15:00	10800
7	19/05/2016	GP	showers	7	10	3	W	10	08:30	12:30	10800
8	20/05/2016	RMD	showers	8	10	1	SE	12	10:15	16:15	10800
9	13/05/2016	RMD	none	0	16	1	NE	13	09:30	15:30	10800
9	13/05/2016	RMD	none	0	16	1	NE	13	09:30	15:30	10800
10	05/05/2016	RMD	none	1	10	3	S	10	07:25	10:30	10800
10	05/05/2016	RMD	none	1	10	3	S	10	07:25	10:30	10800
10	05/05/2016	RMD	none	1	10	3	S	10	07:25	10:30	10800
10	05/05/2016	RMD	none	1	10	3	S	10	07:25	10:30	10800
10	13/05/2016	RMD	none	0	10	2	NE	13	08:15	12:15	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
10	13/05/2016	RMD	none	0	10	2	NE	13	08:15	12:15	10800
11	09/05/2016	GP	showers	8	16	1	NE	17	09:30	15:30	21600
12	11/05/2016	RMD	none	8	5	1	NE	13	09:30	15:30	21600
1	07/06/2016	GP	none	7	5	2	SW	17	14:30	16:30	10800
1	09/06/2016	GP	none	7	10	1	SW	16	08:40	11:40	10800
2	09/06/2016	GP	none	8	10	1	SW	17	15:00	18:00	10800
2	09/06/2016	GP	none	8	10	1	SW	17	15:00	18:00	10800
2	15/06/2016	GP	none	7	10	2	NW	14	07:50	10:50	10800
2	15/06/2016	GP	none	7	10	2	NW	14	07:50	10:50	10800
2	15/06/2016	GP	none	7	10	2	NW	14	07:50	10:50	10800
2	15/06/2016	GP	none	7	10	2	NW	14	07:50	10:50	10800
3	07/06/2016	GP	none	7	5	1	SW	17	10:10	13:10	10800
3	15/06/2016	GP	light	7	10	2	NW	15	11:00	14:00	10800
4	08/06/2016	GP	none	8	5	1	E	13	09:15	12:15	10800
4	13/06/2016	GP	light	7	5	3	W	15	15:00	18:00	10800
5	03/06/2016	GP	none	3	10	1	E	15	10:15	13:15	10800
5	13/06/2016	GP	light	1	10	1	W	14	08:40	11:40	10800
6	11/06/2016	GP	none	8	10	1	SW	15	10:00	13:00	10800
6	13/06/2016	GP	none	7	10	1	W	13	11:45	14:45	10800
6	13/06/2016	GP	light	7	10	1	W	13	11:45	14:45	10800
7	03/06/2016	GP	none	5	10	1	E	19	13:30	16:30	10800
7	08/06/2016	GP	none	8	5	1	E	13	12:30	15:30	10800
8	10/06/2016	RMD	light	8	4	1	NE	15	09:20	15:20	21600
9	03/06/2016	RMD	none	2	16	1	SE	16	10:30	16:30	10800
10	11/06/2016	RMD	none	7	10	2	SE	18	13:45	16:45	10800
10	11/06/2016	RMD	none	7	10	2	SE	18	13:45	16:45	10800
10	17/06/2016	RMD	none	8	10	2	NW	13	08:00	12:00	14400
11	09/06/2016	GP	none	7	16	1	SE	15	09:30	15:30	21600
12	08/06/2016	RMD	none	8	16	1	SE	17	09:30	15:30	21600
12	08/06/2016	RMD	none	8	16	1	SE	17	09:30	15:30	21600
12	08/06/2016	RMD	none	8	16	1	SE	17	09:30	15:30	21600

Table 16 Details of timing, duration and weather conditions for vantage point surveys undertaken during the non-breeding season in 2016/2017.

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
1	13/09/2016	GP	Misty	5/8	2	F2	NW	9	06:10	08:30	10800
10	13/09/2016	GP	None	5/8	2	F1	NW	10	18:00	20:30	10800
10	13/09/2016	GP	None	5/8	2	F1	NW	10	18:00	20:30	10800
4	14/09/2016	GP	None	1/2	2	F3	NW	10	06:30	09:30	10800
3	15/09/2016	GP	None	3/8	2	F1	S	14	17:20	20:20	10800
5	16/09/2016	GP	None	5/8	2	F1	W	11	06:30	09:30	10800
6	16/09/2016	GP	None	1/2	2	F2	W	12	17:30	20:30	10800
6	16/09/2016	GP	None	1/2	2	F2	W	12	17:30	20:30	10800
2	17/09/2016	GP	Misty	1/2	2	F1	SW	10	06:30	09:30	10800
2	17/09/2016	GP	None	8/8	2	F1	S	14	17:30	20:30	10800
10	18/09/2016	GP	Misty	8/8	1	F3	S	13	06:10	09:10	10800
5	18/09/2016	GP	None	3/8	2	F1	W	14	17:15	20:15	10800
6	19/09/2016	GP	None	8/8	2	F1	W	10	06:15	09:15	10800
1	19/09/2016	GP	None	8/8	2	F1	W	11	17:10	20:10	10800
3	20/09/2016	GP	None	8/8	1	F1	SW	10	06:15	09:15	10800
4	20/09/2016	GP	None	8/8	2	F1	W	12	17:00	20:00	10800
4	20/09/2016	GP	None	8/8	2	F1	W	12	17:00	20:00	10800
12	20/09/2016	TG	None	8/8	10	F1	SE	11	06:40	09:40	10800
12	20/09/2016	TG	None	8/8	15	F1	SE	14	17:15	20:15	10800
11	21/09/2016	TG	Misty	8/8	5	F2	SE	11	06:42	09:42	10800
11	21/09/2016	TG	None	3/4	15	F1	SE	10	17:13	20:13	10800
7	22/09/2016	TG	None	1/2	15	F1	SE	5	06:45	09:45	10800
7	22/09/2016	TG	Light	8/8	1	F1	SE	12	17:11	20:11	10800
8	27/09/2016	TG	None	8/8	1	F1	SW	11	06:55	09:55	10800
8	27/09/2016	TG	None	3/4	3	F1	SW	11	16:54	19:54	10800
9	28/09/2016	TG	None	8/8	5	F1	S	12	06:57	09:57	10800
9	28/09/2016	TG	Heavy Showers	3/4	1	F1	S	14	16:52	19:52	10800
1	15/10/2016	GP	Misty	3/4	2	F1	SE	4	07:30	10:30	10800
10	15/10/2016	GP	None	7/8	5	F1	NW	10	16:00	19:00	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
10	15/10/2016	GP	None	7/8	5	F1	NW	10	16:00	19:00	10800
10	15/10/2016	GP	None	7/8	5	F1	NW	10	16:00	19:00	10800
5	16/10/2016	GP	Light	8/8	1	F3	S	8	07:15	10:15	10800
2	16/10/2016	GP	Light	8/8	5	F2	S	10	16:15	19:15	10800
7	17/10/2016	GP	Light	5/8	5	F2	SW	11	16:10	19:10	10800
4	18/10/2016	GP	None	1/4	2	F1	SW	6	07:30	10:30	10800
3	18/10/2016	GP	Light	1/2	2	F1	NW	8	16:00	19:05	10800
6	19/10/2016	GP	None	8/8	2	F1	NW	7	07:30	10:30	10800
1	20/10/2016	GP	None	8/8	5	F1	E	8	07:10	10:10	10800
6	20/10/2016	GP	None	7/8	2	F1	E	10	16:00	19:00	10800
7	21/10/2016	GP	None	8/8	2	F1	SE	7	07:00	10:00	10800
5	21/10/2016	GP	None	7/8	5	F1	SE	10	16:15	19:00	10800
4	22/10/2016	GP	None	5/8	5	F1	E	10	16:00	19:00	10800
10	24/10/2016	GP	None	1/8	2	F1	NE	5	07:30	10:30	10800
10	24/10/2016	GP	None	1/8	2	F1	NE	5	07:30	10:30	10800
10	24/10/2016	GP	None	1/8	2	F1	NE	5	07:30	10:30	10800
11	24/10/2016	RMD	None	5/8	15	F1	NE	12	15:52	18:52	10800
11	24/10/2016	RMD	None	5/8	15	F1	NE	12	15:52	18:52	10800
3	25/10/2016	GP	None	3/8	1	F1	NE	4	07:30	10:30	10800
11	25/10/2016	RMD	None	3/4	5	F1	SE	3	07:45	10:45	10800
12	25/10/2016	RMD	None	7/8	9	F1	N	11	15:50	18:50	10800
12	26/10/2016	RMD	None	8/8	15	F1	S	11	07:45	10:45	10800
8	26/10/2016	RMD	Light	8/8	4	F1	SW	13	15:42	18:42	10800
8	27/10/2016	RMD	Misty	8/8	10	F1	SW	11	07:45	10:45	10800
9	27/10/2016	RMD	None	8/8	15	F1	SE	16	15:40	18:40	10800
9	28/10/2016	RMD	Misty	8/8	4	F1	SW	12	07:50	10:50	10800
2	29/10/2016	GP	None	3/8	2	F1	SE	11	15:45	18:45	10800
9	20/11/2016	GP	None	3/8	1	F1	NE	5	14:15	17:15	10800
5	21/11/2016	GP	None	8/8	5	F1	NE	0	07:30	10:30	10800
6	21/11/2016	GP	None	7/8	5	F3	NE	2	14:10	17:10	10800
8	22/11/2016	GP	None	1/4	5	F3	NW	4	07:30	10:30	10800
3	22/11/2016	GP	None	3/8	10	F1	NE	2	14:00	17:10	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
9	23/11/2016	GP	None	0/8	5	F1	NE	5	07:30	14:30	10800
4	23/11/2016	GP	None	1/4	5	F2	NE	5	14:10	17:10	10800
6	24/11/2016	GP	None	0/8	5	F1	NE	0	07:30	10:30	10800
8	25/11/2016	GP	None	1/4	5	F1	E	5	14:10	17:10	10800
4	28/11/2016	GP	None	8/8	5	F1	E	6	07:30	10:30	10800
5	28/11/2016	GP	None	8/8	5	F1	E	5	14:10	17:10	10800
1	28/11/2016	SI	None	8/8	5	F1	E	6	07:19	10:19	10800
1	28/11/2016	SI	None	8/8	5	F1	E	8	13:58	16:58	10800
12	28/11/2016	JD	None	8/8	10	F1	NE	6	07:15	10:19	10800
12	28/11/2016	JD	None	8/8	10	F1	NW	6	14:25	17:25	10800
2	29/11/2016	SI	None	7/8	10	F1	SE	4	07:21	10:21	10800
2	29/11/2016	SI	None	7/8	10	F1	SE	4	14:00	17:10	10800
11	29/11/2016	JD	None	1/4	15	F1	E	6	07:20	10:20	10800
11	29/11/2016	JD	None	1/8	15	F3	SE	6	14:20	17:25	10800
11	29/11/2016	JD	None	1/8	15	F4	SE	6	14:20	17:25	10800
11	29/11/2016	JD	None	1/8	15	F5	SE	6	14:20	17:25	10800
3	30/11/2016	GP	None	0/8	5	F1	E	0	07:30	10:30	10800
7	30/11/2016	SI	None	3/4	10	F1	E	3	07:25	10:25	10800
7	30/11/2016	SI	None	3/4	10	F1	E	3	14:00	17:00	10800
10	30/11/2016	JD	None	0/8	15	F1	E	3	07:20	10:20	10800
10	30/11/2016	JD	None	0/8	15	F1	E	6	14:30	17:30	10800
2	15/12/2016	SI	None	1/8	10	F1	NW	8	07:43	10:45	10800
2	15/12/2016	SI	None	1/8	10	F1	NW	8	14:30	17:30	10800
12	16/12/2016	RMD	None	8/8	15	F1	NW	5	08:00	11:00	10800
5	16/12/2016	RMD	None	0/8	15	F1	NW	8	14:00	17:00	10800
11	19/12/2016	RMD	None	8/8	<1	F1	NW	8	08:00	11:00	10800
6	19/12/2016	RMD	None	1/4	20	F1	NW	8	14:00	17:00	10800
6	20/12/2016	RMD	None	1/2	15	F1	SE	0	08:00	11:00	10800
12	20/12/2016	RMD	Constant	8/8	4	F1	SE	5	14:00	17:00	10800
5	21/12/2016	RMD	Light	8/8	15	F1	SW	5	08:00	11:00	10800
10	21/12/2016	RMD	Light	5/8	15	F1	SW	6	14:00	17:00	10800
10	22/12/2016	RMD	None	3/8	5	F1	SW	5	08:00	11:00	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
11	22/12/2016	RMD	Single shower	7/8	15	F1	SW	8	14:00	17:00	10800
11	22/12/2016	RMD	Single shower	7/8	15	F1	SW	8	14:00	17:00	10800
11	22/12/2016	RMD	Single shower	7/8	15	F1	SW	8	14:00	17:00	10800
Casual	23/12/2016	RMD	Heavy Showers	5/8	10	F3	SW	11	14:10	14:10	Casual
11	17/01/2017	RMD	Misty	8/8	3	F1	SW	8	08:00	11:00	10800
11	17/01/2017	RMD	None	8/8	15	F1	SW	10	14:30	17:30	10800
12	18/01/2017	RMD	None	8/8	15	F1	SE	8	08:00	11:00	10800
5	18/01/2017	RMD	Single shower	8/8	15	F1	S	8	14:30	17:30	10800
5	19/01/2017	RMD	None	1/8	15	F1	SE	2	08:00	11:00	10800
12	19/01/2017	RMD	None	0/8	15	F1	SE	11	14:30	17:30	10800
6	25/01/2017	RMD	Occasional showers	8/8	15	F3	SE	8	07:50	10:50	10800
10	25/01/2017	RMD	None	7/8	15	F3	SE	9	14:45	17:45	10800
10	27/01/2017	RMD	Heavy Showers	8/8	5	F1	SE	6	07:50	10:50	10800
3	27/01/2017	RMD	None	5/8	15	F1	SW	8	14:45	17:45	10800
2	29/01/2017	MD	Light	8/8	6	F1	E	6	07:35	10:35	10800
2	29/01/2017	MD	Light	8/8	5	F1	SE	4	14:45	17:45	10800
3	31/01/2017	RMD	Light	8/8	4	F1	SW	4	07:40	10:40	10800
6	31/01/2017	RMD	None	3/4	10	F1	SE	10	14:45	17:45	10800
11	08/02/2017	GP	None	7/8	5	F2	S	7	15:10	18:10	10800
11	08/02/2017	GP	None	7/8	5	F2	S	7	15:10	18:10	10800
12	09/02/2017	GP	None	8/8	2	F2	E	5	15:10	18:10	10800
2	10/02/2017	GP	None	8/8	2	F1	E	1	07:30	10:30	10800
5	10/02/2017	GP	None	8/8	5	F2	E	3	15:10	18:10	10800
6	11/02/2017	GP	None	1/8	5	F1	NE	0	07:30	10:30	10800
3	12/02/2017	GP	None	8/8	1	F2	NE	3	15:15	18:15	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
3	12/02/2017	GP	None	8/8	1	F2	NE	3	15:15	18:15	10800
3	12/02/2017	GP	None	8/8	1	F2	NE	3	15:15	18:15	10800
5	13/02/2017	GP	Misty	8/8	1	F3	E	5	07:15	10:15	10800
10	14/02/2017	GP	None	5/8	5	F2	SE	10	15:15	18:15	10800
10	14/02/2017	GP	None	5/8	5	F2	SE	10	15:15	18:15	10800
10	14/02/2017	GP	None	5/8	5	F2	SE	10	15:15	18:15	10800
3	15/02/2017	GP	Light	7/8	2	F2	SW	6	07:15	10:15	10800
11	16/02/2017	GP	Light	8/8	1	F1	SW	7	07:15	10:15	10800
11	16/02/2017	GP	Light	8/8	1	F1	SW	7	07:15	10:15	10800
6	16/02/2017	GP	None	8/8	2	F1	SW	7	15:20	18:20	10800
12	22/02/2017	GP	Misty	8/8	<1	F1	SW	9	07:00	10:00	10800
2	23/02/2017	GP	None	1/4	5	F2	NW	8	15:30	18:30	10800
10	24/02/2017	GP	Misty	7/8	<1	F2	SW	5	07:00	10:00	10800

Table 17 Details of timing, duration and weather conditions for vantage point surveys undertaken during the breeding season in 2017.

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
3	12/03/2017	GP	None	1/2	10	F3	W	11	13:00	16:00	10800
9	13/03/2017	RMD	None	7/8	8	F2	SW	9	09:30	15:30	21600
12	13/03/2017	RMD	None	8/8	10	F1	SW	14	15:50	16:50	3600
12	14/03/2017	RMD	Misty	8/8	2	F1	SW	12	09:40	13:40	14400
11	14/03/2017	RMD	None	3/8	16	F1	W	13	14:00	16:00	7200
12	14/03/2017	RMD	None	5/8	16	F1	SE	11	16:10	17:10	3600
3	14/03/2017	GP	None	1/2	10	F3	W	11	13:10	16:10	10800
3	14/03/2017	GP	None	1/2	10	F3	W	11	13:10	16:10	10800
11	15/03/2017	RMD	None	1/4	16	F1	SE	11	09:35	13:35	14400
10	15/03/2017	RMD	None	8/8	16	F1	SE	11	14:00	17:00	10800
1	15/03/2017	GP	None	0/8	10	F2	SW	7	08:15	14:15	21600
8	16/03/2017	RMD	Light	8/8	5	F2	SW	6	09:40	15:40	21600
8	16/03/2017	RMD	Light	8/8	5	F2	SW	6	09:40	15:40	21600
5	16/03/2017	RMD	None	1/4	20	F1	NW	9	15:50	16:50	3600
5	21/03/2017	RMD	Light	1/2	16	F1	SW	1	10:00	15:00	18000
6	21/03/2017	RMD	Light	8/8	16	F1	SW	5	15:15	17:15	7200
6	21/03/2017	RMD	Light	8/8	16	F1	SW	5	15:15	17:15	7200
6	22/03/2017	RMD	None	8/8	15	F2	N	2	09:50	13:50	14400
10	22/03/2017	RMD	Light	7/8	15	F1	N	5	14:15	17:15	10800
7	23/03/2017	RMD	Misty	8/8	15	F1	N	5	09:40	15:40	21600
2	24/03/2017	GP	None	0/8	10	F1	NE	5	07:15	10:15	10800
4	24/03/2017	GP	None	0/8	10	F2	NE	9	10:30	16:30	21600
2	27/03/2017	GP	None	1/8	5	F1	E	8	07:15	10:15	10800
2	27/03/2017	GP	None	1/8	5	F1	E	8	07:15	10:15	10800
3	05/04/2017	GP	None	8/8	10	F1	NW	10	08:15	11:15	10800
8	05/04/2017	GP	None	8/8	10	F1	NW	10	13:30	16:30	10800
2	06/04/2017	GP	None	8/8	5	F1	NW	8	07:00	10:00	10800
2	06/04/2017	GP	None	8/8	5	F1		16	07:00	10:00	10800
10	08/04/2017	GP	None	8/8	5	F3	S	16	10:20	16:20	21600
10	08/04/2017	GP	None	8/8	5	F3	S	16	10:20	16:20	21600
7	09/04/2017	GP	None	8/8	5	F1	NW	8	07:45	10:45	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
4	09/04/2017	GP	None	8/8	5	F1	NW	10	10:50	13:50	10800
1	10/04/2017	GP	None	8/8	5	F2	NW	8	08:45	11:45	10800
5	10/04/2017	GP	None	7/8	10	F2	NW	10	12:00	15:00	10800
5	10/04/2017	GP	None	7/8	10	F2	NW	10	12:00	15:00	10800
5	10/04/2017	GP	None	7/8	10	F2	NW	10	12:00	15:00	10800
5	10/04/2017	GP	None	7/8	10	F2	NW	10	12:00	15:00	10800
5	10/04/2017	GP	None	7/8	10	F2	NW	10	12:00	15:00	10800
5	10/04/2017	GP	None	7/8	10	F2	NW	10	12:00	15:00	10800
7	10/04/2017	GP	None	1/2	10	F2	NW	12	15:10	18:10	10800
2	11/04/2017	GP	None	8/8	10	F2	NW	7	07:45	10:45	10800
1	12/04/2017	GP	None	8/8	2	F2	NW	9	07:45	10:45	10800
6	12/04/2017	GP	Light	1/4	1	F2	NW	8	11:00	14:00	10800
6	12/04/2017	GP	Light	1/4	1	F2	NW	8	11:00	14:00	10800
6	12/04/2017	GP	Light	1/4	1	F2	NW	8	11:00	14:00	10800
3	17/04/2017	GP	None	8/8	10	F1	NW	9	09:40	12:40	10800
5	17/04/2017	GP	None	8/8	10	F1	NW	9	13:00	16:00	10800
8	18/04/2017	GP	None	8/8	10	F1	NW	10	08:00	11:00	10800
8	18/04/2017	GP	None	8/8	10	F1	NW	10	08:00	11:00	10800
9	18/04/2017	GP	None	7/8	10	F1	S	12	11:00	17:00	21600
6	19/04/2017	GP	None	7/8	5	F1	SW	13	10:45	13:45	10800
6	19/04/2017	GP	None	7/8	5	F1	SW	13	10:45	13:45	10800
4	19/04/2017	GP	None	7/8	5	F1	SW	14	14:00	16:30	10800
12	22/04/2017	GP	None	1/4	5	F1	NE	8	08:30	11:30	10800
12	22/04/2017	GP	None	1/4	5	F1	NE	8	08:30	11:30	10800
11	22/04/2017	GP	None	8/8	10	F1	NE	13	12:30	15:30	10800
11	22/04/2017	GP	None	8/8	10	F1	NE	13	12:30	15:30	10800
11	22/04/2017	GP	None	8/8	10	F1	NE	13	12:30	15:30	10800
11	22/04/2017	GP	None	8/8	10	F1	NE	13	12:30	15:30	10800
12	27/04/2017	GP	None	8/8	10	F2	NW	9	09:50	12:50	10800
12	27/04/2017	GP	None	8/8	10	F2	NW	9	09:50	12:50	10800
12	27/04/2017	GP	None	8/8	10	F2	NW	9	09:50	12:50	10800
11	27/04/2017	GP	None	5/8	10	F2	NW	11	13:00	16:00	10800
11	27/04/2017	GP	None	5/8	10	F2	NW	11	13:00	16:00	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
1	05/05/2017	GP	None	3/8	10	F2	E	13	11:30	14:30	10800
2	05/05/2017	GP	None	3/8	10	F3	E	14	14:40	17:40	10800
2	05/05/2017	GP	None	3/8	10	F3	E	14	14:40	17:40	10800
2	05/05/2017	GP	None	3/8	10	F3	E	14	14:40	17:40	10800
6	06/05/2017	GP	None	8/8	5	F3	E	10	14:30	17:30	10800
6	06/05/2017	GP	None	8/8	5	F3	E	10	14:30	17:30	10800
1	08/05/2017	GP	None	0/8	10	F1	E	11	06:45	09:45	10800
4	08/05/2017	GP	None	0/8	5	F1	E	17	09:50	12:50	10800
3	08/05/2017	GP	None	3/8	5	F2	NE	18	13:30	16:30	10800
3	08/05/2017	GP	None	3/8	5	F2	NE	18	13:30	16:30	10800
5	09/05/2017	GP	None	0/8	10	F1	SE	8	08:00	11:00	10800
4	09/05/2017	GP	None	3/8	5	F1	E	9	11:30	14:30	10800
3	18/05/2017	GP	None	5/8	10	F1	SW	9	09:10	12:10	10800
5	18/05/2017	GP	None	1/2	10	F2	SW	14	13:30	16:30	10800
8	19/05/2017	KOC	Light	7/8	15	F3	SW	12	10:40	13:40	10800
8	19/05/2017	KOC	Light	7/8	5	F3	SW	12	14:10	17:10	10800
2	20/05/2017	GP	None	7/8	10	F3	S	13	10:15	13:15	10800
6	20/05/2017	GP	None	1/2	10	F3	S	13	13:45	16:45	10800
6	20/05/2017	GP	None	1/2	10	F3	S	13	13:45	16:45	10800
9	22/05/2017	KOC	None	3/4	20	F3	SW	15	11:10	14:10	10800
9	22/05/2017	KOC	None	3/4	20	F3	SW	15	11:10	14:10	10800
9	22/05/2017	KOC	None	3/4	20	F3	SW	15	11:10	14:10	10800
9	22/05/2017	KOC	None	3/4	20	F3	SW	15	11:10	14:10	10800
9	22/05/2017	KOC	None	3/4	20	F3	SW	17	14:40	17:40	10800
	22/05/2017	KOC	None	3/4	20	F3	SW	17	17:56	17:56	
7	22/05/2017	KOC	None	7/8	15	F3	SW	15	18:45	20:15	4800
7	23/05/2017	KOC	None	8/8	10	F3	W	15	09:50	11:20	4800
10	23/05/2017	KOC	None	8/8	10	F3	W	15	12:00	15:00	10800
10	23/05/2017	KOC	None	8/8	10	F3	W	15	12:00	15:00	10800
10	23/05/2017	KOC	None	8/8	10	F3	W	15	12:00	15:00	10800
10	23/05/2017	KOC	None	8/8	10	F3	W	15	12:00	15:00	10800
10	23/05/2017	KOC	None	8/8	10	F3	W	15	12:00	15:00	10800
10	23/05/2017	KOC	None	8/8	10	F3	W	15	12:00	15:00	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
10	23/05/2017	KOC	None	8/8	10	F3	W	15	12:00	15:00	10800
10	23/05/2017	KOC	None	8/8	10	F3	W	15	12:00	15:00	10800
	23/05/2017	KOC	None	8/8	10	F3	W	15	15:12	15:12	
10	23/05/2017	KOC	None	5/8	10	F4	W	15	15:30	18:30	10800
10	23/05/2017	KOC	None	5/8	10	F4	W	15	15:30	18:30	10800
10	23/05/2017	KOC	None	5/8	10	F4	W	15	15:30	18:30	10800
10	23/05/2017	KOC	None	5/8	10	F4	W	15	15:30	18:30	10800
10	23/05/2017	KOC	None	5/8	10	F4	W	15	15:30	18:30	10800
10	23/05/2017	KOC	None	5/8	10	F4	W	15	15:30	18:30	10800
11	24/05/2017	GP	None	8/8	2	F1	S	16	11:00	14:00	10800
11	24/05/2017	GP	None	8/8	2	F1	S	16	11:00	14:00	10800
12	24/05/2017	GP	None	3/8	2	F1	S	20	14:30	17:30	10800
12	24/05/2017	GP	None	3/8	2	F1	S	20	14:30	17:30	10800
12	24/05/2017	GP	None	3/8	2	F1	S	20	14:30	17:30	10800
7	24/05/2017	KOC	None	5/8	10	F2	SW	18	10:50	13:50	10800
7	24/05/2017	KOC	None	5/8	10	F2	SW	18	10:50	13:50	10800
11	26/05/2017	GP	None	8/8	10	F2	SE	17	08:00	11:00	10800
12	26/05/2017	GP	None	7/8	2	F2	SE	21	11:30	14:30	10800
1	16/06/2017	GP	Misty	8/8	2	F1	W	13	08:00	11:00	10800
3	16/06/2017	GP	None	8/8	5	F1	W	16	12:30	18:30	21600
4	17/06/2017	GP	None	0/8	10	F2	SW	16	09:00	12:00	10800
1	17/06/2017	GP	None	1/4	10	F1	SW	22	13:30	16:30	10800
2	18/06/2017	GP	None	0/8	10	F1	SW	15	08:30	12:30	14400
2	18/06/2017	GP	None	0/8	10	F1	SW	15	08:30	12:30	14400
4	19/06/2017	GP	None	3/8	10	F1	NE	17	08:00	11:00	10800
4	19/06/2017	GP	None	3/8	10	F1	NE	17	08:00	11:00	10800
10	19/06/2017	GP	None	1/2	5	F1	NE	22	12:30	15:30	10800
10	19/06/2017	GP	None	1/2	5	F1	NE	22	12:30	15:30	10800
10	19/06/2017	GP	None	1/2	5	F1	NE	22	12:30	15:30	10800
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
5	19/06/2017	JD	None	1/4	10	F1	SE	20	10:15	16:45	21600
2	20/06/2017	GP	None	1/2	10	F1	NE	15	08:00	11:00	10800
11	20/06/2017	JD	None	0/8	10	F1	S	21	10:30	17:00	21600
11	20/06/2017	JD	None	0/8	10	F1	S	21	10:30	17:00	21600
11	20/06/2017	JD	None	0/8	10	F1	S	21	10:30	17:00	21600
10	21/06/2017	GP	None	7/8	5	F1	S	18	08:20	12:30	14400
10	21/06/2017	GP	None	7/8	5	F1	S	18	08:20	12:30	14400
10	21/06/2017	GP	None	7/8	5	F1	S	18	08:20	12:30	14400
12	21/06/2017	JD	None	8/8	10	F1	SW	23	10:30	17:00	21600
8	25/06/2017	KOC	None	7/8	15	F3	W	16	14:05	17:05	10800
8	25/06/2017	KOC	None	8/8	10	F2	NW	15	17:35	20:35	10800
6	26/06/2017	KOC	None	8/8	15	F2	SE	15	09:15	12:15	10800
6	26/06/2017	KOC	None	8/8	15	F2	SE	15	09:15	12:15	10800
6	26/06/2017	KOC	Misty	8/8	5	F2	SE	14	12:45	15:45	10800
7	26/06/2017	KOC	Misty	8/8	3	F3	SE	14	16:15	17:15	3600
9	27/06/2017	KOC	None	7/8	15	F3	S	18	10:40	13:40	10800
9	27/06/2017	KOC	None	3/4	15	F3	S	18	14:10	17:10	10800
7	28/06/2017	KOC	None	8/8	15	F2	NW	17	11:50	14:50	10800
7	28/06/2017	KOC	None	8/8	15	F2	NW	16	15:25	17:25	7200
1	14/07/2017	GP	None	7/8	10	F2	W	12	07:50	13:30	21600

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
3	14/07/2017	GP	None	1/2	10	F2	W	20	14:30	17:30	10800
3	16/07/2017	GP	None	1/2	10	F1	NW	14	09:00	12:00	10800
5	16/07/2017	GP	None	7/8	10	F1	NW	17	12:15	15:15	10800
2	17/07/2017	GP	None	1/8	10	F1	SE	14	07:10	10:10	10800
2	17/07/2017	GP	None	1/8	10	F1	SE	14	07:10	10:10	10800
4	17/07/2017	GP	None	0/8	10	F1	SE	20	10:30	16:30	21600
2	20/07/2017	GP	Occasional showers	3/4	5	F2	SW	11	08:30	11:30	10800
5	24/07/2017	GP	None	1/4	10	F1	NW	15	08:30	11:30	10800
5	24/07/2017	GP	None	1/4	10	F1	NW	15	08:30	11:30	10800
5	24/07/2017	GP	None	1/4	10	F1	NW	15	08:30	11:30	10800
1	04/08/2017	RMD	Light	1/2	5	F1	W	15	10:50	16:50	21600
11	10/08/2017	RMD	None	8/8	10	F1	W	14	11:00	14:00	10800
12	10/08/2017	RMD	None	8/8	10	F1	W	15	14:15	16:15	7200
11	17/08/2017	RMD	None	3/4	5	F1	SW	17	10:00	13:00	10800
12	17/08/2017	RMD	Occasional showers	3/4	5	F1	SW	17	13:15	17:15	14400
2	07/08/2017	KOC	Dry	7/8	15	F3	W	16	12:15	15:15	10800
3	08/08/2017	KOC	Occasional showers	3/4	10	F2	N	12	12:00	15:00	10800
10	09/08/2017	GP	none	6/8	10	F3	N	14	08:15	14:15	21600
6	09/08/2017	GP	none	2/8	10	F2	NW	18	14:45	17:45	10800
8	10/08/2017	GP	none	8/8	5	F2	SW	13	09:30	12:30	10800
9	10/08/2017	GP	none	5/8	10	F2	SW	17	13:00	16:00	10800
7	11/08/2017	GP	none	7/8	5	F2	NW	15	08:00	14:00	21600
5	11/08/2017	GP	none	4/8	10	F2	NW	17	14:30	17:30	10800
4	15/08/2017	GP	Occasional showers	7/8	10	F2	SW	12	07:15	10:15	10800
5	15/08/2017	GP	Occasional showers	6/8	10	F2	SW	15	10:30	13:30	10800
6	15/08/2017	GP	none	4/8	10	F2	SW	16	14:00	17:00	10800
4	17/08/2017	GP	Occasional showers	7/8	10	F2	S	14	07:30	10:30	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
8	17/08/2017	GP	Occasional showers	7/8	10	F2	S	15	11:00	14:30	10800
9	17/08/2017	GP	Occasional showers	6/8	10	F3	SW	18	15:00	18:00	10800

Table 18 Details of timing, duration and weather conditions for vantage point surveys undertaken during the non-breeding season in 2017/2018 (September 2017 to February 2018 inclusive).

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
1	05/09/2017	GP	Light drizzle	8/8	2	F1	W	13	10:20	13:20	10800
2	05/09/2017	GP	dry	3/4	10	F2	SW	16	14:00	17:00	10800
4	06/09/2017	GP	dry	1/2	5	F2	W	12	08:30	11:30	10800
3	06/09/2017	GP	dry	7/8	2	F2	W	14	12:00	15:00	10800
1	06/09/2017	GP	dry	8/8	2	F2	SW	15	15:15	18:15	10800
3	07/09/2017	GP	Light drizzle	8/8	5	F3	W	14	14:30	17:30	10800
5	08/09/2017	GP	Occasional showers	1/2	10	F2	W	13	09:10	12:10	10800
4	08/09/2017	GP	Occasional showers	7/8	5	F2	W	14	12:30	15:30	10800
5	13/09/2017	GP	Occasional showers	1/2	10	F3	W	9	10:00	13:00	10800
2	13/09/2017	GP	Occasional showers	7/8	10	F2	W	11	13:30	16:30	10800
7	11/09/2017	RMD	Occasional showers	8/8	20	F2	W	13	11:05	17:05	21600
7	11/09/2017	RMD	Occasional showers	8/8	20	F2	W	13	11:05:00	17:05	21600
7	11/09/2017	RMD	Occasional showers	8/8	20	F2	W	13	11:05	17:05	21600

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
7	11/09/2017	RMD	Occasional showers	8/8	20	F2	W	13	11:05	17:05	21600
8	12/09/2017	RMD	Light	5/8	15	F2	S	11	10:10	16:10	21600
10	04/09/2017	OOG	None	8/8	2	F2	S	16	13:30	15:30	7200
9	05/09/2017	OOG	None	5/8	10	F1	SW	18	10:00	13:00	10800
11	05/09/2017	OOG	None	5/8	10	F2	SW	19	13:50	16:50	10800
11	06/09/2017	OOG	None	5/8	5	F1	W	17	09:50	12:50	10800
9	06/09/2017	OOG	None	5/8	5	F2	SW	19	13:50	16:50	10800
12	07/09/2017	OOG	Light	8/8	2	F2	W	14	09:45	12:45	10800
12	07/09/2017	OOG	None	7/8	5	F2	W	15	13:15	16:15	10800
6	11/09/2017	OOG	None	3/4	5	F2	W	13	11:20	17:20	21600
10	12/09/2017	OOG	None	5/8	5	F2	S	15	11:30	17:30	21600
1	12/10/17	GP	dry	6/8	10	F1	SW	7	07:30	10:30	10800
2	12/10/17	GP	dry	5/8	10	F3	SW	12	11:00	14:00	10800
4	13/10/17	GP	dry	8/8	5	F2	SW	16	08:10	11:10	10800
5	13/10/17	GP	dry	8/8	2	F2	SW	17	12:30	15:30	10800
3	14/10/17	GP	dry	8/8	2	F3	SE	15	16:20	19:20	10800
1	17/10/17	GP	dry	3/8	10	F1	SW	11	11:15	14:15	10800
3	18/10/17	GP	dry	8/8	10	F2	E	9	10:00	13:00	10800
4	20/10/17	GP	dry	8/8	5	F1	SW	6	10:10	13:10	10800
2	22/10/17	GP	dry	8/8	5	F2	SW	10	10:00	13:00	10800
5	23/10/17	GP	Occasional showers	7/8	5	F1	S	13	13:00	16:00	10800
6	23/10/17	GP	dry	8/8	2	F1	SW	14	16:15	19:15	10800
6	25/10/17	GP	dry	8/8	5	F1	SW	13	16:15	19:15	10800
7	14/10/17	HW	dry	8/8	2	F3	SE	15	8:00	14:00	21600
8	17/10/17	HW	dry	3/8	10	F1	SW	11	8:00	14:00	21600
9	18/10/17	HW	dry	8/8	10	F2	E	9	9:00	15:00	21600
10	20/10/17	HW	dry	8/8	5	F1	SW	6	9:00	15:00	21600
11	22/10/17	HW	dry	8/8	5	F2	SW	10	9:00	15:00	21600
17	23/10/17	HW	Occasional showers	7/8	5	F1	S	13	9:00	15:00	21600
10	07/11/2017	GP	dry	3/8	5	F2	W	5	07:00	13:00	21600

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
11	07/11/2017	GP	Occasional showers	5/8	2	F2	W	6	14:30	17:30	10800
11	07/11/2017	GP	Occasional showers	5/8	2	F2	W	6	14:30	17:30	10800
1	08/11/2017	GP	Occasional showers	4/8	5	F1	SW	4	07:00	13:00	21600
2	09/11/2017	GP	dry	2/8	10	F1	NW	9	11:30	17:30	21600
6	13/11/2017	GP	drizzle	8/8	5	F1	SW	7	11:15	17:15	21600
3	15/11/2017	GP	misty	8/8	2	F1	SE	7	07:15	13:15	21600
11	16/11/2017	GP	dry	1/8	10	F1	NW	8	14:15	17:15	10800
11	16/11/2017	GP	dry	1/8	10	F1	NW	8	14:15	17:15	10800
5	22/11/2017	KOC	Occasional showers	8/8	4	F1	NE	11	10:00	13:00	10800
5	22/11/2017	KOC	Dry	8/8	5	F1	N	10	10:00	13:00	10800
4	22/11/2017	KOC	Light	8/8	2	F2	N	7	13:30	16:30	10800
4	23/11/2017	KOC	None	1/8	15	F3	W	5	10:00	13:00	10800
4	23/11/2017	KOC	None	3/8	10	F3	W	6	10:00	13:00	10800
4	23/11/2017	KOC	None	3/8	10	F3	W	6	10:00	13:00	10800
4	23/11/2017	KOC	None	3/8	10	F3	W	6	10:00	13:00	10800
5	23/11/2017	KOC	None	3/4	15	F2	W	6	13:30	16:30	10800
5	23/11/2017	KOC	None	7/8	15	F2	W	6	13:30	16:30	10800
5	23/11/2017	KOC	None	7/8	15	F2	W	6	13:30	16:30	10800
5	23/11/2017	KOC	None	3/4	15	F2	W	6	13:30	16:30	10800
5	23/11/2017	KOC	None	3/4	8	F1	W	4	13:30	16:30	10800
7	28/11/2017	OOG	None	5/8	5	F2	N	6	03:00	05:00	7200
8	29/11/2017	OOG	None	1/4	2	F1	N	1	07:15	09:15	7200
9	29/11/2017	OOG	None	3/4	2	F1	N	5	15:00	17:30	7200
9	30/11/2017	OOG	None	7/8	2	F1	NW	3	07:15	09:15	7200
8	28/11/2017	SD	None	5/8	4	F3	N	4	15:00	17:00	7200
12	30/11/2017	SD	None	1/4	3	F3	N	2	07:00	09:14	7200
7	29/11/2017	SD	None	1/4	4	F3	N	3	07:00	09:15	7200
12	29/11/2017	SD	None	1/4	3	F3	N	4	15:12	17:12	7200
12	05/12/2017	OOG	None	8/8	5	F1	S	8	09:05	15:05	21600

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
11	05/12/2017	OOG	None	7/8	2	F1	S	10	15:20	17:20	7200
11	06/12/2017	OOG	Heavy Showers	8/8	2	F1	S	10	07:30	09:30	7200
5	06/12/2017	OOG	Misty	8/8	2	F1	S	10	10:05	16:05	21600
5	06/12/2017	OOG	Misty	8/8	2	F1	S	10	10:05	16:05	21600
1	01/12/2017	GP	dry	1/8	10	F1	NW	3	11:00	17:00	21600
6	03/12/2017	GP	dry	7/8	10	F1	W	7	10:30	13:30	10800
10	03/12/2017	GP	dry	6/8	10	F1	W	8	14:00	17:00	10800
10	03/12/2017	GP	dry	6/8	10	F1	W	8	14:00	17:00	10800
4	05/12/2017	GP	dry	8/8	10	F1	SW	8	11:00	17:00	21600
3	07/12/2017	GP	dry	4/8	5	F1	W	5	11:00	17:00	21600
10	09/12/2017	GP	dry	8/8	10	F1	SW	4	09:00	12:00	10800
6	09/12/2017	GP	dry	8/8	10	F1	SW	4	14:00	17:00	10800
2	21/12/2017	GP	Occasional showers	8/8	1	F1	SW	10	11:00	17:00	21600
8	06/12/2017	SD	Light	8/8	2	F4	SW	8	08:30	16:30	21600
8	06/12/2017	SD	Light	8/8	2	F4	SW	8	08:30	16:30	21600
8	06/12/2017	SD	Light	8/8	2	F4	SW	8	08:30	16:30	21600
8	06/12/2017	SD	Light	8/8	2	F4	SW	8	08:30	16:30	21600
8	06/12/2017	SD	Light	8/8	2	F4	SW	8	08:30	16:30	21600
8	06/12/2017	SD	Light	8/8	2	F4	SW	8	08:30	16:30	21600
7	07/12/2017	SD	Dry	1/8	3	F1	NW	4	08:30	16:30	21600
7	07/12/2017	SD	Dry	1/8	3	F1	NW	4	08:30	16:30	21600
7	07/12/2017	SD	Dry	1/8	3	F1	NW	4	08:30	16:30	21600
9	08/12/2017	SD	Dry	1/8	4	F1	NW	1	08:30	16:30	21600
9	08/12/2017	SD	Dry	1/8	4	F1	NW	1	08:30	16:30	21600
9	08/12/2017	SD	Dry	1/8	4	F1	NW	1	08:30	16:30	21600
9	08/12/2017	SD	Dry	1/8	4	F1	NW	1	08:30	16:30	21600
12	02/01/2018	SD	Light	8/8	2	F3	SW	8	10:00	16:00	21600
9	03/01/2018	SD	Light	8/8	1	F4	SW	6	09:00	15:00	21600
7	04/01/2018	SD	Light	8/8	2	F3	SW	5	09:00	15:00	21600
2	05/01/2018	SD	None	5/8	3	F1	SW	2	09:00	15:00	21600
5	02/01/2018	OOG	Misty	7/8	2	F1	W	9	10:15	16:15	21600

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
1	03/01/2018	OOG	Misty	3/4	3	F4	W	5	09:40	15:40	21600
1	03/01/2018	OOG	Misty	3/4	3	F4	W	5	09:40	15:40	21600
8	15/01/2018	OOG	Heavy Showers	7/8	4	F2	W	8	10:05	16:05	21600
4	19/01/2018	OOG	snow showers	7/8	2	F2	W	4	10:05	16:05	21600
4	19/01/2018	OOG	snow showers	7/8	2	F2	W	4	10:05	10:05	21600
3	03/01/2018	GP	Occasional showers	8/8	1	F4	W	6	11:00	17:00	21600
6	05/01/2018	GP	Occasional showers	3/4	5	F2	SW	5	11:00	17:00	21600
10	06/01/2018	GP	dry	3/8	10	F2	NE	4	09:30	12:30	10800
11	06/01/2018	GP	dry	1/2	10	F2	NE	4	14:00	17:00	10800
11	06/01/2018	GP	dry	1/2	10	F2	NE	4	14:00	17:00	10800
11	06/01/2018	GP	dry	1/2	10	F2	NE	4	14:00	17:00	10800
11	06/01/2018	GP	dry	1/2	10	F2	NE	4	14:00	17:00	10800
11	06/01/2018	GP	dry	1/2	10	F2	NE	4	14:00	17:00	10800
10	22/01/2018	GP	dry	7/8	2	F1	SW	6	10:30	13:30	10800
11	22/01/2018	GP	dry	7/8	2	F1	SW	7	14:30	17:30	10800
11	22/01/2018	GP	dry	7/8	2	F1	SW	7	14:30	17:30	10800
11	22/01/2018	GP	dry	7/8	2	F1	SW	7	14:30	17:30	10800
3	01/02/2018	GP	Occasional showers	1/2	10	F3	NW	5	12:00	18:00	21600
6	02/02/2018	GP	dry	1/2	10	F1	NW	3	07:30	13:30	21600
10	04/02/2018	GP	dry	0	10	F1	NW	1	07:30	13:30	21600
11	04/02/2018	GP	dry	1/2	10	F2	NE	6	15:00	18:00	10800
11	04/02/2018	GP	dry	1/2	10	F2	NE	6	15:00	18:00	10800
11	04/02/2018	GP	dry	1/2	10	F2	NE	6	15:00	18:00	10800
11	06/02/2018	GP	dry	1/2	10	F2	NW	3	10:00	13:00	10800
5	02/02/2018	OOG	None	1/4	10	F1	W	6	10:40	16:40	21600
12	05/02/2018	OOG	None	3/4	10	F2	SE	4	10:10	16:10	21600
4	06/02/2018	OOG	None	1/8	10	F2	NW	1	09:50	12:50	10800

VP Name	Date	Observer	Rain	Cloud 0/8 = no cloud 8/8 = fully overcast	Visibility (km)	Wind Speed (Bft)	Wind Direction	Temp (Deg C)	Start Time	End Time	Duration of survey (s)
1	06/02/2018	OOG	None	7/8	10	F2	N	3	13:05	16:05	10800
1	06/02/2018	OOG	None	7/8	10	F2	N	3	13:05	16:05	10800
1	06/02/2018	OOG	None	7/8	10	F2	N	3	13:05	16:05	10800
4	07/02/2018	OOG	Light	8/8	5	F1	SW	0	10:00	13:00	10800
1	07/02/2018	OOG	Light	8/8	5	F1	SW	4	13:30	16:30	10800
8	01/02/2018	SD	None	3/4	10	F1	NW	3	09:30	16:00	21600
8	01/02/2018	SD	None	3/4	10	F1	NW	3	09:30	16:00	21600
8	01/02/2018	SD	None	3/4	10	F1	NW	3	09:30	16:00	21600
8	01/02/2018	SD	None	3/4	10	F1	NW	3	09:30	16:00	21600
8	01/02/2018	SD	None	3/4	10	F1	NW	3	09:30	16:00	21600
8	01/02/2018	SD	None	3/4	10	F1	NW	3	09:30	16:00	21600
9	02/02/2018	SD	None	1/8	10	F1	NW	2	10:00	16:00	21600
7	05/02/2018	SD	None	1/2	10	F1	SE	2	10:30	16:30	21600
2	06/02/2018	SD	None	1/4	10	F1	SE	1	10:30	16:30	21600
2	06/02/2018	SD	None	1/4	10	F1	SE	1	10:30	16:30	21600
2	06/02/2018	SD	None	1/4	10	F1	SE	1	10:30	16:30	21600
2	06/02/2018	SD	None	1/4	10	F1	SE	1	10:30	16:30	21600

A8-1.2.3.4 Aquatic Ecology

Following a comprehensive desktop review to identify watercourses along the UWF Grid Connection, various field surveys took place.

A watercourse characteristics survey of crossing locations along the UWF Grid Connection route (by INIS Ecologists and members of the HES team) was carried out visually on the 17th, 18th and 26th of January 2017 during which the following parameters were recorded at each watercourse crossing point:

- *Grid coordinates of the crossing point;*
- *Watercourse feature i.e. drain, stream or river;*
- *Crossing type e.g. existing culvert, new crossing;*
- *Channel width and depth (m);*
- *Substrate type - listing substrate fractions in order of dominance i.e. large rocks, cobble, gravel, sand, mud, etc.*
- *Target notes where necessary on additional fisheries -influencing variables such as extent of riffle and glide/Bank stability.*

For additional information see Chapter 11: Water and relevant Appendices.

Surveys of watercourse crossing locations located on haulage routes associated with the UWF Grid Connection were carried out on the 7th and 8th June, 2017. Surveys of watercourse crossings pertaining to UWF Related Works were carried out on 17th of July, 2017. There are no watercourse crossings for the UWF Replacement Forestry whilst confirmatory surveys of a number of watercourses associated with the Upperchurch Windfarm were undertaken on the 9th and 13th September 2017. These surveys included biological sampling (Q-values) and fisheries assessments for watercourses draining the Upperchurch Windfarm at or in close proximity to the following locations: WW31; WW32; WW2, in addition to 4 locations previously identified in studies for Upperchurch Windfarm (MWP6; MWP2; MWP3; MWP4). The character of watercourses within the study area, including tributaries and main stem channel evaluations were completed for the upper reaches of the Clodiagh and Owenbeg Rivers.

Evaluations of any watercourses pertinent to UWF Other Activities were carried out visually in conjunction with site visits on 25th of July, 2017 however no watercourse crossings are proposed for this project element.

Watercourses have previously been characterised into 4 classes; see Section 11.2.6.1 of Chapter 11 Water.

Following the above broad characterisations, and using a combination of the following Best Practice we evaluated each watercourse crossing for fisheries and assigned a fisheries importance rating of Optimal, Sub-Optimal or Poor. We note that instances of marginal fisheries value (typically between Sub-Optimal and Poor) were subsumed into the Sub-Optimal category to allow for more robust evaluation of effects. Best Practice literature utilised was as follows:

- Barbour, M.T. and Stribling, J.B. (1991) Use of Habitat Assessment in Evaluating the Biological Integrity of Stream Communities. In: Methods in Stream Ecology (Eds. Hauer, F.R. and Lamberti, G.A. Academic Press.
- Kelly & King (2001) A review of the ecology and distribution of three lamprey species, Lampetra fluviatilis (L.), Lampetra planeri (Bloch), and Petromyzon marinus (L.): A context for conservation and biodiversity considerations in Ireland. Biology and the Environment. 101B(3):165-185.

- Kennedy, GJA & Strange, CD (1986) The effects of intra- and inter-specific competition on the distribution of stocked juvenile Atlantic salmon, Salmo salar L., in relation to depth and gradient in an upland trout, Salmo trutta L., stream. J. Fish. Biol., 29(2):199-214.
- Greenberg, L.A. and Dahl, J. 1998. Effect of habitat type on growth and diet of brown trout (Salmo trutta L.) in stream enclosures. Fisheries Management & Ecology 5: 331-348.
- Hatfield, T. & Bruce, J. (2000) Predicting Salmonid Habitat–Flow Relationships for Streams from Western North America. North American Journal of Fisheries Management 20:1005–1015, 2000
- O'Grady, M.F., Curtin, J (1993) The Enhancement of drained salmonid rivers in Ireland. A bioengineering perspective. Hydroecol. Appl., 5(2):7-26.

Watercourse Characterisations and equivalent fisheries Evaluations (following Best Practice) in addition to selected photographs of rivers and their habitats are presented in illustrative plates in Section 8.2.3.3.

A8-1.2.3.5 Bats

Scoping of surveys

The key sensitivities of bats are the destruction or disturbance of their roosting places, and the modification of their commuting routes and foraging habitats. During the day, bats roost in man-made structures (typically houses, farm buildings and bridges), mature trees and caves. They may suffer direct effects due to the destruction or modification of their roosts (e.g. the demolition of a house or felling of a tree), or indirect effects due to disturbance of the area surrounding a roost (e.g. illumination of exit / entry points, or removal of surrounding vegetation). They are most sensitive to effects during their maternity and hibernation periods, which are from May to August and November to March, respectively. During the night, bats 'commute' from their roosts to a suitable feeding area (which may be several kilometres from their roost), and spend most of the night foraging for insect prey. They typically favour linear habitat features (e.g. hedgerows and forest edges) for commuting and foraging, and usually avoid brightly-lit areas.

Survey aims

The aims of the bat surveys were to:

- Assess the bat roost suitability of buildings and mature trees that will be directly affected by the Whole UWF Project
- Identify any significant bat roosts (particularly maternity and hibernation roosts) in the vicinity of the Whole UWF Project
- Identify any important commuting routes / feeding areas along hedgerows, treelines or other linear features that will be severed or otherwise modified by the Whole UWF Project.

Preliminary evaluation

A Preliminary Ecological Appraisal was carried out for all buildings within 150m of the Whole UWF Project, using the approach outlined in Section 4.3 of Collins (2016). All buildings were assigned a suitability category of negligible, low, moderate or high suitability, based on the age and condition of structural features used by roosting bats (e.g. roof tiles, attic spaces, soffit / fascia boards, walls).

A preliminary ground-level inspection was carried out for all mature trees within 50m of the Whole UWF Project, using a high-powered torch and binoculars (Steiner SkyHawk 3.0 10x42). The aim of the ground-level inspection was to identify any potential roost features (cavities or crevices on trunks or limbs) and evidence of bats (e.g. droppings, fur-oil stains at access points). Coniferous trees within plantations were not inspected, because they are rarely large enough to have any features suitable for bats, and because it is standard forestry practice to remove any trees that have obvious signs of damage and disease; as a result, trees within plantations typically have negligible suitability for bats.

Visual inspections were also carried out for bridges within 150m of the Whole UWF Project material haul routes, using the methods outlined in Collins (2016) and Billington & Norman (1997). Although bridges were eventually scoped out of the impact assessment, the surveys were carried out before it had been confirmed that no bridge strengthening / modifications were required and were thus pre-cautionary in nature. All watercourse crossings along local roads and overlapping material haulage routes (i.e. excluding national and regional roads) were characterised by type (e.g. culvert, bridge), building materials (e.g. concrete, stone), dimensions, condition, and the presence of obvious cracks and crevices, and were assigned a roost suitability category as outlined above. Records of bat roosts and bat activity within 10km of the Whole UWF Project were obtained from Bat Conservation Ireland.

Surveys of potential roosts

Follow-up surveys were carried out for all features of high or moderate roost suitability that were considered to be at risk of direct or indirect effects, subject to the approval of landowners. In most cases this included a preliminary roost appraisal and a presence / absence survey, as defined in Collins (2016). Where evidence of bats was found, roost characterisation surveys (Collins, 2016) were carried out. If droppings were found but could not be identified, samples were collected and sent for DNA analysis at the Department of Chemical and Life Sciences at the Waterford Institute of Technology.

Presence / absence surveys and roost characterisation surveys involved a manual detector survey at dusk and dawn using an EM3+ bat detector (Wildlife Acoustics); this is a high-specification modern bat detector that is fit for purpose. The surveyor focussed on the building / feature for the majority of the survey period, but if no bats were observed entering the structure at dawn then the observer took the opportunity to track passing bats to other roosts in the surrounding area (i.e. a back-tracking survey, Collins 2016).

Four buildings of moderate or high suitability in the vicinity of the UWF Grid Connection were surveyed on multiple occasions in order to cover the maternity period (July / August 2016), the mating season (September / October 2016) and the hibernation period (December 2016). Five additional buildings in the vicinity of UWF Related Works were surveyed in July/August 2017 to cover the maternity period.

Evaluation of foraging areas / commuting routes

Surveys using automated detectors

Bat activity surveys were carried out at out at 27 locations, comprising 21 initially-proposed temporary compounds or set down locations, and 6 treelines / hedgerows with high suitability as bat foraging / commuting habitat.. Surveys were undertaken using automated Anabat Express bat detectors (Titley Scientific, purchased in 2015-16); these are high-specification modern bat detectors that are fit for purpose. External microphones were mounted on canes at a height of approximately 1.5m in order to obtain 'clean' recordings that were not affected by surrounding vegetation.

One detector was placed in each location for two nights in the mid-summer period (June – August 2016) and two nights in the autumn season (September / October 2016). Night length ranged from 7.15 hours in late June to 12.45 hours in early October, giving a total survey effort of approx. 35-40 hours at each sampling point. We consider that this survey effort was sufficient to provide a good representation of bat activity during their most active periods, that it was proportionate to the potential effects of the Whole UWF Project (as discussed in Section 2.2.5 of Collins (2016) and included sampling of bat activity within the zone of effect for both the UWF Grid Connection and UWF Related Works

Surveys were carried out during suitable weather conditions, i.e. minimum temperatures above 10^{o}C, average winds of less than 4m/s and little or no rainfall. There was wet weather or high winds on some of the survey nights in September, so the survey was extended until two nights of suitable conditions were obtained.

Species identification and interpretation of data

Sonograms from Anabat Express detectors were obtained in the 'zero-crossing' format and viewed using AnalookW software (Corben 2014). Species were identified with reference to British Bat Calls: A Guide to Species Identification (Russ 2012) based primarily on frequency and call shape, but also with reference to call slope for *Myotis* spp. Social calls were classified as unidentified bats unless they closely matched the examples provided in Russ (2012).

It is acknowledged that *Myotis* spp. can have very similar calls, and that the classification of sonograms can be imprecise, so all Myotis records in this document should be considered as conferre records, i.e. *Myotis* cf *daubentonii*. There can also be overlaps in call frequency between *Pipistrellus* spp. - calls with a CF component at 50 kHz may be either soprano pipistrelle or common pipistrelle, while calls at 40 kHz may be either common pipistrelle or Nathusius' pipistrelles – but in most cases, it is possible to determine the species based on call characteristics and/or other calls immediately before or after the recording. If a bat pass could not be confidently identified to species level it was recorded as an unidentified bat, or identified only to genus level (e.g. *Myotis* spp.).

Calculation and comparison of bat activity indices

In order to standardise bat activity between the mid-summer and autumn survey periods, results are displayed as a 'Bat Activity Index', which is the total number of bat passes divided by the number of hours per night (Hundt, 2012). This was calculated from sunset to sunrise, using publicly-available data from www.timeanddate.com.

At present there is not a standard system to categorise bat activity as low, moderate or high, because the results vary depending on the species involved and the location of the site. For the purposes of this report we use a bespoke system to discuss and compare levels of bat activity at the site, as outlined in the Table 19. This approach uses standardised terms (e.g. occasional, frequent) to categorise bat activity indices within certain ranges; the average time interval between passes is also provided to give a more-intuitive interpretation of the terms.

Table 19 Characterisation of Bat Activity Indices

Bat Activity Index	Average interval between calls	Terms of characterisation
<2	> 30 minutes	Negligible
2 - 12	5 – 30 minutes	Occasional
12 – 60	1 – 5 minutes	Frequent
>60	< 1 minute	Near-constant

Valuation of ecological features and assessment of impacts

Impacts were assessed using the Guidelines for Ecological Impact Assessment in the UK and Ireland (CIEEM 2016) and Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA, 2017). Reference was also made to Wray *et al.,* (2010) with regards to the evaluation of roosts and commuting routes / foraging areas.

Results of Bat Surveys are presented in Section 8.2.3.4.

A8-1.2.3.6 Non-Volant Mammals

Surveys for all legally protected non-volant mammal species were undertaken within a 50m buffer of the UWF Grid Connection, with the exception of otter as detailed below. The main survey was undertaken on 8th – 11th March 2016. Additional surveys were undertaken on 29th August 2016, 29th September 2016 and 5th/6th April 2017. Mammal surveys of UWF Related Works, UWF Replacement Forestry and UWF Other Activities overlapped dates of Habitat Surveys as described in Section 8.2.2.1.

Otters

Otter surveys followed the NRA *Guidelines for Treatment of Otters During Construction of National Road Schemes* (NRA, 2006), which state that, although there are no seasonal constraints for otter surveys, any dense vegetation (especially in summer) can reduce success in the identification of otter holts or couches. Hence these surveys were scheduled for winter months 2016/17 in order to optimize detection of otters within the study area.

Guidance on the extent of the study area for otters was taken from the *British Highways Agency's Nature Conservation Advice in Relation to Otters HA8199* (Highways Agency, 1999) which dictates a linear search of 300m upstream and downstream of each watercourse crossing is undertaken.

Badgers

According to the NRA *Guidelines for the Treatment of Badgers Prior to Construction of National Road Schemes* (NRA, 2005), survey of setts within 50m of the proposed works location is required. Badger surveys are significantly constrained by vegetative cover and season, and are best conducted from November to April (NRA, 2005). In accordance with NRA guidance, all areas were systematically searched for setts and all hedgerows and boundaries were checked comprehensively by Inis ecologists. Badger territorial activity is high from mid-January to March and surveys at this time are most efficient in identification of badger paths, latrines and feeding signs.

Other Mammals

The following field signs of all mammals were recorded during non-volant mammal surveys within the study area:

- Well-used pathways;
- Prints/tracks;
- Scat/spraints/droppings;
- Signs of feeding (foraged pine cones, badger snuffle holes)
- Places of shelter and features or areas likely to be of particular value as foraging resources (NRA 2004).

Photographs and detailed notes were also recorded for each feature and mapped using ArcGIS 10.4.

A8-1.2.3.7 General Birds

The receiving environment for Whole UWF Project includes typical upland habitats in the Irish context in addition to an improved agricultural landscape.

Breeding Bird Surveys

Breeding season bird transects were carried out during May/June 2016 and April/June 2017 at seven transects along the UWF Grid Connection (Table 20).

Table 20 Details of breeding bird transects undertaken along transects 1 to 7 during the breeding season of 2016 and 2017.

Year	Visit Number	Dates
2016	1 (Early season)	8th, 11th, 12th and 13th May
	2 (Late season)	8th, 9th and 11th June
2017	1 (Early season)	5th, 6th, 7th and 27th April
	2 (Late season)	19th, 20th, 21st and 22nd June

The number of transects was defined using Best Practice guidance from Birdwatch Ireland i.e.:

$\sqrt{n} + 1$, where n = total length of the line (31km). Therefore, $\sqrt{31.7} + 1 = 6.6km$ of transects;

Note: The calculation of numbers of transects required is based on a larger length of 31km as oppose to the actual length of 28km, to account for any variation or changes during the iterative design process. A cautionary approach was taken.

Therefore, 7 no. 1 km transects were completed.

Data was recorded using standard Countryside Bird Survey (CBS) methodology (Birdwatch Ireland, 2012). The conservation status of each species recorded during the field surveys was assessed using the Birds of Conservation Concern in Ireland list (BoCCI) (Colhoun and Cummins, 2013) in addition to relevant national or international legal designations.

Available data on breeding birds within the EIS documentation for the Upperchurch Windfarm was reviewed within the context of overlap with the locations of UWF Related Works, UWF Replacement Forestry and UWF Other Activities. Due to the continuity and overlap of habitat types present throughout the respective elements, a sufficient representative sample of breeding birds is considered to have been achieved through both the results of the current study and previously conducted studies for the Upperchurch Windfarm.

Winter Bird Surveys

Bird transects were also carried out on the same seven transects during the non-breeding season of 2016/17 (Table 21) and 2017/18 (Table 22). The utilised methodology included walked transects and short watches from suitable vantage points to record bird species within the study area during the non-breeding season.

Table 21 Details of bird surveys undertaken along transects 1 to 7 during the non-breeding season of 2016/17.

Month	Dates
November 2016	28th, 29th and 30th
December 2016	15th, 16th, 17th and 23rd
January 2017	19th and 20th
February 2017	22nd and 23rd

Table 22 Details of bird surveys undertaken along transects 1 to 7 during the non-breeding season of 2017/18. (November 2017 to February 2018)

Month	Dates
November 2017	28th and 29th
December 2017	
January 2018	3rd, 10th, 11th and 12th
February 2018	3rd, 5th, 8th

Red Grouse Surveys

Tape playback counts were undertaken on the 23rd and 30th March 2017, under licence from NPWS, on suitable habitat on the UWF Grid Connection following the methodology outlined in Bibby *et al.,* (2000) and Cummins *et al.,* (2010).

The tape lure play-back method involves walking a transect line across the site while playing the call of a male Red Grouse every 250m and recording the territorial response calls of any male Red Grouse present within earshot of the transect line. The grid coordinates of any responding birds are recorded together with any associated behaviour. If the responding bird could not be visually located but could be aurally heard, the approximate location of the bird was recorded and plotted on a map. This is standard and the most effective method used to detect the presence of red grouse onsite prior to the breeding season.

In addition to the tape lure method, any evidence of red grouse including feathers and droppings, were noted and mapped. If droppings were encountered they were recorded as fresh roost sites (pair or single), old roost sites (pair or single) or dropping sites (fresh or old). These details are the primary indicators in determining active pairs of red grouse accurately within the study plot.

Analysis of fresh dropping sites should be carried out to show the rough extent of territories and the number of red grouse within the territory [i.e. paired (two roosts) or unpaired (single roosts) males]. It is necessary to establish whether droppings are old or fresh to eliminate any pre-pair formation locations.

Roost sites comprise of a heap of droppings. A pair roost will consist of two heaps of droppings spaced up to one meter apart (occasionally 1-3 meters apart). Roosts are the most likely to have the ‘soft droppings’, a

different type of dropping excreted from the grouses two blind guts. This means that there will be two 'soft droppings' per bird, these are classic indicators of fresh roosts (Murray and Bridge, 1997).

Merlin Surveys

Breeding Merlin surveys were undertaken across four months throughout the breeding season (April - July 2017) in suitable habitat at Bleanbeg Bog (identified as the most likely habitat to hold breeding birds based on scoping) with four-week intervals between surveys (Table 23).

Table 23 Dates on which Merlin surveys were carried out at Bleanbeg Bog during the breeding season of 2017.

Visit No.	Date
1	27th April
2	30th May
3	22nd June
4	31st July

Prior to the first visit, all areas identified as unsuitable for breeding Merlin (open water, urban areas, farmland, enclosed pastures and areas above 700m) were excluded from the target search area. The remaining habitat was walked using parallel transects 120m apart and intensively searched for evidence of Merlin. Features such as suitable nest sites (old corvid nests) and suitable perches (posts, hummocks, boulders, remnant peat stands and root mats) were noted and the grid reference recorded.

Recorded information/evidence (if found) was defined in the form of secondary Merlin evidence (whitewash, pellets, feathers), prey remains (feather spots, moth wings, prey remains etc.), nests (possible or occupied) and direct observations (calling birds, displaying birds, hunting birds, inter-specific aggression etc.).

Locations of collected evidence (if any) or observations (if any) are recorded for subsequent visits and prey remains and pellets were collected, placed in a bag and labelled with the date, site and location (for subsequent analysis). Observations of additional raptor species such as Kestrel, Sparrowhawk or Buzzard were noted as well as other noteworthy species such as Golden Plover, Curlew, etc.

The following four criteria are to be used for classifying territory status as per the most recent pilot survey Lusby *et al.,* (2011:

- **Unoccupied:** No fresh signs, sightings or calls recorded or fresh signs recorded on a single visit.
- **Occupied:** At least one Merlin seen or heard or fresh signs of occupation (pluckings, pellets, droppings or Merlin feathers) found on at least two occasions separated by at least one week;
- **Breeding Attempt:** Courtship display (food pass between male and female), copulation, adults entering or leaving a nest, eggs or eggshells found, young seen or heard, adults repeatedly alarm calling;
- **Successful breeding attempt:** At least one young fledged or young capable of flight when last seen.

Constraint: Due to the presence of a pair of breeding Hen Harrier proximal to the survey areas, surveys following April avoided parts of Bleanbeg Bog so as to avoid any undue disturbance to an Annex I species.

Kingfisher Surveys

Kingfisher surveys following the methodology presented in National Roads Authority (2008) was undertaken on the 8-11th March 2016. Watercourse crossings were evaluated for any evidence of nest holes within 300m of crossing locations (in tandem with Otter surveys). In each case banks were inspected for evidence of Kingfisher, and general suitability of banks in proximity to crossing locations for nesting Kingfisher. Target notes were made on suitable nesting banks, and any observed nest holes.

Results of Bird Surveys are presented in Section 8.2.3.6

A8-1.2.3.8 Amphibians and Reptiles

Amphibians and reptiles occurring within the UWF Grid Connection, UWF Related Works, UWF Replacement Forestry and UWF Other Activities were recorded during the course of all site walkovers for habitat, mammal and bird surveys.

Results are presented in Section 8.2.3.8.

A8-1.2.3.9 Marsh Fritillary

Suitable habitats, determined by the presence of Devil's Bit Scabious (*Succisa pratensis*) as well as an evaluation of vegetation height and structure, aspect and scrub cover, were identified in along the UWF Grid Connection during the Phase I habitat survey.

These habitats were revisited in 4th and 22nd September 2016 to undertake larval web searches. Survey timings were planned to meet the requirements of best practice guidance (NRA, 2009). The surveys involved a walked search of all suitable habitats. Weather conditions during the surveys were overcast, dry and warm. The locations of larval webs were recorded using a Garmin eTrex 10 GPS/GNSS handheld receiver and mapped using ArcGIS 10.4.

A follow up detailed habitat survey and evaluation of suitable Marsh Fritillary habitat was undertaken on 5th/6th April 2017 to delineate the suitable micro-habitats within the UWF Grid Connection which were known to contain larval webs from the 2016 survey. The extents of suitable micro-habitats were recorded using detailed aerial photography and Garmin eTrex 10 GPS/GNSS handheld receiver. Larval webs and the grid coordinates of scattered groups of basking/foraging larvae were also recorded during this survey. This habitat survey was undertaken in overcast, dry and warm conditions.

The Upperchurch Windfarm does include potential Marsh Fritillary habitat located at; a) the environs of T21 at Grousehall; and b) the environs of T2, T3 and T4 at Shevry. Due to their potential to possibly contain larval webbing these sites were visited on 6th September 2017 to confirm the baseline environment. In the interest of clarity both the consented turbine footprint and described works area for turbine establishment and erection were surveyed. No other Marsh Fritillary habitat overlaps the Whole UWF Project.

Results are presented in Section 8.2.3.9.

A8-1.2.4 Survey Results

A8-1.2.4.1 Designated European Sites

The following 23 European or Natura 2000 Sites have been identified within 15km of the construction area boundaries which includes all haul routes to be used during construction:

1. *Anglesey Road SAC (Site Code: 002125)*
2. *Askeaton Fen Complex SAC (Site Code: 002279)*
3. *Barrigone SAC (Site Code: 000432)*
4. *Bolingbrook Hill SAC (Site Code: 002124)*
5. *Clare Glen SAC (Site Code: 000930)*
6. *Curraghchase Woods SAC (Site Code: 000174)*
7. *Glenomra Wood SAC (Site Code: 001013)*
8. *Glenstal Wood SAC (Site code: 001432)*
9. *Keeper Hill SAC (Site Code: 001197)*
10. *Kilduff, Devilsbit Mountain SAC (Site Code: 000934)*
11. *Lough Derg (Shannon) SPA (Site Code: 004058)*
12. *Lough Derg, North-East Shore SAC (Site Code: 002241)*
13. *Lower River Shannon SAC (Site Code: 002165)*
14. *Lower River Suir SAC (Site Code: 002137)*
15. *Philipston Marsh SAC (Site Code: 001847)*
16. *Ratty River Cave SAC (Site Code: 002316)*
17. *River Shannon and River Fergus Estuaries SPA (Site Code: 004077)*
18. *Silvermine Mountain SAC (Site Code: 000939)*
19. *Silvermine Mountain West SAC (Site Code: 002258)*
20. *Slieve Bernagh SAC (Site Code: 002312)*
21. *Slievefelim to Silvermines SPA (Site Code: 001179)*
22. *Stack's to Mullaghareirk Mountains, West Limerick Hills and Mount Eagle SPA (Site Code: 004161)*
23. *Tory Hill SAC (Site Code: 000439)*

A8-1.2.4.2 Designated National Sites

The following 8 NHAs have been identified within 15km of the Whole UWF Project:

1. *Bleanbeg Bog NHA (Site Code: 002450)*
2. *Grageen Fen and Bog NHA (Site Code: 002186)*
3. *Mauherslieve Bog NHA (Site Code: 002385)*
4. *Woodcock Hill Bog NHA (Site Code: 002402)*
5. *Moyreen Bog NHA (Site Code: 002361)*
6. *Carrigkerry Bogs NHA (Site Code: 002399)*
7. *Scohaboy Bog NHA (Site Code: 000937)*
8. *Gortacullin Bog NHA (Site Code: 002401)*

The following 60 pNHAs have been identified within 15km of the Whole UWF Project:

- *Inner Shannon Estuary - South Shore (Site Code: 000435)*
- *Cabragh Wetlands (Site Code: 001934)*
- *Fergus Estuary and Inner Shannon, North Shore (Site Code: 002048)*
- *Killavalla Wood (Site Code: 001178)*
- *Loughmore Common Turlough (Site Code: 000438)*
- *Keeper Hill (Site Code: 001197)*
- *Derrygareen Heath (Site Code: 000931)*
- *Sturamus Island (Site Code: 001436)*
- *Barrigone (Site Code: 000432)*
- *Bilboa And Gortnageragh River Valleys (Site Code: 001851)*
- *Knockalisheen Marsh (Site Code: 002001)*
- *Clare Glen (Site Code: 00930)*
- *Cahiracon Wood (Site Code: 001000)*
- *Dromore and Bleach Loughs (Site Code: 001030)*
- *Nenagh River Gorge (Site Code: 001133)*
- *Glenstal Wood (Site Code: 001432)*
- *Aughnaglanny Valley (Site Code: 000948)*
- *Garrannon Wood (Site Code: 001012)*
- *Silvermine Mountains (Site Code: 000939)*
- *Killough Hill (Site Code: 000959)*
- *Lough Ourna (Site Code: 000650)*
- *Ormond's Mill, Loughmoe, Templemore (Site Code: 002066)*
- *Adare Woodlands (Site Code: 000429)*
- *Knockanavar Wood (Site Code: 000961)*

- *Inchinsquillib and Dowlings Woods (Site Code: 000956)*
- *Lough Derg (Site Code: 000011)*
- *Kilduff, Devilsbit Mountain (Site Code: 000934)*
- *Castleconnell (Domestic Dwelling, Occupied) (Site Code: 000433)*
- *Ballyvorheen Bog (Site Code: 001849)*
- *Gortglass Lough (Site Code: 0001015)*
- *Curraghchase Woods (Site Code: 000174)*
- *Cloonsnaghta Lough (Site Code: 0001004)*
- *Cloonlara House (Site Code: 000028)*
- *Dromsallagh Bog (Site Code: 001850)*
- *Tory Hill (Site Code: 000439)*
- *Ballymorrisheen Marsh (Site Code: 001425)*
- *Ardagh Church, Newcastlewest (Disused) (Site Code: 000430)*
- *Willsborough Esker (Site Code: 000943)*
- *Clareen Lough (Site Code: 000929)*
- *Ballintemple Bog (Site Code: 000882)*
- *Glenomra Wood (Site Code: 001013)*
- *Templemore Wood (Site Code: 000942)*
- *Clonderalaw Bay (Site Code: 000027)*
- *Paradise House (Ballynacally) (Site Code: 000062)*
- *Derrygeeha Lough (Site Code: 000050)*
- *Gorteennamrock (Site Code: 001433)*
- *Kilbeg Marsh (Site Code: 001848)*
- *Cappagh Fen (Site Code: 001429)*
- *Glenastar Wood (Site Code: 001431)*
- *Dundrum (Site Code: 002096)*
- *Skoolhill (Site Code: 001996)*
- *Ballinvirick Marsh (Site Code: 001427)*
- *Philipston Marsh (Site Code: 001847)*
- *Ardmayle Pond (Site Code: 000945)*
- *Annacarty Wetlands (Site Code: 000639)*
- *Fort Fergus (Ballynacally) (Site Code: 000035)*
- *Dundrum Sanctuary (Site Code: 000950)*
- *Castle Lake (Site Code: 000239)*
- *Laffansbridge (Site Code: 000965)*
- *Ballyneill Marsh (Site Code: 001846)*

Table 24 Proposed Natural Heritage Areas (pNHAs) within 15km of the Whole UWF Project.

Site name and code	**Distance from ***
Inner Shannon Estuary - South Shore (Site Code: 000435)	0 m – UWF Other Activities, Haul Route location HA3 and HA4 located within pNHA boundary
Cabragh Wetlands (Site Code: 001934)	510 m north of UWF Other Activities, Haul Route location HA14
Fergus Estuary and Inner Shannon, North Shore (Site Code: 002048)	1.1 km north of UWF Other Activities, Haul Route HA4
Killavalla Wood (Site Code: 001178)	1.2 km west of UWF Other Activities, Haul Route location HA8
Loughmore Common Turlough (Site Code: 000438)	2.0 km south of UWF Other Activities, Haul Route location HA3
Keeper Hill (Site Code: 001197)	2.1 km north of UWF Grid Connection, Access Road AR4
Derrygareen Heath (Site Code: 000931)	2.2 km south of UWF Grid Connection
Sturamus Island (Site Code: 001436)	2.4 km north of UWF Other Activities, Haul Route location HA1
Barrigone (Site Code: 000432)	3.2 km east of Other Activities, Haul Route location HA1
Bilboa And Gortnageragh River Valleys (Site Code: 001851)	3.3 km south of UWF Grid Connection, Access Road AR9
Knockalisheen Marsh (Site Code: 002001)	4.2 km northeast of UWF Other Activities, Haul Route HA4
Clare Glen (Site Code: 00930)	4.2 km south of UWF Grid Connection
Cahiracon Wood (Site Code: 001000)	4.4 km northwest of UWF Other Activities, Haul Route location HA1
Dromore and Bleach Loughs (Site Code: 001030)	4.9 km west of UWF Other Activities, Haul Route location HA2
Nenagh River Gorge (Site Code: 001133)	5.3 km north of UWF Grid Connection
Glenstal Wood (Site Code: 001432)	5.6 km south of UWF Grid Connection
Aughnaglanny Valley (Site Code: 000948)	6.3 km south of UWF Grid Connection
Garrannon Wood (Site Code: 001012)	7.2 km northwest of UWF Other Activities, Haul Route location HA3
Silvermine Mountains (Site Code: 000939)	7.3 km north of UWF Grid Connection, Access Road AR4
Killough Hill (Site Code: 000959)	7.6 km south of UWF Other Activities, Haul Route location HA14
Lough Ourna (Site Code: 000650)	7.8 km north of UWF Other Activities, Haul Route location HA5
Ormond's Mill, Loughmoe, Templemore (Site Code: 002066)	8.0 km south of UWF Other Activities, Haul Route location HA14

Site name and code	Distance from *
Adare Woodlands (Site Code: 000429)	8.0 km south of UWF Other Activities, Haul Route location HA2
Knockanavar Wood (Site Code: 000961)	8.3 km south of UWF Grid Connection, Access Road AR9
Inchinsquillib and Dowlings Woods (Site Code: 000956)	8.5 km south of UWF Related Works, turning circle in Christmas tree farm
Lough Derg (Site Code: 000011)	8.6 km northwest of UWF Grid Connection
Kilduff, Devilsbit Mountain (Site Code: 000934)	8.9 km northeast of UWF Other Activities, Haul Route location HA12
Castleconnell (Domestic Dwelling, Occupied) (Site Code: 000433)	8.9 km southwest of UWF Grid Connection
Ballyvorheen Bog (Site Code: 001849)	9.0 km south of UWF Grid Connection
Gortglass Lough (Site Code: 0001015)	9.3 km north of UWF Other Activities, Haul Route location HA1
Curraghchase Woods (Site Code: 000174)	9.3 km west of UWF Other Activities, Haul Route location HA2
Cloonsnaghta Lough (Site Code: 0001004)	9.4 km northwest of UWF Other Activities Haul Route location HA1
Cloonlara House (Site Code: 000028)	9.5 km northeast of UWF Other Activities Haul Route location HA4
Dromsallagh Bog (Site Code: 001850)	9.8 km south of UWF Grid Connection
Tory Hill (Site Code: 000439)	10.3 km of UWF Other Activities, Haul Route location HA2
Ballymorrisheen Marsh (Site Code: 001425)	10.7 km southeast of UWF Other Activities, Haul Route location HA1
Ardagh Church, Newcastlewest (Disused) (Site Code: 000430)	10.9 km south of UWF Other Activities, Haul Route location HA1
Willsborough Esker (Site Code: 000943)	11.0 km north of UWF Other Activities, Haul Route location HA5
Clareen Lough (Site Code: 000929)	11.0 km northwest of UWF Other Activities, Haul Route location HA5
Ballintemple Bog (Site Code: 000882)	11.1 km northeast of UWF Other Activities, Haul Route location HA6
Glenomra Wood (Site Code: 001013)	11.5 km west of UWF Grid Connection
Templemore Wood (Site Code: 000942)	11.6 km northeast of UWF Other Activities, Haul Route location HA12
Clonderalaw Bay (Site Code: 000027)	11.6 km west of UWF Other Activities, Haul Route location HA1

Site name and code	Distance from *
Paradise House (Ballynacally) (Site Code: 000062)	11.7 km north of UWF Other Activities, Haul Route location HA1
Derrygeeha Lough (Site Code: 000050)	11.7 km northwest of UWF Other Activities, Haul Route location HA1
Gorteennamrock (Site Code: 001433)	12.0 km east of UWF Other Activities, Haul Route location HA1
Kilbeg Marsh (Site Code: 001848)	12.5 km south of UWF Grid Connection, Access Road AR10
Cappagh Fen (Site Code: 001429)	12.5 km southeast of UWF Other Activities, Haul Route location HA1
Glenastar Wood (Site Code: 001431)	12.6 km south of UWF Other Activities, Haul Route location HA1
Dundrum (Site Code: 002096)	12.6 km south of UWF Grid Connection
Skoolhill (Site Code: 001996)	12.7 km southeast of UWF Other Activities, Haul Route location HA4
Ballinvirick Marsh (Site Code: 001427)	12.7 km southwest of UWF Other Activities, Haul Route location HA2
Philipston Marsh (Site Code: 001847)	13.1 km south of UWF Grid Connection Access Road AR10
Ardmayle Pond (Site Code: 000945)	13.9 km south of UWF Other Activities, Haul Route location HA18
Annacarty Wetlands (Site Code: 000639)	13.9 km south of UWF Grid Connection
Fort Fergus (Ballynacally) (Site Code: 000035)	14.2 km north of UWF Other Activities, Haul Route location HA1
Dundrum Sanctuary (Site Code: 000950)	14.2 km south of UWF Grid Connection
Castle Lake (Site Code: 000239)	14.5 km north of UWF Other Activities, Haul Route location HA3
Laffansbridge (Site Code: 000965)	14.5 km southeast of UWF Other Activities, Haul Route location HA14
Ballyneill Marsh (Site Code: 001846)	15.0 km south of UWF Grid Connection, Access Road AR10

*Distance from Construction area boundaries, specific element specified in column

A8-1.2.4.3 Hen Harrier

Table 25 Distance of confirmed Hen Harrier nest sites recorded during the breeding season in 2016 and 2017 to the nearest construction area boundaries.

G = Grazing; RG = Rough Grazing; HB = Heath or bog; DE = Deciduous woodland or scrub; GO = Gorse; CF = Clear fell; NF2 = New forestry plantation trees 20-30cm high; NF3 = New forestry plantation trees c 1m high; NF4= New forestry plantation trees > 2m high; 2nd F1/F2 = Second rotation forestry plantation trees 20-30cm high; 2nd F3 = Second rotation forestry plantation trees c 1m high; 2nd F4 = Second rotation forestry plantation trees > 2m high; F= Post thicket forestry

Nest Location	Habitat Type	Distance (m) from nearest construction area boundaries	Year
A	NF	154	2016
B	HB	680	2017
C	HB	470	2017
D	NF4	500	2016
E	2NF4	903	2016
F	NF1	2154	2016

Table 26 Distance of Hen Harrier roost sites recorded in the non-breeding season of 2016/17 to the nearest construction area boundaries.

G = Grazing; RG = Rough Grazing; HB = Heath or bog; DE = Deciduous woodland or scrub; GO = Gorse; CF = Clear fell; NF2 = New forestry plantation trees 20-30cm high; NF3 = New forestry plantation trees c 1m high; NF4= New forestry plantation trees > 2m high; 2nd F1/F2 = Second rotation forestry plantation trees 20-30cm high; 2nd F3 = Second rotation forestry plantation trees c 1m high; 2nd F4 = Second rotation forestry plantation trees > 2m high; F= Post thicket forestry

Roost Location	**Habitat Type**	**Distance (m) from nearest construction area boundaries**	**Year**
1	HB	681	2016/2017
2	HB	171	2016/2017
3	HB	1313	2016/2017

Table 27 Details of Hen Harrier sightings and the habitats over which the birds were observed from vantage point surveys undertaken du ring the breeding season in 2016.

G = Grazing; RG = Rough Grazing; HB = Heath or bog; DE = Deciduous woodland or scrub; GO = Gorse; CF = Clear fell; NF2 = New forestry plantation trees 20-30cm high; NF3 = New forestry plantation trees c 1m high; NF4 = New forestry plantation trees > 2m high; 2nd F1/F2 = Second rotation forestry plantation trees 20-30cm high; 2nd F3 = Second rotation forestry plantation trees c 1m high; 2nd F4 = Second rotation forestry plantation trees > 2m high; F= Post thicket forestry

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
1	11/03/16	Nil Sightings																	
1	15/03/16	Nil Sightings																	
2	15/03/16	Nil Sightings																	
2	21/03/16	Nil Sightings																	
3	11/03/16	Nil Sightings																	
3	13/03/16	Nil Sightings																	
4	12/03/16	Nil Sightings																	
4	21/03/16	Hen Harrier	M	13:40														F	30
4	21/03/16	Hen Harrier	F	13:50															300
5	12/03/16	Nil Sightings																	
5	13/03/16	Nil Sightings																	
6	12/03/16	Nil Sightings																	
6	21/03/16	Hen Harrier	M	11:39		RG													558
6	21/03/16	Hen Harrier	M	11:48														F	240
6	21/03/16	Hen Harrier	M	11:48			HB												50
6	21/03/16	Hen Harrier	M	11:49			HB												20

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
6	21/03/16	Hen Harrier	F	11:49			HB												40
7	13/03/16	Nil Sightings																	
7	14/03/16	Nil Sightings																	
8	15/03/16	Hen Harrier	M	17:35		RG				CF									3
8	16/03/16	Hen Harrier	M	10:35		RG				CF									10
9	16/03/16	Hen Harrier	F	12:53				DE		CF									28
9	16/03/16	Hen Harrier	F	14:03		RG		DE											10
10	14/03/16	Hen Harrier	M	14:03			HB												30
11	15/03/16	Nil Sightings																	
12	14/03/16	Hen Harrier	M	12:07						CF									13
12	14/03/16	Hen Harrier	F	12:07						CF									13
1	04/04/16	Hen Harrier	M	11:05							NF1								8
1	04/04/16	Hen Harrier	M	11:05				DE											20
1	04/04/16	Hen Harrier	M	11:05							NF1								10
1	04/04/16	Hen Harrier	M	11:05														F	10
1	21/04/16	Nil Sightings																	
2	07/04/16	Hen Harrier	M	08:53			HB											F	420
2	07/04/16	Hen Harrier	M	09:00			HB												2100
2	07/04/16	Hen Harrier	M	09:35			HB											F	1140
2	07/04/16	Hen Harrier	M	09:55		RG	HB											F	360
2	07/04/16	Hen Harrier	F+M	10:01			HB											F	240

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
2	07/04/16	Hen Harrier	F	10:05		RG	HB											F	180
2	09/04/16	Hen Harrier	F	15:10			HB											F	10
2	09/04/16	Hen Harrier	F	15:45														F	180
2	09/04/16	Hen Harrier	F	17:10		RG												F	270
3	08/04/16	Hen Harrier	F	10:05		RG	HB											F	180
3	04/04/16	Hen Harrier	M+2 F's	14:50														F	270
4	05/04/16	Hen Harrier	F	12:13			HB												20
4	05/04/16	Hen Harrier	F	13:47			HB												20
5	05/04/16	Hen Harrier	F	10:27			HB												2100
5	05/04/16	Hen Harrier	M	09:00			HB												1140
5	05/04/16	Hen Harrier	M	09:35			HB											F	40
5	05/04/16	Hen Harrier	M	09:55		RG	HB											F	360
5	17/04/16	Nil Sightings																	
6	06/04/16	Hen Harrier	F	10:50			HB												90
6	07/04/16	Hen Harrier	F+M	16:26			HB					NF2							120
6	07/04/16	Hen Harrier	M+M	16:46			HB												40
6	07/04/16	Hen Harrier	M+M	16:48														F	300
6	25/04/16	Hen Harrier	1sty M	17:00			HB											F	1200
6	25/04/16	Hen Harrier	F	17:00			HB											F	120
6	25/04/16	Hen Harrier	F+ad M	18:10			HB											F	1800

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
6	25/04/16	Hen Harrier	2ad M's	18:40														F	30
7	07/04/16	Nil Sightings																	
7	25/04/16	Nil Sightings																	
8	06/04/16	Nil Sightings																	
9	06/04/16	Nil Sightings																	
9	07/04/16	Nil Sightings																	
10	17/04/16	Hen Harrier	3xM's	15:35														F	1200
10	25/04/16	Hen Harrier	M+F	13:30			HB											F	1800
11	05/04/16	Nil Sightings																	
12	04/04/16	Hen Harrier	M	12:15				DE										F	60
12	04/04/16	Hen Harrier	F	13:15														F	35
12	04/04/16	Hen Harrier	M	14:10														F	57
12	04/04/16	Hen Harrier	M	14:35														F	3
12	04/04/16	Hen Harrier	M	16:20														F	20
1	06/05/16	Nil Sightings																	
1	10/05/16	Nil Sightings																	
2	06/05/16	Hen Harrier	F	09:05			HB											F	45
2	06/05/16	Hen Harrier	M	09:05			HB											F	60
2	18/05/16	Hen Harrier	M	12:45			HB											F	130
3	04/05/16	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
3	06/05/16	Nil Sightings																	
4	04/05/16	Nil Sightings																	
4	19/05/16	Nil Sightings																	
5	04/05/16	Hen Harrier	M	14:05			HB												15
5	12/05/16	Hen Harrier	M	10:05		RG													13
6	05/05/16	Hen Harrier	F	15:30														F	250
6	13/05/16	Hen Harrier	M	13:25			HB											F	1020
6	13/05/16	Hen Harrier	M	13:25			HB											F	1500
7	05/05/16	Nil Sightings																	
7	19/05/16	Nil Sightings																	
8	20/05/16	Hen Harrier	M	13:40	G														6
9	13/05/16	Hen Harrier	F	10:55		RG		DE											20
9	13/05/16	Hen Harrier	F	15:03		RG		DE											187
10	05/05/16	Hen Harrier	M	08:10														F	180
10	05/05/16	Hen Harrier	F	09:05														F	70
10	05/05/16	Hen Harrier	M	10:15			HB												20
10	05/05/16	Hen Harrier	F	10:20														F	600
10	13/05/16	Hen Harrier	M	09:36														F	660
10	13/05/16	Hen Harrier	M	09:40														F	500
11	09/05/16	Nil Sightings																	
12	11/05/16	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
1	07/06/16	Nil Sightings																	
1	09/06/16	Hen Harrier	M	11:15				DE											14
2	09/06/16	Hen Harrier	M	17:15			HB											F	55
2	09/06/16	Hen Harrier	F	17:15			HB											F	30
2	15/06/16	Hen Harrier	M	08:40			HB												20
2	15/06/16	Hen Harrier	F	08:40			HB												30
2	15/06/16	Hen Harrier	M	10:15			HB												30
2	15/06/16	Hen Harrier	F	10:15			HB												30
3	07/06/16	Nil Sightings																	
3	15/06/16	Hen Harrier	M	13:25			HB												175
4	08/06/16	Hen Harrier	M	11:05			HB												20
4	13/06/16	Hen Harrier	M	16:10			HB												30
5	03/06/16	Nil Sightings																	
5	13/06/16	Hen Harrier	M	11:20			HB												25
6	11/06/16	Nil Sightings																	
6	13/06/16	Hen Harrier	M	14:30			HB											F	30
6	13/06/16	Hen Harrier	F	14:30			HB											F	20
7	03/06/16	Nil Sightings																	
7	08/06/16	Nil Sightings																	
8	10/06/16	Hen Harrier	M	11:18	G	RG													21
9	03/06/16	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
10	11/06/16	Hen Harrier	M	14:30														F	15
10	11/06/16	Hen Harrier	M	15:50			HB												45
10	17/06/16	Hen Harrier	F	10:55														F	10
11	09/06/16	Nil Sightings																	
12	08/06/16	Hen Harrier	M	10:05														F	4
12	08/06/16	Hen Harrier	M	12:20														F	11
12	08/06/16	Hen Harrier	M	13:55														F	476

Table 28 Details of Hen Harrier behaviour which the birds were exhibiting during each observation and associated notes for vantage point surveys undertaken during the breeding season in 2016.

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
1	11/03/16	Nil Sightings										
1	15/03/16	Nil Sightings										
2	15/03/16	Nil Sightings										
2	21/03/16	Nil Sightings										
3	11/03/16	Nil Sightings										
3	13/03/16	Nil Sightings										
4	12/03/16	Nil Sightings										
4	21/03/16	Hen Harrier	M			DI					30	1x male and 1x female HH over traditional nest site
4	21/03/16	Hen Harrier	F	S							300	
5	12/03/16	Nil Sightings										
5	13/03/16	Nil Sightings										
6	12/03/16	Nil Sightings										
6	21/03/16	Hen Harrier	M				H				558	1x male and 1 x female HH circling together.
6	21/03/16	Hen Harrier	M					FL			240	
6	21/03/16	Hen Harrier	M				H				50	
6	21/03/16	Hen Harrier	M		C						20	
6	21/03/16	Hen Harrier	F		C						40	
7	13/03/16	Nil Sightings										

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
7	14/03/16	Nil Sightings										
8	15/03/16	Hen Harrier	M					FI			3	1x male HH seen at 17:35 flying over RG and CF
8	16/03/16	Hen Harrier	M					FI			10	1x male HH seen at 10:35 flying over RG and gorse
9	16/03/16	Hen Harrier	F					FI			28	1x female HH seen at 12:53 flying over CF & DE,
9	16/03/16	Hen Harrier	F					FI			10	
10	14/03/16	Hen Harrier	M	S							30	2 Golden Plover
11	15/03/16	Nil Sightings										
12	14/03/16	Hen Harrier	M		C						13	1x male HH and 1x female HH seen at 12:07 circling each other high over CF
12	14/03/16	Hen Harrier	F		C						13	
1	04/04/16	Hen Harrier	M				H				8	
1	04/04/16	Hen Harrier	M				H				20	
1	04/04/16	Hen Harrier	M				H				10	
1	04/04/16	Hen Harrier	M				H				10	
1	21/04/16	Nil Sightings										
2	07/04/16	Hen Harrier	M		C						420	1x male and 1 x female HH over traditional nest site
2	07/04/16	Hen Harrier	M						P		2100	
2	07/04/16	Hen Harrier	M			DI					1140	
2	07/04/16	Hen Harrier	M			DI					360	
2	07/04/16	Hen Harrier	F+M		C						240	

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
2	07/04/16	Hen Harrier	F	S							180	
2	09/04/16	Hen Harrier	F	S							10	
2	09/04/16	Hen Harrier	F		C						180	
2	09/04/16	Hen Harrier	F	S							270	
3	08/04/16	Hen Harrier	F	S							180	
3	04/04/16	Hen Harrier	M+2F's	S							270	1x male and 1 x female HH over traditional nest site
4	05/04/16	Hen Harrier	F		C						20	
4	05/04/16	Hen Harrier	F				H				20	
5	05/04/16	Hen Harrier	F				H				2100	
5	05/04/16	Hen Harrier	M						P		1140	
5	05/04/16	Hen Harrier	M			DI					40	
5	05/04/16	Hen Harrier	M			DI					360	
5	17/04/16	Nil Sightings										
6	06/04/16	Hen Harrier	F				H				90	
6	07/04/16	Hen Harrier	F+M		C						120	1x male and 1 x female HH courting over suita-ble nesting habitat
6	07/04/16	Hen Harrier	M+M	S							40	
6	07/04/16	Hen Harrier	M+M	S							300	
6	25/04/16	Hen Harrier	1sty M			DI					1200	1x male HH (Ringtail) skydancing
6	25/04/16	Hen Harrier	F		C						120	
6	25/04/16	Hen Harrier	F+ad M	S	C			FL			1800	

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
6	25/04/16	Hen Harrier	2ad M's	S				FL			30	
7	07/04/16	Nil Sightings										
7	25/04/16	Nil Sightings										
8	06/04/16	Nil Sightings										
9	06/04/16	Nil Sightings										
9	07/04/16	Nil Sightings										
10	17/04/16	Hen Harrier	3xM's	S				FL			1200	
10	25/04/16	Hen Harrier	M+F	S	C	DI		FL			1800	1x male and 1x female HH courting over suitable nesting habitat
11	05/04/16	Nil Sightings										
12	04/04/16	Hen Harrier	M	S							60	1x male HH soaring both in a S-N and N-S directions.
12	04/04/16	Hen Harrier	F					FL			35	1x female HH flying over forestry in an East-West direction landing into forestry.
12	04/04/16	Hen Harrier	M					FL	P		57	1x male HH flying in an E-W direction over forestry and then perches in forestry.
12	04/04/16	Hen Harrier	M					FL			3	1x male HH flying in an E-W direction over forestry
12	04/04/16	Hen Harrier	M					FL			20	1x male HH flying in an E-W direction over forestry
1	06/05/16	Nil Sightings										
1	10/05/16	Nil Sightings										
2	06/05/16	Hen Harrier	F					FL	P		45	
2	06/05/16	Hen Harrier	M					FL	P		60	

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
2	18/05/16	Hen Harrier	M	S			H	FL			130	
3	04/05/16	Nil Sightings										
3	06/05/16	Nil Sightings										
4	04/05/16	Nil Sightings										
4	19/05/16	Nil Sightings										
5	04/05/16	Hen Harrier	M				H				15	
5	12/05/16	Hen Harrier	M				H				13	
6	05/05/16	Hen Harrier	F	S							250	
6	13/05/16	Hen Harrier	M		C			FL			1020	1x adult male HH
6	13/05/16	Hen Harrier	M		C			FL			1500	1st year male HH; ringtail
7	05/05/16	Nil Sightings										
7	19/05/16	Nil Sightings										
8	20/05/16	Hen Harrier	M					FL			6	
9	13/05/16	Hen Harrier	F	S							20	
9	13/05/16	Hen Harrier	F	S				FL			187	
10	05/05/16	Hen Harrier	M		C	DI					180	
10	05/05/16	Hen Harrier	F		C						70	
10	05/05/16	Hen Harrier	M				H				20	
10	05/05/16	Hen Harrier	F		C						600	
10	13/05/16	Hen Harrier	M	S		DI		FL			660	2 adult male HH together
10	13/05/16	Hen Harrier	M	S				FL			500	

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
11	09/05/16	Nil Sightings										
12	11/05/16	Nil Sightings										
1	07/06/16	Nil Sightings										
1	09/06/16	Hen Harrier	M				H				14	
2	09/06/16	Hen Harrier	M					FL			55	1x female and male HH together, no food pass seen
2	09/06/16	Hen Harrier	F					FL			30	
2	15/06/16	Hen Harrier	M					FL		FP	20	
2	15/06/16	Hen Harrier	F					FL		FP	30	
2	15/06/16	Hen Harrier	M					FL		FP	30	Food pass
2	15/06/16	Hen Harrier	F					FL		FP	30	Food pass
3	07/06/16	Nil Sightings										Food pass
3	15/06/16	Hen Harrier	M				H				175	Food pass
4	08/06/16	Hen Harrier	M				H				20	
4	13/06/16	Hen Harrier	M				H				30	
5	03/06/16	Nil Sightings										
5	13/06/16	Hen Harrier	M				H				25	Begging calls from female HH heard
6	11/06/16	Nil Sightings										
6	13/06/16	Hen Harrier	M					FL		FP	30	Food pass
6	13/06/16	Hen Harrier	F					FL		FP	20	Food pass
7	03/06/16	Nil Sightings										

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
7	08/06/16	Nil Sightings										
8	10/06/16	Hen Harrier	M				H				21	1x male HH flew low from N-S hunting over RG and grazing
9	03/06/16	Nil Sightings										
10	11/06/16	Hen Harrier	M					FL			15	1x male HH carrying prey into dead ground food pass not seen
10	11/06/16	Hen Harrier	M				H				45	
10	17/06/16	Hen Harrier	F					FL		FP	10	Begging calls from female HH heard
11	09/06/16	Nil Sightings										
12	08/06/16	Hen Harrier	M		C			FL			4	1x male HH, 3 sightings. Possible Food pass
12	08/06/16	Hen Harrier	M					FL			11	
12	08/06/16	Hen Harrier	M	S				FL			476	

Table 29 Details of Hen Harrier sightings and the habitats over which the birds were observed from vantage point surveys undertaken during the non - breeding season in 2016/17.

G = Grazing; RG = Rough Grazing; HB = Heath or bog; DE = Deciduous woodland or scrub; GO = Gorse; CF = Clear fell; NF2 = New forestry plantation trees 20-30cm high; NF3 = New forestry plantation trees c 1m high; NF4 = New forestry plantation trees > 2m high; 2nd F1/F2 = Second rotation forestry plantation trees 20-30cm high; 2nd F3 = Second rotation forestry plantation trees c 1m high; 2nd F4 = Second rotation forestry plantation trees > 2m high; F= Post thicket forestry

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Duration (s)
1	13/09/16	Nil Sightings																	
10	13/09/16	Hen Harrier	Male	19:09			X												30
10	13/09/16	Hen Harrier	Male	19:15														X	10
4	14/09/16	Hen Harrier	Male	08:00			X												15
3	15/09/16	Hen Harrier	Juvenile	19:35		X													20
5	16/09/16	Nil Sightings																	
6	16/09/16	Hen Harrier	Juvenile	19:32			X												60
6	16/09/16	Hen Harrier	Male	19:38			X												30
2	17/09/16	Hen Harrier	Male	08:16			X												80
2	17/09/16	Nil Sightings																	
10	18/09/16	Hen Harrier	Immature Male	07:31			X												20
5	18/09/16	Nil Sightings																	
6	19/09/16	Hen Harrier	Juvenile	07:13			X												10
1	19/09/16	Nil Sightings																	
3	20/09/16	Hen Harrier	Juvenile	07:10		X	X												15
4	20/09/16	Hen Harrier	Male	18:28			X												70

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Duration (s)
4	20/09/16	Hen Harrier	Juvenile	19:28		X													20
12	20/09/16	Nil Sightings																	
12	20/09/16	Nil Sightings																	
11	21/09/16	Nil Sightings																	
11	21/09/16	Nil Sightings																	
7	22/09/16	Nil Sightings																	
7	22/09/16	Nil Sightings																	
8	27/09/16	Nil Sightings																	
8	27/09/16	Nil Sightings																	
9	28/09/16	Nil Sightings																	
9	28/09/16	Hen Harrier	Male	17:25		X													60
1	15/10/16	Nil Sightings																	
10	15/10/16	Hen Harrier	Male	17:45			X												20
10	15/10/16	Hen Harrier	Male	17:45			X												2820
10	15/10/16	Hen Harrier	Male	18:32			X												10
5	16/10/16	Nil Sightings																	
2	16/10/16	Nil Sightings																	
7	17/10/16	Nil Sightings																	
4	18/10/16	Nil Sightings																	
3	18/10/16	Nil Sightings																	
6	19/10/16	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Duration (s)
1	20/10/16	Nil Sightings																	
6	20/10/16	Hen Harrier	Male	18:44			X												30
7	21/10/16	Nil Sightings																	
5	21/10/16	Nil Sightings																	
4	22/10/16	Nil Sightings																	
10	24/10/16	Hen Harrier	Female	08:15			X												25
10	24/10/16	Hen Harrier	Male	08:17			X												40
10	24/10/16	Hen Harrier	Male	08:30			X												30
11	24/10/16	Hen Harrier	Male	16:29			X												10
11	24/10/16	Hen Harrier	Male	18:32			X												13
3	25/10/16	Nil Sightings																	
11	25/10/16	Nil Sightings																	
12	25/10/16	Nil Sightings																	
12	26/10/16	Nil Sightings																	
8	26/10/16	Nil Sightings																	
8	27/10/16	Hen Harrier	Male	09:50		X													13
9	27/10/16	Nil Sightings																	
9	28/10/16	Nil Sightings																	
2	29/10/16	Nil Sightings																	
9	20/11/16	Nil Sightings																	
5	21/11/16	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Duration (s)
6	21/11/16	Hen Harrier	Juvenile	16:18		X													40
8	22/11/16	Nil Sightings																	
3	22/11/16	Nil Sightings																	
9	23/11/16	Nil Sightings																	
4	23/11/16	Hen Harrier	Juvenile	15:20			X												10
6	24/11/16	Nil Sightings																	
8	25/11/16	Nil Sightings																	
4	28/11/16	Nil Sightings																	
5	28/11/16	Hen Harrier	Immature Male	15:09		X													360
1	28/11/16	Nil Sightings																	
1	28/11/16	Nil Sightings																	
12	28/11/16	Nil Sightings																	
12	28/11/16	Nil Sightings																	
2	29/11/16	Nil Sightings																	
2	29/11/16	Hen Harrier	Female	16:51		X	X												20
11	29/11/16	Nil Sightings																	
11	29/11/16	Hen Harrier	Female	16:24			X												12
11	29/11/16	Hen Harrier	Male	16:47			X												947
11	29/11/16	Hen Harrier	Male	16:52			X												11
3	30/11/16	Nil Sightings																	
7	30/11/16	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Duration (s)
7	30/11/16	Nil Sightings																	
10	30/11/16	Nil Sightings																	
10	30/11/16	Nil Sightings																	
2	15/12/16	Nil Sightings																	
2	15/12/16	Nil Sightings																	
12	16/12/16	Nil Sightings																	
5	16/12/16	Nil Sightings																	
11	19/12/16	Nil Sightings																	
6	19/12/16	Hen Harrier	Immature Female	16:08	X	X													20
6	20/12/16	Hen Harrier	Male	09:02	X	X												X	36
12	20/12/16	Nil Sightings																	
5	21/12/16	Nil Sightings																	
10	21/12/16	Nil Sightings																	
10	22/12/16	Nil Sightings																	
11	22/12/16	Hen Harrier	Male	16:00			X											X	642
11	22/12/16	Hen Harrier	Male	16:15			X											X	212
11	22/12/16	Hen Harrier	Female	16:21			X												7
	23/12/16	Hen Harrier	Male	14:10															
11	17/01/17	Hen Harrier	Male	08:55		X												X	18
11	17/01/17	Hen Harrier	Male	17:03			X												15
12	18/01/17	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Duration (s)
5	18/01/17	Nil Sightings																	
5	19/01/17	Nil Sightings																	
12	19/01/17	Nil Sightings																	
6	25/01/17	Nil Sightings																	
10	25/01/17	Nil Sightings																	
10	27/01/17	Nil Sightings																	
3	27/01/17	Nil Sightings																	
2	29/01/17	Nil Sightings																	
2	29/01/17	Nil Sightings																	
3	31/01/17	Nil Sightings																	
6	31/01/17	Nil Sightings																	
11	08/02/17	Hen Harrier	Male	17:25			X												14
11	08/02/17	Hen Harrier	Male	17:40			X												5
12	09/02/17	Nil Sightings																	
2	10/02/17	Hen Harrier	Male	10:10			X												15
5	10/02/17	Nil Sightings																	
6	11/02/17	Nil Sightings																	
3	12/02/17	Hen Harrier	Male	15:20		X													12
3	12/02/17	Hen Harrier	Male	15:35			X												10
3	12/02/17	Hen Harrier	Male	17:10			X												10
5	13/02/17	Nil Sightings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Duration (s)
10	14/02/17	Hen Harrier	Male	16:00			X												6
10	14/02/17	Hen Harrier	Male	17:30			X												8
10	14/02/17	Hen Harrier	Ringtail	17:45														X	20
3	15/02/17	Nil Sightings																	
11	16/02/17	Hen Harrier	Ringtail	07:34			X												5
11	16/02/17	Hen Harrier	Male	07:34		X	X											X	30
6	16/02/17	Nil Sightings																	
12	22/02/17	Nil Sightings																	
2	23/02/17	Nil Sightings																	
10	24/02/17	Nil Sightings																	

Table 30 Details of Hen Harrier behaviour which the birds were exhibiting during each observation and associated notes for vantage point surveys undertaken during the non - breeding season in 2016/17.

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
1	13/09/16	Nil Sightings										
10	13/09/16	Hen Harrier	Male				X				30	1x male HH hunting over bog habitat
10	13/09/16	Hen Harrier	Male					X			10	1x male HH flying over forestry east towards Bealaclave.
4	14/09/16	Hen Harrier	Male				X				15	1x male HH hunting over bog habitat
3	15/09/16	Hen Harrier	Juve-nile					X			20	1x HH (Ringtail – prob. juv. Male) flying, lost from view
5	16/09/16	Nil Sightings										
6	16/09/16	Hen Harrier	Juve-nile					X			60	1x HH (Ringtail) circling around then flying north to north slope of Mauherslieve
6	16/09/16	Hen Harrier	Male					X			30	1x male HH flying similar flight to previous bird then circling north slope of Mauherslieve
2	17/09/16	Hen Harrier	Male				X				80	1x male HH hunting
2	17/09/16	Nil Sightings										18 Golden Plover
10	18/09/16	Hen Harrier	Imma-ture Male				X				20	1x male HH hunting over bog habitat
5	18/09/16	Nil Sightings										
6	19/09/16	Hen Harrier	Juve-nile					X			10	1x female HH seen briefly over roost area
1	19/09/16	Nil Sightings										
3	20/09/16	Hen Harrier	Juve-nile					X			15	1x female HH seen briefly over roost area
4	20/09/16	Hen Harrier	Male		X						70	1x male HH circling over bog habitat

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
4	20/09/16	Hen Harrier	Juve-nile					X			20	1x HH (Ringtail) flying direct line toward roost. South of Mauherslieve
12	20/09/16	Nil Sightings										
12	20/09/16	Nil Sightings										
11	21/09/16	Nil Sightings										
11	21/09/16	Nil Sightings										
7	22/09/16	Nil Sightings										
7	22/09/16	Nil Sightings										
8	27/09/16	Nil Sightings										
8	27/09/16	Nil Sightings										
9	28/09/16	Nil Sightings										
9	28/09/16	Hen Harrier	Male				X				60	1x male HH came from the N hunting over rough grassland and then headed in a south-erly direction.
1	15/10/16	Nil Sightings										
10	15/10/16	Hen Harrier	Male				X				20	1x male HH hunting then perched on tussock for 45 mins then flying west into dead ground at 18:32hrs .
10	15/10/16	Hen Harrier	Male					X			2820	
10	15/10/16	Hen Harrier	Male					X			10	
5	16/10/16	Nil Sightings										
2	16/10/16	Nil Sightings										
7	17/10/16	Nil Sightings										
4	18/10/16	Nil Sightings										

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
3	18/10/16	Nil Sightings										
6	19/10/16	Nil Sightings										
1	20/10/16	Nil Sightings										
6	20/10/16	Hen Harrier	Male					X			30	1x male HH landing on ground twice eventu-ally settling to roost at 18:44 hrs
7	21/10/16	Nil Sightings										
5	21/10/16	Nil Sightings										
4	22/10/16	Nil Sightings										
10	24/10/16	Hen Harrier	Fe-male				X				25	1x HH (Ringtail - probably female) hunting 08:15 hrs coming from west.
10	24/10/16	Hen Harrier	Male				X				40	1x HH (Sub ad M) hunting coming from west.
10	24/10/16	Hen Harrier	Male				X				30	1x male HH hunting coming from west.
11	24/10/16	Hen Harrier	Male				X				10	1x male HH hunting over HB, flying in an E-W direction.
11	24/10/16	Hen Harrier	Male					X			13	1x male HH flying E-W over HB habitat and landing into heather 18:30.
3	25/10/16	Nil Sightings										
11	25/10/16	Nil Sightings										
12	25/10/16	Nil Sightings										
12	26/10/16	Nil Sightings										
8	26/10/16	Nil Sightings										
8	27/10/16	Hen Harrier	Male				X				13	1x male HH hunting over rough grassland fly-ing in an E-W and then flew N, disappeared from view.
9	27/10/16	Nil Sightings										

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
9	28/10/16	Nil Sightings										
2	29/10/16	Nil Sightings										8 Golden Plover flying around top of Mau-herslieve 18:20h
9	20/11/16	Nil Sightings										
5	21/11/16	Nil Sightings										7 Golden Plover flying around
6	21/11/16	Hen Harrier	Juve-nile					X			40	1x HH (Ringtail -prob. male), flying north
8	22/11/16	Nil Sightings										
3	22/11/16	Nil Sightings										
9	23/11/16	Nil Sightings										
4	23/11/16	Hen Harrier	Juve-nile				X				10	9 Golden Plover flying around
6	24/11/16	Nil Sightings										
8	25/11/16	Nil Sightings										
4	28/11/16	Nil Sightings										20 Golden Plover on rough grassland.
5	28/11/16	Hen Harrier	Imma-ture Male				X				360	1x HH (Sub ad Male) hunting on RG for 6 minutes, 2 strikes on prey and then perched on fieldbank for 2 minutes.
1	28/11/16	Nil Sightings										
1	28/11/16	Nil Sightings										
12	28/11/16	Nil Sightings										
12	28/11/16	Nil Sightings										
2	29/11/16	Nil Sightings										
2	29/11/16	Hen Harrier	Fe-male					X			20	1x female HH flew east over VP

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
11	29/11/16	Nil Sightings										
11	29/11/16	Hen Harrier	Fe-male					X			12	1x female HH flew in from south low over bog, circled briefly and quickly dropped into heather
11	29/11/16	Hen Harrier	Male					X			947	1x male HH flew in from the south over bog, flying for 16 seconds and perched on fence post at edge of forestry. Perched on the post for 8 min 20 secs before flying a short distance onto a tree in the bog. Perched here for a fur-ther 5 mins 20 secs. Flew from tree and over bog for 78 seconds before perching briefly on the ground (22 seconds). Took off from ground and flew up towards area where fe-male roosted and dropped into heather and out of sight
11	29/11/16	Hen Harrier	Male					X			11	1x male HH flew in from the south, flying low over bog, circled briefly before landing into heather.
3	30/11/16	Nil Sightings										
7	30/11/16	Nil Sightings										
7	30/11/16	Nil Sightings										
10	30/11/16	Nil Sightings										
10	30/11/16	Nil Sightings										
2	15/12/16	Nil Sightings										
2	15/12/16	Nil Sightings										
12	16/12/16	Nil Sightings										
5	16/12/16	Nil Sightings										

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
11	19/12/16	Nil Sightings										
6	19/12/16	Hen Harrier	Imma-ture Fe-male					X			20	1x HH (Imm. Female) flying from south to north in front of VP6, flying low over grassland and rough grassland and disappeared behind hill to north of VP. Possibly heading to a roost. C. 20 Golden Plover feeding in improved grass-land field to north of the VP6.
6	20/12/16	Hen Harrier	Male				X				36	1x male HH came from the north over rough grassland and forestry, lifted the field full of JD and RO and flew over VP6 and headed south behind VP6.
12	20/12/16	Nil Sightings										
5	21/12/16	Nil Sightings										
10	21/12/16	Nil Sightings										
10	22/12/16	Nil Sightings										8 x Golden Plover flying over HB in a S-N direc-tion.
11	22/12/16	Hen Harrier	Male					X	X		642	1x male HH; first male flew from the forestry to east of bog habitat, perched on a fence post on the bog habitat for around 630 seconds and then went to roost after the second male went to roost in a clump of heather on the bog.
11	22/12/16	Hen Harrier	Male					X	X		212	1x male HH; second male joined the first male on the fence post coming from the forestry to the east of the vp. Perched there for approx. 200 seconds and was the first to head to roost on the bog.
11	22/12/16	Hen Harrier	Fe-male					X			7	1x female HH came from the west over the bog habitat and went straight into a roost near to the 2x male HH.

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
	23/12/16	Hen Harrier	Male									1x male HH flew from Knockmaroe towards Knocknabansha and then headed west to-wards Knockduff. He was flying over improved grassland and headed towards mature for-estry on Knockduff.
11	17/01/17	Hen Harrier	Male					X			18	1x male HH flying east over mature forestry and then looped back and headed west over rough grassland and over the mature forestry again and disappeared behind forestry and out of sight.
11	17/01/17	Hen Harrier	Male					X			15	1x male HH flew east over hill across heath and then looped back over the hill and headed west. Possibly heading to roost but was dis-turbed by presence of three fallow deer.
12	18/01/17	Nil Sightings										
5	18/01/17	Nil Sightings										
5	19/01/17	Nil Sightings										
12	19/01/17	Nil Sightings										
6	25/01/17	Nil Sightings										
10	25/01/17	Nil Sightings										
10	27/01/17	Nil Sightings										
3	27/01/17	Nil Sightings										
2	29/01/17	Nil Sightings										
2	29/01/17	Nil Sightings										
3	31/01/17	Nil Sightings										
6	31/01/17	Nil Sightings										

VP Name	Date	Species	Sex	Soar-ing	Cir-cling	Display-ing	Hunt ing	Fly-ing	Perc hing	Food Pass	Dura-tion (s)	Bird Notes
11	08/02/17	Hen Harrier	Male				X				14	1x male HH hunting around roost at dusk
11	08/02/17	Hen Harrier	Male				X				5	
12	09/02/17	Nil Sightings										
2	10/02/17	Hen Harrier	Male				X				15	
5	10/02/17	Nil Sightings										
6	11/02/17	Nil Sightings										
3	12/02/17	Hen Harrier	Male				X				12	
3	12/02/17	Hen Harrier	Male				X				10	
3	12/02/17	Hen Harrier	Male				X				10	
5	13/02/17	Nil Sightings										
10	14/02/17	Hen Harrier	Male				X				6	
10	14/02/17	Hen Harrier	Male				X				8	
10	14/02/17	Hen Harrier	Ring-tail					X			20	1x male HH and 1x HH (Ringtail – prob. male) near roost at dusk
3	15/02/17	Nil Sightings										
11	16/02/17	Hen Harrier	Ring-tail					X			5	1x HH (Ringtail) leaving roost
11	16/02/17	Hen Harrier	Male					X			30	1x male HH flying from roost toward Keeper Hill.
6	16/02/17	Nil Sightings										
12	22/02/17	Nil Sightings										
2	23/02/17	Nil Sightings										
10	24/02/17	Nil Sightings										

Table 31 Details of Hen Harrier sightings and the habitats over which the birds were observed from vantage point surveys undertaken during the breeding season in 2017.

G = Grazing; RG = Rough Grazing; HB = Heath or bog; DE = Deciduous woodland or scrub; GO = Gorse; CF = Clear fell; NF2 = New forestry plantation trees 20-30cm high; NF3 = New forestry plantation trees c 1m high; NF4 = New forestry plantation trees > 2m high; 2nd F1/F2 = Second rotation forestry plantation trees 20-30cm high; 2nd F3 = Second rotation forestry plantation trees c 1m high; 2nd F4 = Second rotation forestry plantation trees > 2m high; F= Post thicket forestry

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
3	12/03/17	Nil Sight-ings																	
9	13/03/17	Nil Sight-ings																	
12	13/03/17	Nil Sight-ings																	
12	14/03/17	Nil Sight-ings																	
11	14/03/17	Nil Sight-ings																	
12	14/03/17	Nil Sight-ings																	
3	14/03/17	Hen Harrier	Male	15:37			X												130
3	14/03/17	Hen Harrier	Female	15:37			X												280
11	15/03/17	Nil Sight-ings																	
10	15/03/17	Nil Sight-ings																	
1	15/03/17	Nil Sight-ings																	
8	16/03/17	Hen Harrier	Male	12:20		X												X	88
8	16/03/17	Hen Harrier	Male	15:29		X													37

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
5	16/03/17	Nil Sight-ings																	
5	21/03/17	Nil Sight-ings																	
6	21/03/17	Hen Harrier	Male	16:28		X													7
6	21/03/17	Hen Harrier	Male	16:44	X	X												X	162
6	22/03/17	Nil Sight-ings																	
10	22/03/17	Nil Sight-ings																	
7	23/03/17	Nil Sight-ings																	
2	24/03/17	Hen Harrier	Male	09:54			X					X							90
4	24/03/17	Nil Sight-ings																	
2	27/03/17	Hen Harrier	Male	09:55								X							35
2	27/03/17	Hen Harrier	Female	09:55								X							35
3	05/04/17	Nil Sight-ings																	
8	05/04/17	Nil Sight-ings																	
2	06/04/17	Hen Harrier	Female	08:05			X											X	270
2	06/04/17	Hen Harrier	Male	08:05			X											X	510
10	08/04/17	Hen Harrier	Male	12:15			X											X	190
10	08/04/17	Hen Harrier	Male	15:00			X											X	30
7	09/04/17	Nil Sight-ings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
4	09/04/17	Nil Sight-ings																	
1	10/04/17	Nil Sight-ings																	
5	10/04/17	Hen Harrier	Male	12:59			X												450
5	10/04/17	Hen Harrier	Female	13:05			X												300
5	10/04/17	Hen Harrier	Male	13:13			X												10
5	10/04/17	Hen Harrier	Female	13:13			X												10
5	10/04/17	Hen Harrier	Male	14:16			X												50
5	10/04/17	Hen Harrier	Female	14:20			X												2400
7	10/04/17	Hen Harrier	Male	15:30		X													10
2	11/04/17	Hen Harrier	Male	08:00		X	X											X	761
1	12/04/17	Nil Sight-ings																	
6	12/04/17	Hen Harrier	Male	11:47			X												30
6	12/04/17	Hen Harrier	Male	13:05			X					X							1957
6	12/04/17	Hen Harrier	Male	13:26								X							430
3	17/04/17	Nil Sight-ings																	
5	17/04/17	Hen Harrier	Male	14:45			X												17
8	18/04/17	Hen Harrier	Male	08:00			X											X	900
8	18/04/17	Hen Harrier	Female	08:00			X											X	800
9	18/04/17	Nil Sight-ings																	

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
6	19/04/17	Hen Harrier	Female	11:13			x											x	720
6	19/04/17	Hen Harrier	Male	11:20			x											x	100
4	19/04/17	Nil Sight-ings																	
12	22/04/17	Hen Harrier	Male	08:48														X	70
12	22/04/17	Hen Harrier	Female	08:49														X	80
11	22/04/17	Hen Harrier	Female	13:00			X											x	80
11	22/04/17	Hen Harrier	Female	13:40			X												60
11	22/04/17	Hen Harrier	Female	13:40			X												60
11	22/04/17	Hen Harrier	Male	13:40			X											X	380
12	27/04/17	Hen Harrier	Male	12:05														X	270
12	27/04/17	Hen Harrier	Male	12:05														X	80
12	27/04/17	Hen Harrier	Female	12:05														X	340
11	27/04/17	Hen Harrier	Male	15:00				X											470
11	27/04/17	Hen Harrier	Male	15:15															135
1	05/05/17	Nil Sight-ings																	
2	05/05/17	Hen Harrier	Male	14:50			X											X	384
2	05/05/17	Hen Harrier	Female	14:50			X											X	50
2	05/05/17	Hen Harrier	Male	15:00			X												330
6	06/05/17	Hen Harrier	Male	15:45			X												504
6	06/05/17	Hen Harrier	Female	15:45			X												610

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
1	08/05/17	Nil Sight-ings																	
4	08/05/17	Hen Harrier	Male	10:12			X												108
3	08/05/17	Hen Harrier	Female	15:50			X												30
3	08/05/17	Hen Harrier	Male	16:20			X											X	135
5	09/05/17	Hen Harrier	Male	09:46			X												70
4	09/05/17	Nil Sight-ings																	
3	18/05/17	Nil Sight-ings																	
5	18/05/17	Nil Sight-ings																	
8	19/05/17	Hen Harrier	Male	11:09		X	X							X					314
8	19/05/17	Nil Sight-ings																	
2	20/05/17	Hen Harrier	Male	12:53			X											X	80
6	20/05/17	Hen Harrier	Male	16:17		X	X											X	60
6	20/05/17	Hen Harrier	Female	16:17			X											X	10
9	22/05/17	Hen Harrier	Male	11:36			X											X	169
9	22/05/17	Hen Harrier	Male	12:03														X	8
9	22/05/17	Hen Harrier	Male	12:39		X													151
9	22/05/17	Hen Harrier	Male	14:04														X	53
9	22/05/17	Hen Harrier	Male	15:05			X							X				X	130
	22/05/17	Hen Harrier	Male	17:56		X													15

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
7	22/05/17	Nil Sight-ings																	
7	23/05/17	Nil Sight-ings																	
10	23/05/17	Hen Harrier	Male	12:18			X												18
10	23/05/17	Hen Harrier	Male	13:29			X											X	342
10	23/05/17	Hen Harrier	Male	13:33			X											X	189
10	23/05/17	Hen Harrier	Male	13:57			X							X					34
10	23/05/17	Hen Harrier	Male	13:59			X												28
10	23/05/17	Hen Harrier	Male	14:11			X												27
10	23/05/17	Hen Harrier	Male	14:12			X							X					192
10	23/05/17	Hen Harrier	Male	14:54			X							X					605
	23/05/17	Hen Harrier	Male	15:12			X											X	180
10	23/05/17	Hen Harrier	Male	15:37			X												540
10	23/05/17	Hen Harrier	Male	16:14			X												131
10	23/05/17	Hen Harrier	Male	16:25			X												680
10	23/05/17	Hen Harrier	Male	17:00			X							X				X	2145
10	23/05/17	Hen Harrier	Male	17:45			X							X				X	1080
10	23/05/17	Hen Harrier	Male	18:24			X												582
11	24/05/17	Hen Harrier	Male	11:05			X											X	35
11	24/05/17	Hen Harrier	Male	12:20														X	60
12	24/05/17	Hen Harrier	Male	15:55			X											X	80
12	24/05/17	Hen Harrier	Male	15:55			X											X	120

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
12	24/05/17	Hen Harrier	Female	15:55			X											X	40
7	24/05/17	Hen Harrier	Male	12:28		X												X	420
7	24/05/17	Hen Harrier	Male	12:50		X								X				X	185
11	26/05/17	Nil Sight-ings																	
12	26/05/17	Nil Sight-ings																	
1	16/06/17	Nil Sight-ings																	
3	16/06/17	Hen Harrier	Male	14:57		X													150
4	17/06/17	Nil Sight-ings																	
1	17/06/17	Nil Sight-ings																	
2	18/06/17	Hen Harrier	Male	09:10			X											X	2449
2	18/06/17	Hen Harrier	Male	12:21		X													40
4	19/06/17	Hen Harrier	Male	08:30			X												90
4	19/06/17	Hen Harrier	Male	10:55			X												20
10	19/06/17	Hen Harrier	Male	14:38			X												60
10	19/06/17	Hen Harrier	Female	14:38			X											X	200
10	19/06/17	Hen Harrier	Male	15:10			X												30
5	19/06/17	Hen Harrier	Male	10:50			X												17
5	19/06/17	Hen Harrier	Male	10:51			X												46
5	19/06/17	Hen Harrier	Female	11:53			X												23
5	19/06/17	Hen Harrier	Female	12:08			X											X	64

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
5	19/06/17	Hen Harrier	Male	12:55			X												76
5	19/06/17	Hen Harrier	Male	13:00			X												16
5	19/06/17	Hen Harrier	Male	13:02			X												7
5	19/06/17	Hen Harrier	Male	13:08			X												169
5	19/06/17	Hen Harrier	Male	14:16		X	X											x	55
5	19/06/17	Hen Harrier	Male	14:22			X											X	470
5	19/06/17	Hen Harrier	Female	14:25			X												171
5	19/06/17	Hen Harrier	Male	14:57														X	27
5	19/06/17	Hen Harrier	Female	15:51			X												37
5	19/06/17	Hen Harrier	Male	15:51		X	X												42
5	19/06/17	Hen Harrier	Female	15:59			X												23
5	19/06/17	Hen Harrier	Female	16:04			X												28
5	19/06/17	Hen Harrier	Male	16:10		X	X												31
5	19/06/17	Hen Harrier	Female	16:11			X												135
2	20/06/17	Hen Harrier	Male	10:47			X											X	130
11	20/06/17	Hen Harrier	Male	10:47			X											X	118
11	20/06/17	Hen Harrier	Male	12:39														X	13
11	20/06/17	Hen Harrier	Male	12:42			X											X	47
10	21/06/17	Hen Harrier	Male	08:50			X												75
10	21/06/17	Hen Harrier	Female	09:15			X												15
10	21/06/17	Hen Harrier	Male	09:44			X												20

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
12	21/06/17	Nil Sight-ings																	
8	25/06/17	Hen Harrier	Male	16:18	X	X		X											344
8	25/06/17	Nil Sight-ings																	
6	26/06/17	Hen Harrier	Male	11:55		X													25
6	26/06/17	Hen Harrier	Male	12:02		X													21
6	26/06/17	Nil Sight-ings																	
7	26/06/17	Nil Sight-ings																	
9	27/06/17	Nil Sight-ings																	
9	27/06/17	Nil Sight-ings																	
7	28/06/17	Nil Sight-ings																	
7	28/06/17	Nil Sight-ings																	
1	14/07/17	Nil Sight-ings																	
3	14/07/17	Nil Sight-ings																	
3	16/07/17	Nil Sight-ings																	
5	16/07/17	Hen Harrier	Male	13:00			X												100
2	17/07/17	Hen Harrier	Male	07:17			X												1764
2	17/07/17	Hen Harrier	Female	09:14			X												131

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
4	17/07/17	Hen Harrier	Female	15:18			X											X	5
2	20/07/17	Nil Sight-ings																	
5	24/07/17	Hen Harrier	Male	07:47			X												30
5	24/07/17	Hen Harrier	Female	09:43			X												70
5	24/07/17	Hen Harrier	Female	10:26			X												30
1	04/08/20 17	Nil Sight-ings																	
11	10/08/20 17	Nil Sight-ings																	
12	10/08/20 17	Nil Sight-ings																	
10	09/08/20 17	Hen Harrier	Female	09:55			X												60
10	09/08/20 17	Hen Harrier	Juve-nile Fe-male	09:55			X												10
10	09/08/20 17	Hen Harrier	Female	11:40			X												130
10	09/08/20 17	Hen Harrier	Juve-nile Fe-male	11:40			X												20
10	09/08/20 17	Hen Harrier	Female	13:15			X												60
10	09/08/20 17	Hen Harrier	Juve-nile Fe-male	13:15			X												180
10	09/08/20 17	Hen Harrier	Juve-nile Fe-male	14:10			X												250

VP Name	Date	Species	Sex	Time of sighting	G	RG	HB	DE	GO	CF	NF1	NF2	NF3	NF4	2nd F1/ F2	2nd F3	2nd F4	F	Dura-tion (s)
6	09/08/2017	Nil Sightings																	
8	10/08/2017	Hen Harrier	Female	11:48														X	140
9	10/08/2017	Nil Sightings																	
7	11/08/2017	Nil Sightings																	
5	11/08/2017	Nil Sightings																	
4	15/08/2017	Nil Sightings																	
5	15/08/2017	Nil Sightings																	
6	15/08/2017	Nil Sightings																	
4	17/08/2017	Nil Sightings																	
8	17/08/17	Nil Sightings																	
9	17/08/17	Nil Sightings																	

Table 32 Details of Hen Harrier behaviour which the birds were exhibiting during each observation and associated notes for vantage point surveys undertaken during the breeding season in 2017.

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
3	12/03/17	Nil Sightings											
9	13/03/17	Nil Sightings											
12	13/03/17	Nil Sightings											
12	14/03/17	Nil Sightings											
11	14/03/17	Nil Sightings											c. 200 Golden Plover
12	14/03/17	Nil Sightings											
3	14/03/17	Hen Harrier	Male	15:37					X			130	1x male HH and 1x female HH flying together.
3	14/03/17	Hen Harrier	Female	15:37					X			280	
11	15/03/17	Nil Sightings											
10	15/03/17	Nil Sightings											
1	15/03/17	Nil Sightings											
8	16/03/17	Hen Harrier	Male	12:20		X			X			88	1x male HH flying N-S over RG, circled over RG to south of VP and then flew over mature forestry and out of sight.
8	16/03/17	Hen Harrier	Male	15:29				X	X			37	1x male HH flying S-N over RG, and went behind farmhouse and out of sight.
5	16/03/17	Nil Sightings											
5	21/03/17	Nil Sightings											
6	21/03/17	Hen Harrier	Male	16:28					X			7	1x male HH hunting over RG north of VP. c.50 Golden Plover.

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
6	21/03/17	Hen Harrier	Male	16:44		X	X		X			162	1x male HH flew E-W over RG, circled back, displaying over grassland and forestry north of VP, flew and circled over and behind VP, across the road up onto the RG field south of vp and lost from sight behind hill.
6	22/03/17	Nil Sightings											
10	22/03/17	Nil Sightings											
7	23/03/17	Nil Sightings											
2	24/03/17	Hen Harrier	Male	09:54	X			X	X			90	1x male HH soaring over Mauher Slieve. 6 Golden Plover over Mauher Slieve.
4	24/03/17	Nil Sightings											
2	27/03/17	Hen Harrier	Male	09:55	X							35	1x male HH over traditional nest site
2	27/03/17	Hen Harrier	Female	09:55	X							35	1x male HH and 1x female HH flying together over traditional territory.
3	05/04/17	Nil Sightings											
8	05/04/17	Nil Sightings											
2	06/04/17	Hen Harrier	Female	08:05	X							270	
2	06/04/17	Hen Harrier	Male	08:05	X			X				510	
10	08/04/17	Hen Harrier	Male	12:15	X	X						190	1x male HH displaying high (c. 1km} over traditional territory.
10	08/04/17	Hen Harrier	Male	15:00					X			30	

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
7	09/04/17	Nil Sightings											
4	09/04/17	Nil Sightings											
1	10/04/17	Nil Sightings											
5	10/04/17	Hen Harrier	Male	12:59			X					450	1x male HH displaying over traditional territory. Food pass between male and female HH.
5	10/04/17	Hen Harrier	Female	13:05					X			300	
5	10/04/17	Hen Harrier	Male	13:13							X	10	
5	10/04/17	Hen Harrier	Female	13:13							X	10	
5	10/04/17	Hen Harrier	Male	14:16	X							50	
5	10/04/17	Hen Harrier	Female	14:20				X				2400	
7	10/04/17	Hen Harrier	Male	15:30					X			10	1x male HH hunting
2	11/04/17	Hen Harrier	Male	08:00			X		X	X		761	1x male HH flying from Knockfune then displaying and perched on ground at traditional territory Mauher Slieve.
1	12/04/17	Nil Sightings											
6	12/04/17	Hen Harrier	Male	11:47					X			30	1x male HH over traditional nest site
6	12/04/17	Hen Harrier	Male	13:05					X	X		1957	
6	12/04/17	Hen Harrier	Male	13:26					X			430	2nd male HH flying, then both males fly away to north, one returning.
3	17/04/17	Nil Sightings											

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
5	17/04/17	Hen Harrier	Male	14:45				X				17	
8	18/04/17	Hen Harrier	Male	08:00			X					900	1x male HH and 1x female HH displaying over traditional territory.
8	18/04/17	Hen Harrier	Female	08:00					X			800	
9	18/04/17	Nil Sightings											
6	19/04/17	Hen Harrier	Female	11:13		X						720	1x male HH and 1x female HH circling traditional territory.
6	19/04/17	Hen Harrier	Male	11:20		X						100	
4	19/04/17	Nil Sightings											
12	22/04/17	Hen Harrier	Male	08:48		X				X		70	1x male HH and 1x female HH circling traditional territory.
12	22/04/17	Hen Harrier	Female	08:49		X						80	
11	22/04/17	Hen Harrier	Female	13:00		X			X			80	1x female HH over traditional nest site.
11	22/04/17	Hen Harrier	Female	13:40	X							60	
11	22/04/17	Hen Harrier	Female	13:40	X							60	2x female HH and 1x male HH soaring between two traditional nest sites.
11	22/04/17	Hen Harrier	Male	13:40	X							380	
12	27/04/17	Hen Harrier	Male	12:05					270			270	2x male HH and 1x female HH over traditional territory
12	27/04/17	Hen Harrier	Male	12:05					80			80	
12	27/04/17	Hen Harrier	Female	12:05					340			340	
11	27/04/17	Hen Harrier	Male	15:00				X				470	1x male HH over traditional territory

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
11	27/04/17	Hen Harrier	Male	15:15			X					135	
1	05/05/17	Nil Sightings											
2	05/05/17	Hen Harrier	Male	14:50			X	X	X			384	1x male HH and 1x female HH over traditional territory
2	05/05/17	Hen Harrier	Female	14:50					X			50	
2	05/05/17	Hen Harrier	Male	15:00				X				330	
6	06/05/17	Hen Harrier	Male	15:45		X						504	1x male HH and 1x female HH over traditional territory
6	06/05/17	Hen Harrier	Female	15:45		X						610	
1	08/05/17	Nil Sightings											
4	08/05/17	Hen Harrier	Male	10:12	X							108	
3	08/05/17	Hen Harrier	Female	15:50	X							30	
3	08/05/17	Hen Harrier	Male	16:20			X		X			135	
5	09/05/17	Hen Harrier	Male	09:46	X							70	
4	09/05/17	Nil Sightings											
3	18/05/17	Nil Sightings											
5	18/05/17	Nil Sightings											
8	19/05/17	Hen Harrier	Male	11:09		X	X		X			314	1x male HH flying, circling and skydancing the last 15s over heath, rough grazing and young plantation (>2m).
8	19/05/17	Nil Sightings											

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
2	20/05/17	Hen Harrier	Male	12:53	X							80	1x male HH over traditional territory.
6	20/05/17	Hen Harrier	Male	16:17				X	X		X	60	Food pass at same site as 2016.
6	20/05/17	Hen Harrier	Female	16:17							X	10	
9	22/05/17	Hen Harrier	Male	11:36		x						169	1x male HH circling over heath and mature plantation
9	22/05/17	Hen Harrier	Male	12:03					X			8	1x male HH flying over mature plantation
9	22/05/17	Hen Harrier	Male	12:39					X			151	1x male HH flying over rough grazing
9	22/05/17	Hen Harrier	Male	14:04					X			53	1x male HH flying over mature plantation
9	22/05/17	Hen Harrier	Male	15:05		X						130	1x male HH circling over heath, mature plantation and young plantation (>2m).
CS	22/05/17	Hen Harrier	Male	17:56					X			15	1x male HH flying over rough grazing
7	22/05/17	Nil Sightings											
7	23/05/17	Nil Sightings											
10	23/05/17	Hen Harrier	Male	12:18					X			18	1x male HH flying over heath
10	23/05/17	Hen Harrier	Male	13:29		X			X			342	1x male HH flying, circling over heath and mature plantation, second male HH joins later
10	23/05/17	Hen Harrier	Male	13:33					X			189	1x male HH flying over mature plantation, joins another male HH
10	23/05/17	Hen Harrier	Male	13:57				X				34	1x male HH hunting in heath and over young plantation (>2m)
10	23/05/17	Hen Harrier	Male	13:59					X			28	1x male HH flying over heath

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
10	23/05/17	Hen Harrier	Male	14:11	X				X			27	1x male HH flying, soaring over heath
10	23/05/17	Hen Harrier	Male	14:12				X				192	1x male HH hunting in heath and over young plantation (>2m)
10	23/05/17	Hen Harrier	Male	14:54				X	X	X		605	1x male HH hunting, flying over heath and young plantation (>2m), keeps coming back to the same spot in heath
CS	23/05/17	Hen Harrier	Male	15:12				X	X			180	1x male HH flying hunting over heath and mature plantation
10	23/05/17	Hen Harrier	Male	15:37				x	X	X		540	1x male HH flying, hunting and perching in heath
10	23/05/17	Hen Harrier	Male	16:14					X			131	1x male HH flying over heath
10	23/05/17	Hen Harrier	Male	16:25					X	X		680	1x male HH flying over heath, perching and then flying away
10	23/05/17	Hen Harrier	Male	17:00				X	X	X		2145	1x male HH flying over heath and into young plantation (>2m), and then keeps coming back to perch in the same spot in heath. Doing the same circle many times
10	23/05/17	Hen Harrier	Male	17:45			X		X			1080	1x male HH flying, later skydancing for 4min over heath, young plantation (>2m) and mature plantation, later chasing away a HC.
10	23/05/17	Hen Harrier	Male	18:24					X	X		582	1x male HH perching for almost 10min then flying away
11	24/05/17	Hen Harrier	Male	11:05	X				X			35	1x male HH with prey flying south.
11	24/05/17	Hen Harrier	Male	12:20			X					60	

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
12	24/05/17	Hen Harrier	Male	15:55			X					80	2x male HH and 1x female HH over traditional territory
12	24/05/17	Hen Harrier	Male	15:55			X					120	
12	24/05/17	Hen Harrier	Female	15:55	X							40	
7	24/05/17	Hen Harrier	Male	12:28	X	X						420	1x male HH soaring and circling higher and higher, over rough grazing and mature plantation
7	24/05/17	Hen Harrier	Male	12:50		X	X		X			185	1x male HH flying, circling and skydancing over rough grazing, young plantation (>2m) and mature plantation
11	26/05/17	Nil Sightings											
12	26/05/17	Nil Sightings											
1	16/06/17	Nil Sightings											
3	16/06/17	Hen Harrier	Male	14:57				X				150	
4	17/06/17	Nil Sightings											
1	17/06/17	Nil Sightings											
2	18/06/17	Hen Harrier	Male	09:10				X		X		2449	1x male HH had a successful strike. No evidence of nesting after 4 hour survey. 1x male HH was hunting for 183 seconds, 1x male HH with prey for 441 seconds. The male then perched for 1711 seconds. Then started to hunt again for 114 seconds.
2	18/06/17	Hen Harrier	Male	12:21	X							40	1x male HH soaring and headed NE

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
4	19/06/17	Hen Harrier	Male	08:30				X				90	
4	19/06/17	Hen Harrier	Male	10:55					X			20	1x male HH flying
10	19/06/17	Hen Harrier	Male	14:38		X						60	
10	19/06/17	Hen Harrier	Female	14:38					X		X	200	Probable food pass; 1x female HH flying from bog to edge of forestry perched on ground for 3 mins then returned to bog.
10	19/06/17	Hen Harrier	Male	15:10					X			30	1x male HH flying over same area as previously.
5	19/06/17	Hen Harrier	Male	10:50				X				17	1x male HH hunting low over heather bog/wet heath habitat, flew north behind ridge line and out of sight
5	19/06/17	Hen Harrier	Male	10:51	X	X						46	1x male HH circling and soaring over heather/bog/ wet heath habitat, circled off to NE behind hill top and out of view.
5	19/06/17	Hen Harrier	Female	11:53	X							23	1x female HH soaring over heather bog and forestry, flew north out of sight
5	19/06/17	Hen Harrier	Female	12:08	X	X						64	1x female HH soaring and flying over heather bog, flew north out of sight.
5	19/06/17	Hen Harrier	Male	12:55	X							76	1x male HH soaring over heather bog and forestry
5	19/06/17	Hen Harrier	Male	13:00					X			16	1x male HH chasing Raven east over heather bog, dropped down behind hill and out of sight
5	19/06/17	Hen Harrier	Male	13:02					X			7	1 x HH male flying over heather bog

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
5	19/06/17	Hen Harrier	Male	13:08	X							169	1 x HH male soaring high over heather bog
5	19/06/17	Hen Harrier	Male	14:16				X				55	1 x HH male hunting over heather bog, RG, MF, along ridge of hill from east to west.
5	19/06/17	Hen Harrier	Male	14:22	X	X						470	1x male HH circling and soaring over heather bog, started low but quickly gained altitude beyond 100m. Dropped down to circle close to 1x female HH and gained altitude again and lost sight of him.
5	19/06/17	Hen Harrier	Female	14:25	X	X						171	1x female HH flew in from north and circled / soared up to ~50m, interacted with 1x female HH and dropped down
5	19/06/17	Hen Harrier	Male	14:57					X			27	1x male HH flying from west to east over forestry.
5	19/06/17	Hen Harrier	Female	15:51	X				X			37	1x female HH flying and then soaring over heather bog, soared only to ~50m, flew off to north
5	19/06/17	Hen Harrier	Male	15:51				X	X			42	1x male HH flying close over heather bog, flew off west hunting along forestry edge over rough grassland.
5	19/06/17	Hen Harrier	Female	15:59		X			X			23	1x female HH circling and then hunting over heather bog up on hill
5	19/06/17	Hen Harrier	Female	16:04	X	X			X			28	1x female HH circling and soaring over heather bog, gradually glided off north and out of sight

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
5	19/06/17	Hen Harrier	Male	16:10					X		X	31	1x male HH flew in from west carrying prey, directly towards heather bog on hill
5	19/06/17	Hen Harrier	Female	16:11					X	X	X	135	1x female HH flew from behind hill for food pass, landed on heather bog on south side of hill. Took off after 97 secs later and flew over hill to north and out of sight. Possibly ate food while on the ground - No sign of carrying prey on flight over hill.
2	20/06/17	Hen Harrier	Male	10:47				X				130	No evidence of nesting.
11	20/06/17	Hen Harrier	Male	10:47	X	X			X			118	1x male HH flew over heather bog at Bleanbeg, up and over mature forestry to north, circled and soared over forestry before dropping and flying east/northeast. Lost from sight behind crest of hill
11	20/06/17	Hen Harrier	Male	12:39				X	X			13	1x male HH seen briefly flying and hunting in forestry canopy and rides. Dipped out of sight behind trees
11	20/06/17	Hen Harrier	Male	12:42	X							47	1x male HH hunting along forestry edge on western boundary of bog, flew up over forestry and soared up over 100m. Descended and flew off to NE.
10	21/06/17	Hen Harrier	Male	08:50				X				75	
10	21/06/17	Hen Harrier	Female	09:15					X			15	1x female HH gathering nesting material. Male was carrying prey.

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
10	21/06/17	Hen Harrier	Male	09:44					X			20	
12	21/06/17	Nil Sightings											
8	25/06/17	Hen Harrier	Male	16:18	X				X			344	1x male HH flying, hunting and circling over rough grazing, grazing and scrub.
8	25/06/17	Nil Sightings											
6	26/06/17	Hen Harrier	Male	11:55					X			25	1x male HH flying over rough grazing.
6	26/06/17	Hen Harrier	Male	12:02	X							21	1x male HH soaring over rough grazing, moving down the hill.
6	26/06/17	Nil Sightings											
7	26/06/17	Nil Sightings											
9	27/06/17	Nil Sightings											
9	27/06/17	Nil Sightings											
7	28/06/17	Nil Sightings											
7	28/06/17	Nil Sightings											
1	14/07/17	Nil Sightings											
3	14/07/17	Nil Sightings											
3	16/07/17	Nil Sightings											
5	16/07/17	Hen Harrier	Male	13:00				X				100	1x male HH hunting
2	17/07/17	Hen Harrier	Male	07:17	X	X		X		X		1764	1x male HH hunting, perched on ground, circling, soaring.
2	17/07/17	Hen Harrier	Female	09:14	X			X				131	1x female HH around traditional territory no evidence of active nest.

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
4	17/07/17	Hen Harrier	Female	15:18					X			5	1x female HH flying toward other side of hill.
2	20/07/17	Nil Sightings											
5	24/07/17	Hen Harrier	Male	07:47				X				30	1x male HH hunting
5	24/07/17	Hen Harrier	Female	09:43	X			X				70	1x female HH hunting
5	24/07/17	Hen Harrier	Female	10:26				X	X			30	1x female HH interacting with Sparrowhawk.
1	04/08/17	Nil Sightings											
11	10/08/17	Nil Sightings											
12	10/08/17	Nil Sightings											
10	09/08/17	Hen Harrier	Female	09:55			X		X			60	Food pass female to juvenile.
10	09/08/17	Hen Harrier	Juvenile Female	09:55					X			10	Food pass female to juvenile.
10	09/08/17	Hen Harrier	Female	11:40			X	X	X			130	Food pass female to juvenile.
10	09/08/17	Hen Harrier	Juvenile Female	11:40					X			20	Food pass female to juvenile.
10	09/08/17	Hen Harrier	Female	13:15			X		X			60	Food pass female to juvenile.
10	09/08/17	Hen Harrier	Juvenile Female	13:15			X		X			180	Food pass female to juvenile.

VP Name	Date	Species	Sex	Time of sighting	Soaring	Circling	Displaying	Hunting	Flying	Perching	Food Pass	Duration (s)	Bird Notes
10	09/08/17	Hen Harrier	Juvenile Female	14:10:00								250	Juvenile circling
6	09/08/17	Nil Sightings											
8	10/08/17	Hen Harrier	Female	11:48:00			X					140	1x female HH soaring then flying west.
9	10/08/17	Nil Sightings											
7	11/08/17	Nil Sightings											
5	11/08/17	Nil Sightings											
4	15/08/17	Nil Sightings											
5	15/08/17	Nil Sightings											
6	15/08/17	Nil Sightings											
4	17/08/17	Nil Sightings											
8	17/08/17	Nil Sightings											
9	17/08/17	Nil Sightings											

Table 33 Details of Hen Harrier behaviour which the birds were exhibiting during each observation and associated notes for vantage point surveys undertaken during the non-breeding season in September 2017 to February 2018 (inclusive).

VP Name	Date	Species	Sex	Time of sightings	Soaring	Circling	Displaying	Hunting	Flying	Prechning	Food Pass	Duration (s)	Birds Notes
1	05/09/2017	Nil Sightings											
2	05/09/2017	Nil Sightings											
4	06/09/2017	Nil Sightings											
3	06/09/2017	Hen Harrier	Ringtail	14:55:00				x				10	Ringtail seen briefly hunting upper slopes of Mauher Slieve.
1	06/09/2017	Nil Sightings											
3	07/09/2017	Nil Sightings											
5	08/09/2017	Nil Sightings											
4	08/09/2017	Nil Sightings											
5	13/09/2017	Nil Sightings											
2	13/09/2017	Hen Harrier	Male	13:49:00				x				35	Adult male Hen Harrier hunting off site
7	11/09/2017	Nil Sightings											
7	11/09/2017	Nil Sightings											
7	11/09/2017	Nil Sightings											

VP Name	Date	Species	Sex	Time of sightings	Soaring	Circling	Displaying	Hunting	Flying	Prechning	Food Pass	Duration (s)	Birds Notes
7	11/09/2017	Nil Sightings											
8	12/09/2017	Nil Sightings											
10	04/09/2017	Nil Sightings											
9	05/09/2017	Nil Sightings											
11	05/09/2017	Nil Sightings											
11	06/09/2017	Nil Sightings											
9	06/09/2017	Nil Sightings											
12	07/09/2017	Nil Sightings											
12	07/09/2017	Nil Sightings											
6	11/09/2017	Nil Sightings											
10	12/09/2017	Nil Sightings											
6	23/10/17	Nil Sightings											
7	25/10/17	Nil Sightings											
8	14/10/17	Nil Sightings											
9	17/10/17	Nil Sightings											
10	18/10/17	Nil Sightings											
11	20/10/17	Nil Sightings											

VP Name	Date	Species	Sex	Time of sightings	Soaring	Circling	Displaying	Hunting	Flying	Prechning	Food Pass	Duration (s)	Birds Notes
1	12/10/17	Nil Sightings											
2	12/10/17	Hen Harrier	Female	13:20					x			50	
4	13/10/17	Nil Sightings											
5	13/10/17	Hen Harrier	Ringtail	12:30					x			10	Ringtail hunting.
3	14/10/17	Nil Sightings											
1	17/10/17	Nil Sightings											
3	18/10/17	Nil Sightings											
4	20/10/17	Nil Sightings											
2	22/10/17	Nil Sightings											
5	23/10/17	Nil Sightings											
6	23/10/17	Hen Harrier	Male	18:28					x			7	Dusk watch at possible roost site, (single adult male Hen Harrier here 2016), male going to roost at 18:28hrs
6	25/10/17	Hen Harrier	Male	18:34					x			4	Dusk watch at possible roost site, (single adult male Hen Harrier here 2016), male going to roost at 18:34hrs
10	07/11/2017	Hen Harrier	Male	09:18				x				348	ad male hunting Heather Bog, 4 snipe on site.
11	07/11/2017	Hen Harrier	Female	17:05				x				30	Female going to roost.
11	07/11/2017	Hen Harrier	Male	17:08				x				30	Male going to roost.
1	08/11/2017												

VP Name	Date	Species	Sex	Time of sightings	Soaring	Circling	Displaying	Hunting	Flying	Prechning	Food Pass	Duration (s)	Birds Notes
2	09/11/2017												
6	13/11/2017												
3	15/11/2017												
11	16/11/2017	Hen Harrier	Male	16:42				x		x		1080	Dusk watch at roost site, adult male perched on fence post for 20 mins before flying to nearby roost site in heather at 1707hrs.
11	16/11/2017	Hen Harrier	Male	16:56					x			60	2nd adult male going to roost in heather at 16:56hrs
5	22/11/2017	Nil Sightings											
5	22/11/2017	Nil Sightings											
4	22/11/2017	Nil Sightings											
4	23/11/2017	Nil Sightings											
4	23/11/2017	Nil Sightings											
4	23/11/2017	Nil Sightings											
4	23/11/2017	Nil Sightings											
5	23/11/2017	Nil Sightings											
5	23/11/2017	Nil Sightings											
5	23/11/2017	Nil Sightings											

VP Name	Date	Species	Sex	Time of sightings	Soaring	Circling	Displaying	Hunting	Flying	Prechning	Food Pass	Duration (s)	Birds Notes
5	23/11/2017	Nil Sightings											
5	23/11/2017	Nil Sightings											
7	28/11/17	Nil Sightings											
8	29/11/17	Nil Sightings											
9	29/11/17	Nil Sightings											
9	30/11/17	Nil Sightings											
8	28/11/17	Nil Sightings											
8	28/11/17	Nil Sightings											
12	30/11/2017	Nil Sightings											
12	29/11/2017	Nil Sightings											
7	29/11/17	Nil Sightings											
12	05/12/2017	Nil Sightings											
11	05/12/2017	Hen Harrier	Male	16:05					X			6	HH male flew E - W over bog/heath towards the conifer plantation at c. 10 - 15m.
11	06/12/2017	Nil Sightings										111	
5	06/12/2017	Nil Sightings										90	
5	06/12/2017	Nil Sightings										50	
1	01/12/2017	Nil Sightings											

VP Name	Date	Species	Sex	Time of sightings	Soaring	Circling	Displaying	Hunting	Flying	Prechning	Food Pass	Duration (s)	Birds Notes
6	03/12/2017	Nil Sightings											
10	03/12/2017	HH	Male	16:10				X				80	Ad male hunting Heather Bog heading toward roost site.
10	03/12/2017	HH	Male	16:11				X				50	2nd Ad male hunting Heather Bog heading toward roost site.
4	05/12/2017	Nil Sightings											
3	07/12/2017	HH	Male	15:57				X				20	Ad male hunting Heather Bog.
10	09/12/2017	HH	Male	11:14				X				130	Ad male hunting Heather Bog.
6	09/12/2017	Nil Sightings											
2	21/12/2017	Nil Sightings											
8	06/12/2017	Nil Sightings										20	
8	06/12/2017	Nil Sightings										20	
8	06/12/2017	Nil Sightings										10	
8	06/12/2017	Nil Sightings										5	
8	06/12/2017	Nil Sightings										300	
8	06/12/2017	Nil Sightings										20	
7	07/12/2017	Nil Sightings										20	
7	07/12/2017	Nil Sightings										10	

VP Name	Date	Species	Sex	Time of sightings	Soaring	Circling	Displaying	Hunting	Flying	Prechning	Food Pass	Duration (s)	Birds Notes
7	07/12/2017	Nil Sightings											
9	08/12/2017	Nil Sightings											
9	08/12/2017	Nil Sightings										240	
9	08/12/2017	Nil Sightings										300	
9	08/12/2017	Nil Sightings										5	
12	02/01/2018	Nil Sightings											
9	03/01/2018	Nil Sightings											
7	04/01/2018	Nil Sightings											
2	05/01/2018	Nil Sightings											
5	02/01/2018	Nil Sightings											
1	03/01/2018	Nil Sightings											
1	03/01/2018	Nil Sightings											
8	15/01/2018	Nil Sightings											
4	19/01/2018	Nil Sightings											
4	19/01/2018	Nil Sightings											
3	03/01/18	Nil Sightings											

VP Name	Date	Species	Sex	Time of sightings	Soaring	Circling	Displaying	Hunting	Flying	Prechning	Food Pass	Duration (s)	Birds Notes
6	05/01/18	Nil Sightings											
10	06/01/18	Nil Sightings											
11	06/01/18	Hen Harrier	Male	16:27					X	X		2220	
11	06/01/18	Hen Harrier	Male	16:27					X	X		2220	3 males sitting on fence posts before going to roost.
11	06/01/18	Hen Harrier	Male	16:27					X	X		2220	Ad male and female flying around roost site at before going to roost.
11	06/01/18	Hen Harrier	Male	16:30					X			2040	
11	06/01/18	Hen Harrier	Female	16:35					X			1740	All going to roost at about 17:04hrs.
10	22/01/18	Hen Harrier	Male	12:10				X	X			40	Ad male hunting Heather Bog and flying over Forestry.
11	22/01/18	Hen Harrier	Male	16:58					X	X		1320	Ad male flying in to roost site perched on fence post before going to roost at 17:20hrs.
11	22/01/18	Hen Harrier	Male	17:00					X	X		1200	2nd ad male flying in to roost site perched on fence post before going to roost at 17:20hrs.
11	22/01/18	Hen Harrier	Male	17:12					X			600	3rd ad male flying around roost site at before going to roost 17:22hrs
3	01/02/18	Hen Harrier	Male	12:05				X				25	Ad male hunting Heather Bog around last year's nest site.
6	02/02/18	Hen Harrier	Male	10:50				X				30	Ad male hunting Heather Bog
10	04/02/18	Hen Harrier	Male	08:13				X				70	Ad male hunting Heather Bog
11	04/02/18	Hen Harrier	Male	17:34					X	X		720	Ad male perched on fence post before going to roost at 1746hrs.
11	04/02/18	Hen Harrier	Male	17:44					X			120	2nd ad male going to roost 17:46hrs.

VP Name	Date	Species	Sex	Time of sightings	Soaring	Circling	Displaying	Hunting	Flying	Prechning	Food Pass	Duration (s)	Birds Notes
11	04/02/18	Hen Harrier	Male	17:44					X			120	3rd ad male going to roost 17:46hrs; different location to last months roost site; all three birds flew over skyline out of site.
11	06/02/18	Nil Sightings											
5	02/02/18	Nil Sightings											
12	05/02/18	Nil Sightings											
4	06/02/18	Nil Sightings											
1	06/02/18	Nil Sightings											
1	06/02/18	Hen Harrier	-	15:02					X			43	HH female flew N - S over gorse and grassland being mobbed by hooded crows
1	06/02/18	Nil Sightings											
4	07/02/18	Nil Sightings											
1	07/02/18	Nil Sightings											
8	01/02/18	Hen Harrier	Male	11:13				X	X			8	Male Hen Harrier fist seen hunting close to drainage channel, flew behind dip in the land and was not seen emerging. Later in afternoon, assumed same adult male HH is observed hunting along hedgelines
8	01/02/18	Nil Sightings											
8	01/02/18	Hen Harrier	Male	15:10				X	X			180	
8	01/02/18	Hen Harrier								X		2400	
8	01/02/18	Hen Harrier	Male	15:12					X			24	

VP Name	Date	Species	Sex	Time of sightings	Soaring	Circling	Displaying	Hunting	Flying	Prechning	Food Pass	Duration (s)	Birds Notes
8	01/02/18	Hen Harrier	Male	15:50					X			3	
9	02/02/18	Nil Sightings											
7	05/02/18	Nil Sightings											
2	06/02/18	Nil Sightings											
2	06/02/18	Nil Sightings											
2	06/02/18	Nil Sightings											
2	06/02/18	Nil Sightings											

A8-1.2.4.4 **Aquatic ecology/Fisheries**

Table 34 Summary of type and number of watercourse crossings for the Whole UWF Project

Watercourse Characterisation	UWF Grid Connection		UWF Related Works	UWF Other Activities	UWF Replacement Forestry	Upperchurch Windfarm
	Grid Connection	Access & Haul Routes				
Watercourse with Fisheries value (EPA Blue Line)	14	6	1	No watercourses crossed	No watercourses crossed	Assessed previously in EIS (1 watercourse Crossing)
Watercourse with Fisheries value (EPA Blue Line Equivalent)	9	5	5			
Sub-optimal watercourse with Low fisheries value	5	5	2			
Drainage ditch with No fisheries value	37	9	24			

Table 35 UWF Grid Connection Watercourse Crossings (UGC)

WC_No	E_ITM	N_ITM	Watercourse Description	Watercourse Characterisation	Fisheries Evaluation
W1	572319	664474	c. 2 m wide, c. 10 cm deep, gravel (70), cobbles (5), boulders (5), sands/silts (20)	EPA mapped blue line, major river or stream	Optimal
W2	572551	664577	c. 0.5 m wide, c. 10 cm deep, silts/muds (100)	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal
W3	572662	664563	c. 1 m wide, c. 10 cm deep, cobbles (20), gravels (40), sands/silts (40)	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W4	573103	664507	c. 0.75 m wide, 10 cm deep, gravel (50), sands/silts (50)	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W5	573293	664445	c. 0.5 m wide, 5 - 10 cm deep, stagnant/slow flowing drain, silt/mud (100)	Drain	Poor
W6	573513	664433	c. 1 m wide, c. 30 cm deep, slow/stagnant flow. Vegetation growing in drainage ditch.	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal
W7	573619	664382	c. 1.5/2 m wide, up to 0.5 m deep, gravel (50), sand/silt (50), PRG	EPA mapped blue line, major river or stream	Optimal
W8	574211	664477	c. 2 m wide, c. 15 cm deep, PRG,gravel (100)	EPA mapped blue line, major river or stream	Optimal
W9	574341	664284	c. 1 m wide, c. 30 cm deep, slow flow	Drain	Poor
W10	574702	663936	c. 6 m wide, > 1 m deep to cm's deep, PRG	EPA mapped blue line, major river or stream	Optimal
W11	575500	664052	c. 1.5 m wide, 10 cm deep, sandy/silty bottom	EPA mapped blue line, major river or stream	Optimal
W12	575868	663858	c. 1 m wide, 5 - 10 cm deep, gravel (60), sands/silts (35), cobbles (5)	EPA mapped blue line, major river or stream	Optimal
W13	576583	663270	c. 0.5 m wide, 5 - 10 cm deep, fast flowing, bedrock (100)	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W14	577416	662997	Shallow, narrow forestry drain	Drain	Poor
W15	577494	662982	Shallow, narrow forestry drain	Drain	Poor

WC_No	E_ITM	N_ITM	Watercourse Description	Watercourse Characterisation	Fisheries Evaluation
W16	577621	662955	Shallow, narrow forestry drain	Drain	Poor
W17	578223	663139	Shallow, narrow forestry drain	Drain	Poor
W18	578574	663079	c. 60 cm wide, 30 cm deep	Drain	Poor
W19	578702	662993	c. 20 cm wide, 10 cm deep	Drain	Poor
W20	578794	662966	c. 20 cm wide, 10 cm deep	Drain	Poor
W21	578810	662961	c. 20 cm wide, 10 cm deep	Drain	Poor
W22	579097	662875	c. 60 cm wide, 30 cm deep	Drain	Poor
W23	579209	662799	c. 30 m wide, 5 - 10 cm deep, eroded through peat down to subsoil.	Drain	Poor
W24	579542	662633	Shallow, narrow forestry drain	Drain	Poor
W25	579641	662567	Shallow, narrow forestry drain	Drain	Poor
W26	579699	662480	Shallow, narrow forestry drain	Drain	Poor
W27	579643	662468	c. 50 cm wide, 10 cm deep, fast flowing stream	EPA mapped blue line, major river or stream	Optimal
W28	580322	662155	c. 30 cm wide, 5 - 10 cm deep, shallow forestry drain. Runs parallel to road on southern side and crosses beneath road flowing to north.	Drain	Poor
W29	580675	661832	Field drain, c. 30 cm wide, c. 10 cm deep, flowing across wet grassland field, vegetated with soft rush	Drain	Poor
W30	580687	661825	Field drain, c. 30 cm wide, c. 10 cm deep, flowing adjacent earth bank boundary - same stream as with WC22 adjacent	Drain	Poor
W31	580699	661824	Field drain, c. 30 cm wide, c. 10 cm deep, flowing adjacent earth bank boundary	Drain	Poor
W32	580844	661896	c. 4 m wide, fast flowing cobble (50) and gravel (45) with a fine cloaking of silt all over river bed (5)	EPA mapped blue line, major river or stream	Optimal
W33	581125	661872	Slow flowing shallow drain, c. 1 m wide, c. 5 cm deep. Silt/mud (100), vegetated	Drain	Poor
W34	581225	661902	Forestry drain	Drain	Poor

WC_No	E_ITM	N_ITM	Watercourse Description	Watercourse Characterisation	Fisheries Evaluation
W35	582015	662077	Slow flowing drain c. 30 cm wide, 5 cm deep, gravel (20), mud/silt (80)	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal
W36	582381	661877	c. 5 m wide, 1 m to 5 cm deep, PRG	EPA mapped blue line, major river or stream	Optimal
W37	582525	661785	c. 1 m wide drainage ditch within willow scrub	Drain	Poor
W38	582663	661702	c. 30 cm wide, 10 cm deep, fast flowing	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W39	582698	661604	Drain	Drain	Poor
W40	582767	661543	Drain	Drain	Poor
W41	583032	661285	Drain	Drain	Poor
W42	583107	661214	Stream c. 1.0 m wide, fast flowing, Boulder (20), Cobble (50) and gravel (30).	EPA mapped blue line, major river or stream	Optimal
W43	583475	660746	Drain running along edge of road, c. 10 cm wide, c. 5 cm deep, fast flowing, gravels (50), cobbles (50)	Drain	Poor
W44	583481	660748	Drain on edge of field, c. 10 cm wide, c. 5 cm deep. Vegetated drain.	Drain	Poor
W45	583612	660801	Drain on boundary of field with adjancent earth bank, c. 10 cm wide, c. 5 cm deep. Vegetated drain.	Drain	Poor
W46	583789	660826	Stream c. 0.5 m wide, fast flowing, Boulder (20), Cobble (50) and gravel (30).	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W47	584128	660757	Drain c. 0.5 m wide, 10 cm deep. Gravel bed. Culverted at gate between two fields	EPA mapped blue line, major river or stream	Optimal
W48	584698	660575	Stream c. 30 cm wide and 10 cm deep at the bottom of ravine c. 5 m deep.	EPA mapped blue line, major river or stream	Optimal
W49	584876	660534	Overland flow. Nearly dry at visit. Evidence of past flows.	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal

WC_No	E_ITM	N_ITM	Watercourse Description	Watercourse Characterisation	Fisheries Evaluation
W50	586291	660317	New crossing built by Coillte.	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W51	586342	660345	Currently dry drain with evidence of former high flows. Currently overland flow which is beginning to cut a new drain through forestry downslope.	Drain	Poor
W52	586673	660572	Newly created drainage, currently not flowing. Culverted under track.	Drain	Poor
W53	587038	660896	Forestry drain	Drain	Poor
W54	587084	660913	c. 1.0 m high bank, c. 30 m wide and 5 cm deep. Cobble/gravel bed, fast flowing through forestry	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W55	587778	660609	Slow flowing/stagnant stream through forestry.	EPA mapped blue line, major river or stream	Optimal
W56	588137	660463	Dry stream bed	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W57	589581	660064	c. 4/6 m wide, cobble/gravel bed.	EPA mapped blue line, major river or stream	Optimal
W58	589650	660032	Shallow, slow moving/stagnant field drain	Drain	Poor
W59	589799	659980	Shallow, slow moving/stagnant field drain	Drain	Poor
W60	589863	659957	Shallow, slow moving/stagnant field drain	Drain	Poor
W61	590373	659719	c. 0.5 m wide, c. 10 cm deep, cobble (50), gravel (50) bed	EPA mapped blue line, major river or stream	Optimal
W62	592367	659835	c. 30 cm wide, c. 5 cm deep, sand/silt bottom.	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal
W63	593748	660330	Plastic pipe c.30cm wide	Drain	Poor
W64	594612	660629	Drain c. 0.5 m wide, 10 cm deep	Drain	Poor
W65	594863	660613	Slow flowing, shallow forestry drain	Drain	Poor

Table 36 UWF Grid Connection Watercourse Crossings (Haulage Roads)

WC_No	E_ITM	N_ITM	Watercourse Description	Watercourse Characterisation	Fisheries Evaluation
W66	573895	664106	Potential salmonid habitat. Livestock access, some poaching and siltation. Coarse woody debris in channel. Filamentous green algae downstream. Boulder & cobble dam downstream possible barrier to migration during periods of low flow.	EPA mapped blue line, major river or stream	Optimal
W67	582199	662430	Tributary stream of Clare River. Knockacullin stream on EPA database.	EPA mapped blue line, major river or stream	Optimal
W68	582131	662508	Low flow/stagnant forestry drain.	Drain	Poor
W69	581779	662373	Low flow pool and cascade forestry drain.	Drain	Poor
W70	581570	662279	Low flow stream.	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W71	581452	662211	Near dry/stagnant forestry drain.	Drain	Poor
W72	581351	662161	Low flow stream, culvert elevated c. 50 cm above stream on downslope site. Barrier to migration.	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W73	581168	662064	Low flow/near dry stream.	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W74	581007	661991	Low flow forestry stream.	EPA mapped blue line, major river or stream	Optimal
W75	581545	662355	Low flow stream.	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
W76	581142	662663	Near dry/stagnant forestry drain.	EPA mapped blue line, major river or stream	Optimal
W77	581148	662765	Near dry/stagnant forestry drain.	Drain	Poor
W78	580996	662971	Dry forestry drain.	Drain	Poor

WC_No	E_ITM	N_ITM	Watercourse Description	Watercourse Characterisation	Fisheries Evaluation
W79	580903	662984	Stagnant forestry drain. Existing culvert under forestry road.	Drain	Poor
W80	580870	662982	Dry forestry drain, stagnant pool downstream of culvert.	Drain	Poor
W81	580772	662991	Near dry/stagnant forestry drain.	Drain	Poor
W82	580668	663013	Near dry/stagnant forestry drain.	Drain	Poor
W83	580629	663020	Dry stream, existing culvert under a road.	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal
W84	580544	663020	Stagnant forestry drain. Existing culvert under forestry road.	EPA mapped blue line, major river or stream	Optimal
W85	580263	662794	Very low flow, near dry watercourse.	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal
W86	580234	662734	Very low flow, near dry watercourse.	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal
W87	580089	662559	Dry stream, existing culvert under a road.	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal
W88	579895	662550	Pool and cascade system, low flow during site visit	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal
W89	584658	660517	Existing culvert under farm roadway.	EPA mapped blue line, major river or stream	Optimal
W90	585404	659766	No defined watercourse at this location. Area consists of a poorly drained, poached, rush dominated area draining between the hills. Potential that there is enough overland flow in winter for water to drain through culvert.	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal

Table 37 UWF Related Works Watercourse Crossings

WC_No	E_ITM	N_ITM	Watercourse Description	Watercourse Characterisation	Fisheries Evaluation
WW1	595749	659884	Near dry drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW2	595702	659970	Stream, deepened and resectioned, Existing culvert under access track d/s, Barrier to migration, heavily vegetated, Low fisheries suitability	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
WW3	595624	660346	Dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW4	595423	660338	Near dry stream, evidence of previous high flows/erosion, c. 1.5 m cascade barrier to migration, No fisheries suitability	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
WW5	595372	660334	Near dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW6	595203	660339	Dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW7	595139	660440	Stream, steady flow to to 15 cm deep with wetted width of c. 75 cm. Nice gravel bed. High fisheries suitability.	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
WW8	595105	660460	Dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW9	595097	660464	Dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW10	596075	660400	Dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW11	596062	660403	Near dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW12	595915	660710	Near dry drain culverted under road joining small slow flowing drain on downstream side. No fisheries suitability	Drain	Poor
WW13	595783	661007	Dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW14	595765	661079	Slow flowing, shallow drain, heavily vegetated, Low fisheries potential	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal
WW15	596495	662228	Near stagnant drain, heavily poached and cow dung in stream, Vegetated, No fisheries suitability	Drain	Poor

WC_No	E_ITM	N_ITM	Watercourse Description	Watercourse Characterisation	Fisheries Evaluation
WW16	595912	661510	Dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW17	595637	661315	Near dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW18	595485	661140	Slow flowing, shallow drain. Deeped and re-sectioned, heavily vegetated, Low fisheries potential	Sub-optimal, heavily vegetated with low or no flow during dry periods	Sub-Optimal
WW19	595458	661086	Stream, steady flow up to 10 cm deep with wetted width c. 1.0 m, Nice gravel/cobble bed. High fisheries suitability	EPA mapped blue line, major river or stream	Optimal
WW20	595021	660778	Dry drain with culvert under road	Drain	Poor
WW21	594437	660618	Stagnant field drain, No fisheries suitability	Drain	Poor
WW22	594025	660680	Stream, steady flow to to 20 cm deep with wetted width of c. 1 m. Nice gravel bed. High fisheries suitability.	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
WW23	593736	660338	Dry field drain, No fisheries suitability	Drain	Poor
WW24	593181	661387	Dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW25	593114	661553	Dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW26	593831	661628	Dry field drain, willows creating full tunnelling, No fisheries suitability	Drain	Poor
WW27	594187	661530	Dry field drain, heavily vegetated, No fisheries suitability	Drain	Poor
WW28	594370	661382	Stream, nice gravel/cobble bed, steady flow up to 15 cm deep with wetted width c. 1.0 m. Good fisheries suitability	Headwater Stream Equivalent to EPA blue line but not mapped	Optimal
WW29	594572	660835	Stagnant, silted up field/forestry drain with existing culvert under track. No fisheries suitability.	Drain	Poor
WW30	594623	660786	Stagnant drain, existing culvert. No fisheries suitability	Drain	Poor
WW31	594277	660791	Very small spring, drains under road to land drain (overgrown) within forestry	Drain	Poor
WW32	593168	661686	Minor Stream, High Gradient, 100% overgrown	Drain	Poor

Table 38 Outline construction methodology (OCM) applicable at each watercourse crossing for the Whole Wind Farm Project

UWF Grid Connection								**UWF Related Works**				**UWF Other Activities**	**UWF Re-placement Forestry**	**Upper-church Windfarm**
Grid Connection						**Access & Haul Routes**								
WC No.	**Crossing Type**	**WC No.**	**Crossing Type**	**WC No.**	**Crossing Type**	**WC No.**	**Crossing Type**	**WC No.**	**Crossing Type**	**WC No.**	**Crossing Type**			
W1	C2	W26	A1	W51	A1	W66	A2	WW1	C1	WW26	C3	No water-courses crossed	No water-courses crossed	Assessed previously in EIS
W2	C1	W27	A1	W52	A1	W67	A2	WW2	F	WW27	C2			
W3	C1	W28	A1	W53	A1	W68	A2	WW3	C3	WW28	C3			
W4	C1	W29	C2	W54	A1	W69	A2	WW4	C1	WW29	A1			
W5	C2	W30	C2	W55	C1	W70	A2	WW5	C2	WW30	A1			
W6	C2	W31	C2	W56	A1	W71	A2	WW6	A1	WW31	B2			
W7	C3	W32	C3	W57	D	W72	A2	WW7	C2	WW32	A2			
W8	B1	W33	C2	W58	C2	W73	A2	WW8	C2					
W9	A1	W34	C2	W59	C2	W74	A2	WW9	C3					
W10	D	W35	B1	W60	C3	W75	A2	WW10	C3					
W11	C2	W36	D	W61	C3	W76	A2	WW11	A1					
W12	C3	W37	C2	W62	A1	W77	A2	WW12	B2					
W13	C1	W38	A1	W63	A1	W78	A2	WW13	C4					
W14	A1	W39	A1	W64	C3	W79	A2	WW14	C4					
W15	A1	W40	A1	W65	C3	W80	A2	WW15	C1					
W16	A1	W41	A1			W81	A2	WW16	C2					
W17	A1	W42	A1			W82	A2	WW17	C3					
W18	C1	W43	A1			W83	A2	WW18	C3					
W19	C1	W44	A1			W84	A2	WW19	C3					
W20	C1	W45	C2			W85	A2	WW20	C3					
W21	C1	W46	C2			W86	A2	WW21	B1					
W22	C1	W47	B1			W87	A2	WW22	C4					

UWF Grid Connection								UWF Related Works				UWF Other Activities	UWF Re-placement Forestry	Upper-church Windfarm
Grid Connection						Access & Haul Routes								
WC No.	Crossing Type	WC No.	Crossing Type	WC No.	Crossing Type	WC No.	Crossing Type	WC No.	Crossing Type	WC No.	Crossing Type			
W23	C1	W48	C1			W88	A2	WW23	A1					
W24	A1	W49	C2			W89	A2	WW24	C1					
W25	A1	W50	A1			W90	C4	WW25	C1					

Plate 3: Crossing location of the Newport (Mulkear) River. View is from the true left (eastern) bank looking northwest across the watercourse

Plate 4: Crossing location of the Clare River. View is from the true right (western) bank looking upstream to the east.

Plate 5: Crossing location of the Bilboa River. View is from the true right (western) bank looking east towards Kilcommon

Plate 6: Crossing location of, a tributary watercourse of the Mulkear River. View is from the true right (western) bank looking upstream to the north.

A8-1.2.4.5 Bats

Designated sites

Bats are not listed as conservation interests for any designated sites within 15km of the Whole UWF Project.

Preliminary evaluation of potential bat roosts

Preliminary ecological appraisals were carried out for 127 buildings within 150m of Project Elements 1 – 4 (the UWF Other Activities had no source-pathway linkages): 15 had negligible suitability for bats, 86 had low suitability, 20 had moderate suitability and 6 had high suitability. 31 mature trees in the vicinity of Project Elements 1 – 4 were assessed, of which 28 had low suitability, 3 had a moderate suitability and none had high suitability; all other trees were considered to have negligible suitability for bats. Trees in conifer plantations were not evaluated individually, because they were not of sufficient age or maturity to have features suitable for bats. 32 river crossings (bridges and culverts) were inspected, of which 8 had low suitability, 2 had moderate suitability and 1 had high suitability; all other crossings had negligible suitability. The following tables provide further detail on preliminary evaluations.

Table 39 Roost suitability of buildings within the zone of influence of the Whole UWF Project

Code	ITM grid ref		Description	Rating	Surveyed?
H01	573012	664796	Bungalow	L	
H02	573011	664763	Two-storey house	L	
H03	572978	664634	Bungalow	L	
H04	572930	664448	Bungalow	L	
H05	572917	664380	Bungalow	L	
H06	572911	664350	Two-storey house	L	
H07	574447	664406	Derelict house	H	Y
H08	574531	664352	Metal-roofed barn	N	
H09	574426	664234	Two-storey house	L	
H10	574315	664163	Bungalow	L	
H11	574294	664137	Bungalow	L	
H12	575481	664331	Two-storey house	L	
H13	575421	664304	Derelict house	L	Y
H14	575389	664279	Bungalow	L	
H15	575374	664259	Bungalow	L	
H16	575358	664224	Bungalow	L	
H17	575241	664061	Ruined church	H	Y
H18	576549	663873	Bungalow	L	
H19	576498	663838	Incomplete house	M	
H20	576539	663824	Two-storey house	M	
H21	576441	663684	Two-storey house	L	
H22	576420	663645	Two-storey house	L	
H23	576398	663614	Metal-roofed barns	N	
H24	576383	663593	Bungalow	L	
H25	576350	663554	Two-storey house	L	
H26	576313	663539	Bungalow	L	
H27	580347	661791	Estate house	H	Y

Code	ITM grid ref		Description	Rating	Surveyed?
H28	580263	661588	Bungalow	L	
H29	582324	662338	Barns / farm	N	
H30	582338	662283	Derelict house	H	Y
H31	582370	662198	Two-storey house	L	Y
H32	582744	661673	Bungalow	L	
H33	582675	661584	Bungalow and sheds	L	
H34	582939	661478	Two-storey farmhouse	M	
H35	582973	661390	Modern bungalow	L	
H36	582953	661345	Modern bungalow	L	
H37	582987	661309	Modern bungalow	L	
H38	583044	661324	Modern bungalow	L	
H39	583082	661218	Bungalow	L	
H40	583182	661114	Two-storey house	L	
H41	583484	660951	Bungalow and farm	L	
H42	583638	660663	Bungalow	L	
H43	583671	660661	Bungalow	L	
H44	583716	660655	Bungalow	L	
H45	583749	660594	Farm building	L	
H46	584109	661029	Derelict house, barn	L	
H47	584376	660846	Bungalow	L	
H48	584438	660651	House, farm	L	
H49	584612	660527	House, farm	L	
H50	584660	660403	Bungalow	L	
H51	586204	660235	Metal-roofed shed	N	
H52	586507	660422	Metal-roofed barn	N	
H53	589278	660157	Two-storey house	M	
H54	589234	660067	Metal-roofed barns	N	
H55	590064	660133	Metal-roofed barn	N	
H56	590084	660133	Metal-roofed barn	N	
H57	590078	660122	Stone farm building	M	
H58	590060	660115	Two-storey house	L	
H59	590056	660103	Two-storey house	L	
H60	590072	660101	Two-storey house	L	
H61	590052	660089	Two-storey house	L	
H62	590064	660082	Two-storey house	L	
H63	590049	660077	Two-storey house	L	
H64	590041	660060	Old house	M	
H65	590058	660061	Two-storey house	L	
H66	590027	660046	Two-storey house	L	
H67	590040	660039	Pub	L	
H68	589996	659999	Two-storey house	M	Y
H69	590017	659994	House, shop & sheds	M	
H70	589978	659939	Caravan	L	
H71	589942	659936	Bungalow	L	
H72	589930	659853	Two-storey house	L	Y

Code	ITM grid ref		Description	Rating	Surveyed?
H73	589912	659861	Bungalow	L	
H74	589904	659844	Bungalow	L	
H75	589888	659816	Bungalow	L	
H76	589883	659789	Bungalow	L	
H77	590078	660061	Community Centre	L	
H78	590096	660069	Church	M	
H79	590119	660009	School	L	
H80	590188	660033	Line of bungalows	L	
H81	590209	660055	Clergy House	M	Y
H82	590267	660031	Bungalow	L	
H83	590540	659723	Bungalow	M	Y
H84	590557	659691	Bungalow	M	Y
H85	590617	660134	Derelict house	M	Y
H86	590628	660149	Two-storey house	L	Y
H87	590914	660170	Metal-roofed barns	M	Y
H88	591235	660477	ESB Substation	L	
H90	592262	659940	Bungalow	L	Y
H91	592286	659915	Bungalow	L	
H92	591440	660461	Bungalow	L	
H92	592321	659892	Metal-roofed barns	N	
H93	592349	659868	Two-storey house	M	Y
H94	592577	659794	Metal-roofed barns	N	
H95	592660	659789	Bungalow	L	
H96	592805	659732	Two-storey house	L	
H97	592823	659756	Bungalow	L	
H98	592855	659730	Bungalow	L	
H99	592961	659742	Farmhouse and barns	L	
H100	592921	659806	Bungalow and barns	L	
H101	593267	659975	Bungalow	L	
H102	593327	659998	Bungalow	L	
H103	593332	660032	Bungalow	L	
H104	593371	660016	Metal-roofed barn	L	
H105	593411	660036	Bungalow	L	
H106	593446	660059	Two-storey house	L	
H107	593654	660420	Metal-roofed barns	N	
H108	593741	660362	Bungalow	L	
H109	593756	660301	Two-storey house	L	
H110	593815	660412	Two-storey house	M	
H111	593873	660405	Ruins	L	
H112	593915	660483	Incomplete house	L	
H113	593951	660527	Two-storey house	L	
H114	593998	660679	Derelict house	M	Y
H115	593094	661520	Bungalow	M	Y
H116	594058	661685	Farmhouse and barns	H	Y
H117	594087	661628	Metal barns	N	

Code	ITM grid ref		Description	Rating	Surveyed?
H118	594177	661544	Two-storey house	L	
H119	594365	660893	Bungalow	L	
H120	594440	660889	Derelict stone house	M	
H121	595050	660559	Derelict house, shed	H	Y
H122	595061	660938	House / metal barns	L	
H123	595119	660954	Metal barn	N	
H124	595315	661219	New two-storey house	N	
H125	595674	661140	Bungalow / warehouse	L	
H126	595775	661168	Bungalow	M	Y
H127	595968	660708	Metal barns	N	

Table 40 Preliminary bat roost suitability of trees within the zone of influence of the Whole UWF Project

Code	ITM Grid Ref		Tree species	Description	Rating
T01	572218	664333	Oak	Several crevices	M
T02	572213	664603	Ash	Crevice low on trunk	L
T03	572405	664616	Oak	Broken limbs	L
T04	572952	664534	Ash	Many rotten branches	L
T05	573009	664522	Oak	Broken limbs	L
T06	573235	664481	Oak	Broken limbs	L
T07	573289	664490	Oak	Damaged branches	L
T08	573633	664377	Ash	Broken limbs	L
T09	573636	664351	Sycamore	Broken limbs	L
T10	573918	664074	Beech	Many small crevices	M
T11	574218	664470	Beech	Broken branches	L
T12	574269	664399	Ash	Broken branches, ivy	L
T13	574291	664357	Oak	Broken branches	L
T14	574291	664269	Oak	Damaged branches	L
T15	574471	664370	Oak	Broken limbs	L
T16	574742	664152	Beech	Crevices in trunk	L
T17	574738	664141	Beech	Some broken limbs	L
T18	574736	664126	Beech	Some broken limbs	L
T19	574738	664095	Oak	Some broken limbs	L
T20	574679	664051	Oak	Broken limbs, ivy	L
T21	574667	664031	Unknown	Dead trunk cavities	M
T22	574656	664006	Oak	Some broken limbs	L
T23	575721	663952	Oak	Broken limb, ivy	L
T24	575808	663888	Oak	Several broken limbs	L
T25	575827	663913	Oak	Snapped, folded limb	L
T26	576413	663662	Oak	Small wounds, ivy	L
T27	576421	663674	Oak	Small wounds, ivy	L
T28	582272	662005	Ash	Broken limb	L
T29	582324	661993	Ash	Dense ivy	L
T30	589940	659917	Sycamore	Small knotholes	L
T31	589948	659920	Sycamore	Small knotholes	L

Table 41 Preliminary bat roost suitability for bridges along the material haul routes (local roads)

Code	ITM Grid Ref		Description	Rating	Surveyed?
B02 (red)	594025	660694	Concrete culvert	N	
B03 (red)	593943	660563	Small stone culvert	N	
B01	588747	658960	Two small round culverts, plus concrete slabs	N	
B02 (blue)	588694	659622	Concrete culvert	N	
B08	582647	662486	Iron girders, concrete slabs and brick arches	L	
B09	582932	661385	Small stone culvert, very low	N	
B10	583108	661223	Two stone culverts 1m high, crevices but very low	L	
B11	583484	660732	Concrete span, some small crevices	L	
B12	573104	663725	Stone arch with some crevices	M	Y
B13	573812	663309	Stone arch with some crevices	M	Y
B15	574542	663039	Concrete slabs	N	
B16/35	576531	663857	Small concrete culvert	N	
B18	585567	659051	Two small concrete culverts, rock gabbi-ons above	N	
B19	608956	654190	Eight stone arches, sealed below. One crevice	L	
B20	606637	657993	Four stone arches, many cavities and crev-ices	H	Y
B101	544331	661245	Small concrete culvert	N	
B102	544445	660928	Small concrete culvert	N	
B103	545194	660861	Concrete bridge	N	
B104	572868	664060	Small concrete culvert	N	
B105	572659	662381	High stone arch, well sealed, no crevices	L	
B106	576223	663444	Small concrete culvert	N	
B107	576104	663363	Submerged	N	
B108	580265	661512	Small stone culvert, some crevices, but very low	L	
B109	580238	661397	Small concrete culvert	N	
B110	579993	660820	Small stone culvert, very low	N	
B111	582799	659252	Concrete slabs over small concrete culvert	N	
B112	582502	662267	Concrete slabs	N	
B113	582621	662465	Concrete slabs, no crevices	N	
B114	589298	660071	Concrete culvert	N	
B115	590235	660033	Small concrete culvert and decorative stone bridge	L	
B116	590780	660151	Submerged concrete culvert	N	
B117	608502	655291	Railway bridge of cut stone, some small crevices	L	

Bat roosts - Buildings

In addition to the preliminary roost appraisals, presence / absence bat surveys and/or roost characterisation surveys were carried out at 22 buildings that had moderate or high suitability for bats. The surveyor focussed on the building for the majority of the survey, but if no bats were observed entering the structure at dawn then the surveyor took the opportunity to track passing bats to other roosts in the surrounding area; a number of pipistrelle roosts were located using this method. Four structures were surveyed on three occasions in 2016 in order to cover the maternity period (July / August), the mating period (September / October) and the hibernation period (December).

Bat roosts were identified in 18 structures, some of which supported multiple roost types and multiple species. In total there were 12 maternity roosts, 8 non-breeding summer roosts, 4 transitional / mating roosts and 4 hibernation roosts (Table 42). Most roosts were of common pipistrelles, but roosts of soprano pipistrelles, *Myotis* sp., brown long-eared bats and Leisler's bat were also identified. Detailed descriptions of each roost are provided in a confidential annexe to this report, which will be provided to the planning authority and key statutory consultees but will not be made publicly available.

Each structure has been assigned an overall ecological value using the six-level hierarchical system outlined in *Guidelines for Ecological Impact Assessment in the UK and Ireland* (CIEEM, 2016). In line with this and for the purposes of this report we consider maternity and hibernation roosts of *Myotis* spp and brown long-eared bats to be of county importance, while maternity and hibernation roosts of common and soprano pipistrelles and non-breeding roosts of all other species are considered to be of local importance. Roosts containing single bats are considered to be of negligible ecological importance, although it should be noted that they still receive legal protection. On this basis, five buildings are considered to be of county importance, eight to be of local importance, and five to be of negligible importance.

It should be noted that that five roosts - numbers 3, 4, 8, 10 and 11 - are outside the zone of influence of the Whole UWF Project. In addition, roost number 18 (within a building) was identified during the survey of a nearby bridge along the haul route, but as no construction works are proposed to the bridge or road in this area, there is no risk of effects on the building. On this basis, these six roosts are not considered to be within the zone of influence of the Whole UWF Project, and will not be included in the evaluation of effects.

Table 42 Summary of bat roosts their distances from the Whole UWF Project.

No	Description of structure	Evidence of bats	Valuation	Proximity	Nearest Element
1	Ruined church	Maternity, mating and hibernation roost: 5 - 10 natterer's bats	County	20m	Wind Farm Grid Connection
2	Dwelling house	Maternity roost: 30 - 40 common pipistrelles	Local	120m	Wind Farm Grid Connection
3	Dwelling house	Day roost / satellite roost: 1 soprano pipistrelle	Negligible	350m	Wind Farm Grid Connection
4	Dwelling house	Hibernation roost: >100 brown long-eared bats, 1 natterer's bat. Summer day roost: 2 brown long-eared bats, 1 natterer's bat.	County	160m	Wind Farm Grid Connection
5	Dwelling house	Summer non-breeding roost and mating / transition roost: 3 - 4 common pipistrelles. Hibernation roost: 6 common pipistrelles, 2 brown long-eared bats	County	50m	Wind Farm Grid Connection
6	Dwelling house	Former transitional roost: >200 pipistrelles. Access points have now been sealed.	Negligible (inactive)	140m	Wind Farm Grid Connection
7	Dwelling house	Maternity roost: 40 - 50 common pipistrelles	Local	5m	Wind Farm Grid Connection
8	Dwelling house	Maternity roost: 10 - 20 common pipistrelles	Local	200m	Wind Farm Grid Connection
9	Dwelling house	Day roost / satellite roost: 1 common pipistrelle	Negligible	50m	Wind Farm Grid Connection
10	Dwelling house	Maternity roost: 40 - 50 common pipistrelles	Local	400m	Wind Farm Grid Connection
11	Outbuilding / shed	Day roost / satellite roost: 1 Myotis sp.	Negligible	430m	Wind Farm Grid Connection
12	Dwelling house	Maternity roost: 40 - 50 common pipistrelles	Local	15m	Wind Farm Grid Connection
13	Dwelling house	Maternity roost: 30 - 40 common pipistrelles Possible day roost / satellite roost: 1 Myotis sp.	Local	15m	Wind Farm Grid Connection
14	Dwelling house	Day roost / satellite roost: 1 common pipistrelle	Negligible	15m	Upperchurch Windfarm
15	Dwelling house and traditional farm buildings	Maternity roost: 50 - 60 common pipistrelles Maternity roost: 5 soprano pipistrelles.	Local	130m	UWF Related Works
16	Dwelling house and traditional farm buildings	Maternity roost: 4 - 5 natterers bats. Transitional / mating roosts: 5 - 10 natterers bats, 20 common pipistrelles, 3 brown long-eared bats. Summer non-breeding / day roost: 2 common pipistrelles, 1 Leisler's bat. Hibernation roost: natterer's bats, common pipistrelles, Leisler's bat.	County	0m	Upperchurch Windfarm
17	Dwelling house	Maternity roost: 2 – 3 natterers bats	County	5m	UWF Related Works

No	Description of structure	Evidence of bats	Valuation	Proximity	Nearest Element
18	Dwelling house	Transitional / mating roost and probable maternity roost: 40 - 50 soprano pipistrelles	Local	>10km	Whole UWF Project

Bat roosts - Trees

Ground-level roost assessments were carried out for all trees with moderate or low bat suitability within 50m of the Whole UWF Project. No live bats were seen or heard, and no field signs were observed (e.g. droppings, fur-oil staining, urine splashes), so none of these trees were confirmed to be supported roosting bats at the time of survey. All other broadleaf trees within 50m of the Whole UWF Project were inspected, but none had any potential roost features that would be suitable for bats, so they were considered to have negligible roost suitability.

Bat roosts - Bridges

All bridges with suitability for bats were inspected by torchlight. No live bats were seen or heard, and no field signs were observed (e.g. droppings, fur-oil staining, urine splashes). Therefore, none of these structures appeared to support roosting bats.

Bat detector surveys were also undertaken at the 3 bridges with moderate / high roost potential. No bats were recorded leaving or entering any of the bridges, but a soprano pipistrelle roost was detected in a building near one of the bridges.

Activity surveys

Bat activity surveys using automated detectors were carried out at 27 locations, comprising 21 initially-proposed temporary compounds or set down locations, and 6 treelines / hedgerows with high suitability as bat foraging / commuting habitat. A total of 30,637 bat passes were recorded at the 27 locations over 1,046-night hours, giving an overall Bat Activity Index (BAI) of 29.3 bat passes per hour. This is considered to be a relatively high level of activity, equivalent to approximately one bat pass every two minutes. Summary results are summarised in Table 43 and full lists of the Bat Activity Indices (BAIs) at each location are provided in Table 44.

To assist with the interpretation and comparison of BAIs we classify the results as negligible, occasional, frequent and near-constant, using a bespoke system defined in Table 45.

Bat activity indices varied significantly between sampling sites. The highest activity of all survey locations was at Castlewaller (sampling point SD11), with BAIs of 90.8 in mid-summer and 181.4 in the autumn period; on average there was between 1.5 and 3 bat passes every minute in each season, respectively. The lowest level of activity was at Newross (sampling point SD9), in which there were overall BAIs of 0.8 in mid-summer and 1.2 in the autumn period, an average of 0.01 – 0.02 bat passes per minute, respectively. However, most other locations had occasional to frequent activity in both survey periods.The most frequently-recorded species was the common pipistrelle, which accounted for 69% of all bat passes in mid-summer, and 56.8% in the autumn. Soprano pipistrelles made up 20.0% and 34.2% of passes in each season respectively, *Myotis* spp. 6.4% and 5.5%, Leisler's bat 3.1% and 1.3%, Nathusius' pipistrelle 0.6% and 0.01%, and brown long-eared bat 0.3% and 0.4%. Lesser-horseshoe bats were not recorded; the Whole UWF Project appears to be outside the geographical range of this species. Overall, the species composition is considered to be typical of rural landscapes in Ireland.

Based on the highest activity levels of each species over the two sampling periods, each location was assigned an ecological value using the six-level hierarchical system outlined in the CIEEM guidelines (2016), with reference to the bat-specific guidance outlined in Wray *et al.,* (2011). Locations were considered to be of county importance if they had near-constant activity by pipistrelles and/or frequent activity (or higher) of any other species, to be of local importance if they had frequent pipistrelle activity and occasional activity of any other species, and to be of negligible importance if they had occasional (or lower) activity of pipistrelles and negligible activity of other species. On this basis, five locations were considered to be of county importance, eighteen to be of local importance, and four to be of negligible importance.

Table 43 Summary of bat activity levels at each sampling point. *Species codes are as follows: CP (common pipistrelle), SP (soprano pipistrelle), L (Leisler's bat) and MY (Myotis spp.)*

Site	Grid ref	Habitat	Month	Characterisation of activity	Ecological value
SD1	572230	Mature treeline	Jun	Frequent CP, occasional SP	Local
	664525		Sept	Frequent CP, occasional SP & MY	
SD2	572546	Hedgerow	Aug	Frequent CP	Local
	664578		Sept	Occasional CP	
SD3	572931	Hedgerow	Jun	Negligible	Local
	664569		Sept	Frequent SP, occasional CP	
SD4	572981	Hedgerow	Jun	Frequent CP, occasional SP	Local
	664515		Sept	Occasional CP	
SD5	574373	Hedgerow	Jun	Occasional CP	Negligible
	664242		Sept	Occasional CP	
SD6	574579	Farmyard	Jun	Occasional CP	Local
	664377		Sept	Frequent CP & SP	
SD7	574700	Mature woodland	Aug	Frequent CP, occasional L	Local
	664103		Sept	Frequent CP & SP, occasional MY	
SD8	575251	Ruined church	Jun	Occasional CP & MY	Local
	664078		Sept	Occasional CP	
SD9	575302	Hedgerow	Jun	Negligible	Negligible
	664071		Sept	Negligible	
SD10	575851	Mature woodland	Aug	Frequent CP, occasional SP	Local
	663855		Sept	Negligible	
SD11	576388	Hedgerow	Jun	Frequent CP & SP	County
	663715		Sept	Near-constant SP, frequent CP, occasional MY	
SD12	576477	Hedgerow	Jun	Frequent CP & MY	County
	663726		Sept	Frequent CP, occasional MY	
SD13	576848	Road within conifer plantation	Jun	Near-constant CP	County
	663176		Sept	Frequent CP, occasional SP & MY	
SD14	576957	Road within conifer plantation	Aug	Frequent CP, occasional SP	Local
	662710		Sept	Occasional CP	
SD15	579705	Road within conifer plantation	Jun	Occasional CP & MY	Local
	662415		Sept	Negligible	
SD16	582198	Treeline	Aug	Occasional CP, SP & MY	Local
	661996		Sept	Frequent SP, occasional CP	
SD17	582330	Farmyard	Jun	Frequent CP	Local
	662341		Sept	Frequent CP, occasional SP & MY	
SD18	582859	Road within conifer plantation	Jun	Frequent CP	Local
	662078		Sept	Frequent CP	
SD19	583161	Hedgerow	Sept	Negligible	Negligible
	661101		Sept	Negligible	
SD20	584429	Roadside hedgerow	Aug	Frequent CP & MY, occasional SP	County
	660742		Sept	Frequent CP	

Site	Grid ref	Habitat	Month	Characterisation of activity	Ecological value
SD21	587239	Road within conifer plantation	Jun	Frequent CP, occasional L & SP	Local
	660819		Sept	Occasional CP	
SD22	588440	Road within conifer plantation	Aug	Occasional CP	Local
	660463		Sept	Frequent CP & SP	
SD23	589305	Hedgerow	Aug	Frequent CP & SP	Local
	660234		Sept	Frequent CP, occasional SP	
SD24	589919	Open ground	Jun	Occasional CP & L	Local
	660070		Sept	Occasional CP	
SD25	592248	Hedgerow	Jun	Occasional CP	Local
	659900		Sept	Occasional CP, SP & MY	
SD26	593610	Farmyard	Jun	Near-constant CP	County
	660433		Sept	Occasional CP	
SD27	594849	Edge of conifer plantation	Jun	Occasional CP	Negligible
	660597		Sept	Negligible	

Table 44 Bat Activity Indices for each species during each sampling period

Site	Grid ref	Month	L	CP	SP	NP	MY	MD	MN	MW	BLE	UnID	Total	Summary	Habitat	Ecological value
SD1	572230	Jun	0.1	22	2	0	0	0.1	0	0	0.1	0.2	24.7	Frequent CP, occasional SP	Mature treeline on edge of semi-improved pasture	Local
	664525	Sept	0	52.4	9.8	0	0.9	0	0.1	0.9	0	0	64.1	Frequent CP, occasional SP & *Myotis*		
SD2	572546	Aug	0.8	35.2	0.7	0	0	0.2	0.1	0	0.1	0.1	37.2	Frequent CP	Mature hedgerow bordering semi-improved pasture	Local
	664578	Sept	0.1	4.1	1.5	0	0	0	0.1	0	0	0.3	6.2	Occasional CP		
SD3	572931	Jun	0.3	1.3	0	0	0.1	0	0	0	0.2	0	1.8		Hedgerow on edge of semi-improved pasture	Local
	664569	Sept	0.1	9.3	23.4	0	0.1	0.1	0.1	0	0	0.3	33.4	Frequent SP, occasional CP		
SD4	572981	Jun	1.9	14.8	5.7	1	0.1	0.1	0.4	0	0	0.1	23.7	Frequent CP, occasional SP	Small roadside hedgerow on edge of semi-improved meadow	Local
	664515	Sept	0.2	2.8	1.9	0	0.1	0	0.2	0	0.2	0.8	6.2	Occasional CP		
SD5	574373	Jun	0.5	6.3	0.8	0	0.2	0.1	1.8	0	0	0.1	9.9	Occasional CP	Hedgerow on edge of tilled field	Negligible
	664242	Sept	0.9	6.2	1.8	0	0.2	0.2	0.3	0.7	0.1	0.2	10.6	Occasional CP		
SD6	574579	Jun	0.2	2.7	1	1	0	0.8	0.8	0	0.8	1.5	8.5	Occasional CP	Agricultural tracks beside farm buildings	Local
	664377	Sept	0.7	56.9	12.6	0	0.7	0.6	0.2	0	0.1	0.3	72.1	Frequent CP & SP		
SD7	574700	Aug	3	15.1	0.7	0	0.1	0.3	0.5	0	0.3	0.3	20.2	Frequent CP, occasional L	Riparian woodland bordering semi-improved pasture	Local
	664103	Sept	0.3	34.9	7.4	0	4.4	0.2	0.4	4.6	0	3.8	55.9	Frequent CP & SP, occasional *Myotis*		
SD8	575251	Jun	0.1	7.3	1.5	0	0	0	4.4	0	0	0.2	13.6	Occasional CP & *Myotis*	Inside ruined church	Local
	664078	Sept	0.1	7.4	4.1	0	0	0	1.3	0	0	0.3	13.3	Occasional CP		
SD9	575302	Jun	0.1	0.6	0.1	0	0	0.1	0	0	0	0	0.8		Small roadside hedgerow on edge of semi-natural meadow	Negligible
	664071	Sept	0.1	0.4	0.1	0	0	0.2	0	0	0.1	0.3	1.2			
SD10	575851	Aug	0.9	22.5	4.4	0	0	0.3	0.2	0	0.1	0.1	28.3	Frequent CP, occasional SP	Riparian woodland bordering semi-improved pasture	Local
	663855	Sept	0.2	1	0.7	0	0.2	0	0.5	0	0.1	0.7	3.5			
SD11	576388	Jun	1.1	57.6	30	0	0	0	0.7	0	0	1.3	90.8	Frequent CP & SP	Hedgerow on edge of semi-improved pasture	County
	663715	Sept	0.4	46.5	131	0	2.2	0.1	1.1	0	0	0.1	181.4	Near-constant SP, frequent CP, occasional *Myotis*		
SD12	576477	Jun	0.9	33.1	1.3	0	0.4	0	14	0	0	0.1	50.4	Frequent CP & *Myotis*	Agricultural track bordered by mature broadleaf hedgerows	County
	663726	Sept	0.9	28.5	1.3	0	2.4	0.3	2.8	0	0.2	0.7	37.2	Frequent CP, occasional *Myotis*		
SD13	576848	Jun	0.5	61.7	0.5	0	0	0	0.1	0	0	0.1	63.3	Near-constant CP	Forest road within conifer plantation	County

Site	Grid ref	Month	L	CP	SP	NP	MY	MD	MN	MW	BLE	UnID	Total	Summary	Habitat	Ecological value
	663176	Sept	0.1	21.6	3.9	0	0.7	0.4	0	1	0.1	1.3	29.2	Frequent CP, occasional SP & *Myotis*		
SD14	576957	Aug	0.3	25.7	2.8	0	0.5	0.4	0.1	0	0.1	0	29.8	Frequent CP, occasional SP	Forest road within conifer plantation	Local
	662710	Sept	0.1	8.1	1.4	0	0	0.3	0.2	0.2	0	0.3	10.6	Occasional CP		
SD15	579705	Jun	0	7.4	0.5	0	0	0.7	2.9	0	0	0.1	11.6	Occasional CP & *Myotis*	Forest road within conifer plantation	Local
	662415	Sept	0	0.3	0.2	0	0	0	0	0	0	0	0.5			
SD16	582198	Aug	0.9	8.4	7.5	0	1.2	0.6	0.3	0	0.1	0.7	19.6	Occasional CP, SP & Myotis	Mature treeline bordering semi-improved pasture	Local
	661996	Sept	0.5	9.2	23.2	0	0.7	0	0.3	0.2	0.1	0.7	35	Frequent SP, occasional CP		
SD17	582330	Jun	0.5	31.7	1	1	0	1.4	0.1	0.1	0.1	0.4	35.8	Frequent CP	Farmyard bordered by conifers	Local
	662341	Sept	0.2	16.7	2.4	0	0.9	4.5	0.2	0.4	0.1	0.9	26.5	Frequent CP, occasional SP & *Myotis*		
SD18	582859	Jun	0.6	37	0.3	1	0	0.2	0.1	0	0.1	0	38.9	Frequent CP	Forest road within conifer plantation	Local
	662078	Sept	0.1	25.7	1.2	0	0.1	0.2	0.1	0	0.1	0.1	27.7	Frequent CP		
SD19	583161	Sept	0.1	1.2	0.3	0	0.2	0	0.5	0.1	0	0.1	2.5		Mature hedgerow bordering road and semi-improved pasture	Negligible
	661101	Sept	0.1	0.8	1.5	0	0.3	0	0.6	0	0	0.2	3.6			
SD20	584429	Aug	1	10.3	31.1	0	0.1	0	0.2	12	0	0.2	54.9	Frequent CP & *Myotis,* occasional SP	Edge of mature conifers, hedgerow and road	County
	660742	Sept	0.1	13.3	1.3	0	0.1	0	0	0	0	1	15.9	Frequent CP		
SD21	587239	Jun	5.2	49.5	2	1	0	0.1	0.3	0.2	0.2	0	58.1	Frequent CP, occasional L & SP	Forest road within conifer plantation	Local
	660819	Sept	0	15.3	1.3	0	0.1	0	0	0	0	0	16.8	Occasional CP		
SD22	588440	Aug	0.2	2	1	0	0	0.1	0.7	0	0.1	0	3.9	Occasional CP	Forest road within conifer plantation	Local
	660463	Sept	0.2	21.9	23.7	0	0.1	0.2	0.1	0	0.4	0.3	46.8	Frequent CP & SP		
SD23	589305	Aug	0.9	25.7	47.1	0	0.1	0.2	0.2	0.1	0.1	0.3	74.6	Frequent CP & SP	Roadside hedgerow bordering newly-planted conifers	Local
	660234	Sept	1.1	30.7	4	0	0	0	0.2	0	0	0.1	36.2	Frequent CP, occasional SP		
SD24	589919	Jun	3.1	2.2	0.1	1	0	0.1	0	0	0	0	6.1	Occasional L & CP	Open area on edge of playing fields	Local
	660070	Sept	0.3	3.9	0.8	0	0.1	0	0	0	0	0.2	5.3	Occasional CP		
SD25	592248	Jun	0.8	3.1	0.5	0	0	0.2	0.2	0	0.1	0	5.2	Occasional CP	Hedgerow in intensive grasslands	Local
	659900	Sept	1.9	10.5	2.4	0	0.3	1.5	0.5	0	1.4	0.6	19	Occasional CP & SP, occasional *Myotis*		
SD26	593610	Jun	0.8	65.2	0.2	0	0	0.3	0	0	0	0	66.7	Near-constant CP	Farmyard, close to a sileage store	County

Site	Grid ref	Month	L	CP	SP	NP	MY	MD	MN	MW	BLE	UnID	Total	Summary	Habitat	Ecological value
	660433	Sept	0.9	6.3	0.4	0	0	0.2	0	0	0.1	0.1	8	Occasional CP		
SD27	594849	Jun	0.2	7.2	0.1	0	0.1	0	0	0	0	0	7.6	Occasional CP	Broadleaf trees on edge of conifer plantation	Negligible
	660597	Sept	0	0.5	0.3	0	0.1	0	0.1	0	0	0	1			

Species codes: L - Leisler's bat; CP – common pipistrelle; SP – soprano pipistrelle; NP – Nathusius' pipistrelle; MY – Myotis genus, species unidentified; MN – Natterer's bat; MD – Daubenton's bat; MW – whiskered bat; BLE – brown long-eared bat; UnID – unidentified bat

Table 45 Criteria for classification of results.

Terms of characterisation	**Bat Activity Index**	**Average interval between calls**
Negligible	<2	> 30 minutes
Occasional	2 - 12	5 – 30 minutes
Frequent	12 – 60	1 – 5 minutes
Near-constant	>60	< 1 minute

Potential limitations and information gaps

In accordance with the CIEEM Guidelines (2016), this section aims to identify any aspects in which the baseline data may be deficient, and to discuss how it has been taken into account in the evaluation of effects. Overall, this study is considered to have a broad spatial and seasonal coverage, and provides a good representation of bat roosting and foraging / commuting behaviour along the Whole UWF Project. The survey effort is considered to be proportionate to the potential effects of the Whole UWF Project (Section 2.2.5 of the BCT Guidelines). Nonetheless, some minor limitations are discussed below.

Restricted access to properties

Where possible, detailed bat surveys were carried out for buildings of high or moderate suitability within 150m of Project Elements 1 – 4. It was not always possible to obtain permission to enter private property and/or to access the interior of buildings, so in some cases the presence / absence surveys were carried out from public roads. However, this is not considered to have negatively affected the results, because swarming behaviour can usually be observed at any location around a building, even if the roost entry point is not directly visible.

Weather conditions

Bat activity can vary significantly in relation to weather conditions, with higher activity during periods of warm, calm, dry weather, and lower activity during cold, windy or wet weather. In the BCT guidelines it is recommended that surveying should be avoided during periods of heavy rain, strong winds, mist or dusk temperatures below 10°C. However, it should be noted that the climate of Ireland is often unsettled during summer months, so it is not always possible to ensure that surveys are carried out during ideal weather conditions, particularly when automated detectors are deployed for a number of days at a time.

Detailed weather data for the survey period were obtained from Shannon International Airport (approx. 30km west of the Whole UWF Project site), and summarised lists are presented in Table 46. All roost surveys were carried out during suitable weather conditions. Activity surveys were scheduled to coincide with periods of suitable weather, but on three occasions in September weather conditions deteriorated on the second night. Where this was the case, the detector was left in place for additional nights until there had been at least two nights of suitable weather. With these exceptions, weather conditions were suitable for bats on all other occasions, and are not thought to have negatively influenced the quality of the data.

Table 46 Summary of average weather conditions from June to October 2016 and on selected nights in July and August 2017. Dates of bat surveys are highlighted in grey.

Date	Mean Temp	Min Temp	Mean Pressure (hPa)	Mean Wind Speed (m/s)	Precipitation (mm)
20/06/2016	14	12	1012	6.4	0
21/06/2016	16	12	1013	5	1.02
22/06/2016	14	12	1014	4.4	0
23/06/2016	15	12	1015	5	2.03
24/06/2016	14	11	1017	6.4	0.25
25/06/2016	15	13	1022	6.4	0
26/06/2016	16	13	1019	5.3	0
27/06/2016	14	12	1020	5	0
28/06/2016	14	11	1012	3.9	2.03
29/06/2016	14	12	1004	6.4	0.25
30/06/2016	13	12	1006	4.4	6.1
01/07/2016	12	10	1007	5.3	7.11

Date	Mean Temp	Min Temp	Mean Pressure (hPa)	Mean Wind Speed (m/s)	Precipitation (mm)
02/07/2016	13	11	1013	5.8	1.02
03/07/2016	14	11	1017	3.1	0
04/07/2016	14	10	1014	4.4	0.51
05/07/2016	14	11	1021	3.1	0
06/07/2016	16	12	1019	3.6	0.25
07/07/2016	17	13	1015	3.1	0
08/07/2016	16	14	1014	5.8	0.76
09/07/2016	18	16	1008	5.3	4.06
10/07/2016	14	14	999	6.7	4.06
11/07/2016	14	12	1008	6.7	0.25
12/07/2016	13	11	1015	3.9	3.05
13/07/2016	13	11	1023	4.4	0.25
14/07/2016	14	11	1026	2.8	4.06
15/07/2016	17	12	1022	5	1.02
16/07/2016	16	14	1024	3.9	0.51
17/07/2016	17	14	1023	2.8	0
18/07/2016	21	16	1020	1.7	0
19/07/2016	21	14	1013	2.8	1.02
20/07/2016	17	14	1011	4.4	0
21/07/2016	18	14	1012	4.4	1.02
22/07/2016	16	14	1019	3.6	0
23/07/2016	16	13	1019	3.1	0.51
24/07/2016	16	13	1016	3.9	0.76
25/07/2016	14	13	1019	4.4	1.02
26/07/2016	17	14	1018	4.4	0.76
27/07/2016	16	14	1017	3.9	0.51
28/07/2016	16	14	1011	5.3	0.51
29/07/2016	17	14	1013	4.4	0
30/07/2016	14	11	1017	3.1	0.51
31/07/2016	14	12	1019	3.1	0
01/08/2016	14	13	1012	3.9	8.89
02/08/2016	17	16	1006	4.4	0.51
03/08/2016	15	14	1002	8.1	7.11
04/08/2016	16	13	1011	6.4	0.51
05/08/2016	16	13	1020	3.1	0
06/08/2016	18	13	1022	5	0
07/08/2016	17	14	1021	9.7	0
08/08/2016	14	12	1026	6.4	0
09/08/2016	14	11	1031	4.4	0
10/08/2016	15	13	1029	5.3	0
11/08/2016	14	13	1025	5.8	0
12/08/2016	16	13	1021	6.4	1.02
13/08/2016	16	13	1024	5	0
14/08/2016	16	13	1026	2.2	0
15/08/2016	18	12	1021	5.8	0

Date	Mean Temp	Min Temp	Mean Pressure (hPa)	Mean Wind Speed (m/s)	Precipitation (mm)
16/08/2016	20	16	1014	5.8	1.02
17/08/2016	17	16	1010	5	4.06
18/08/2016	17	14	1009	3.9	2.03
19/08/2016	17	14	992	8.9	3.05
20/08/2016	16	14	997	11.1	4.06
21/08/2016	16	13	1013	6.7	7.87
22/08/2016	17	13	1018	4.4	11.94
23/08/2016	14	12	1020	1.7	0.76
24/08/2016	15	10	1021	2.8	0
25/08/2016	15	9	1016	2.2	2.03
26/08/2016	14	11	1016	3.9	0
27/08/2016	16	12	1014	3.1	1.02
28/08/2016	16	11	1015	3.1	0
29/08/2016	16	12	1022	2.8	0
30/08/2016	17	13	1019	5	2.03
31/08/2016	14	12	1019	4.4	0.51
01/09/2016	13	9	1019	3.9	2.03
02/09/2016	17	14	1016	5	0
03/09/2016	17	13	1007	5	5.08
04/09/2016	16	14	1011	5	0.51
05/09/2016	18	14	1013	4.4	0
06/09/2016	20	17	1017	3.9	2.03
07/09/2016	18	16	1011	5	0
08/09/2016	16	13	1005	6.4	1.02
09/09/2016	16	13	1003	6.7	9.91
10/09/2016	13	11	1011	3.9	1.02
11/09/2016	14	10	1006	7.2	0.76
12/09/2016	13	12	1001	7.2	6.1
13/09/2016	13	8	1012	1.4	0
14/09/2016	13	9	1014	2.8	4.06
15/09/2016	14	12	1012	2.2	0
16/09/2016	13	11	1020	5	0.51
17/09/2016	13	10	1024	2.2	0
18/09/2016	14	11	1021	4.4	6.1
19/09/2016	12	9	1026	1.7	0
20/09/2016	13	11	1020	3.1	0.51
21/09/2016	12	8	1012	5.3	7.11
22/09/2016	11	6	1016	3.6	2.03
23/09/2016	12	8	1015	5.3	0
24/09/2016	14	12	1002	8.9	9.91
25/09/2016	13	11	1009	6.4	3.05
26/09/2016	14	11	1014	3.6	0
27/09/2016	15	13	1018	5.3	0
28/09/2016	17	13	1018	5.3	5.08
29/09/2016	12	10	1013	8.1	4.06

Date	Mean Temp	Min Temp	Mean Pressure (hPa)	Mean Wind Speed (m/s)	Precipitation (mm)
30/09/2016	11	9	1008	4.4	3.05
01/10/2016	11	7	1009	2.2	1.02
02/10/2016	10	4	1015	3.6	0
03/10/2016	14	13	1018	9.5	0.25
04/10/2016	14	14	1023	7.2	0
05/10/2016	14	11	1024	5	0
06/10/2016	11	8	1024	6.4	0
07/10/2016	11	6	1020	3.9	0.25
08/10/2016	12	9	1027	3.9	0
09/10/2016	13	10	1030	1.4	0
26/07/2017	15	13	1003	5	2.03
07/08/2017	14	11	1016	4.4	1.02
08/08/2017	13	11	1016	3	3.05
28/08/2017	15	13	1015	2.3	0.76

A8-1.2.4.6 Habitats

A 50-m buffer was applied to work locations comprising the Whole UWF Project, with the exception of the Upperchurch Windfarm, which has already been described in the EIS for the Upperchurch Windfarm planning application. The area within the buffer is termed the 'survey corridor' hereafter. Nomenclature for vascular plants follows Parnell and Curtis (2012).

UWF Grid Connection

The habitats within the survey corridor of the UWF Grid Connection comprise a mosaic of agricultural grassland, commercial forestry plantations, peatlands, hedgerows, wet grassland, private roads and public roads. For the most part, the landscape is dominated by the Silvermines Mountains with habitats recorded reflective of this.

Table 47 Habitats (non-linear) surveyed within the survey corridor of the UWF Grid Connection, the total of each habitat within the survey corridor and an evaluation of their conservation value.

Habitat Type	Area within Survey Corridor (ha)	Evaluation
BL3	11.53	Local Importance (Lower Value)
ED2	4.48	Local Importance (Lower Value)
ED3	2.93	Local Importance (Lower Value)
FW2	0.11	International Importance
GA1	149.05	Local Importance (Lower Value)
GA1/ED2	0.03	Local Importance (Lower Value)
GA1/WS1	0.39	Local Importance (Lower Value)
GA2	1.58	Local Importance (Lower Value)
GS4	42.46	Local Importance (Higher Value)
GS4/HH3	0.21	Local Importance (Higher Value)
GS4/WS1	1.56	Local Importance (Higher Value)
HH3	2.06	National Importance
PB2	1.38	National Importance
PB4	2.05	Local Importance (Higher Value)
WD1	5.92	Local Importance (Higher Value)
WD2	1.89	Local Importance (Higher Value)
WD4	160.09	Local Importance (Lower Value)
WN5	0.81	Local Importance (Higher Value)
WS1	15.09	Local Importance (Higher Value)
WS5	3.93	Local Importance (Higher Value)

Table 48 Habitats (Linear) surveyed within the survey corridor of the UWF Grid Connection, the total of each habitat within the survey corridor and an evaluation of their conservation value.

Habitat Type	Length within Survey Corridor (m)	Evaluation
BL1	157.44	Local Importance (Lower Value)
BL2	5305.70	Local Importance (Lower Value)
BL3	863.08	Local Importance (Lower Value)
ED2	15310.76	Local Importance (Lower Value)
ED3	73.63	Local Importance (Lower Value)
FW1	2060.41	National Importance
FW2	1878.43	International Importance
FW4	5148.50	Local Importance (Lower Value)
PB4	209.85	Local Importance (Higher Value)
WL1	3711.02	Local Importance (Higher Value)
WL1/WL2	1482.35	Local Importance (Higher Value)
WL2	8444.90	Local Importance (Higher Value)
WS1	256.06	Local Importance (Higher Value)
WS3	212.42	Local Importance (Lower Value)

Buildings and artificial surfaces (BL3)

This habitat type incorporates areas of built land in the Fossitt (2000) classification. It includes all buildings (domestic, agricultural, industrial and community) other than derelict stone buildings and ruins. Modern or intact buildings made of stone are included, as are derelict buildings made of bricks, cement blocks or mass concrete. It also includes areas of land that are covered with artificial surfaces of tarmac, cement, paving stones, etc. Within the context of the current development this classification includes built roads, buildings (including farm buildings) and access tracks.

Spoil and bare ground (ED2)

This habitat type was mainly recorded on unpaved forestry roads and farm tracks within the survey corridor. The majority of the UWF Grid Connection will be laid in existing farm and forestry tracks which are categorized as spoil and bare ground. Apart from the existing farm and forestry tracks, the portion of spoil and bare ground within the survey corridor is small.

Recolonising bare ground (ED3)

This habitat was predominantly recorded along existing farm and forestry tracks which did not have regular maintenance or heavy traffic and so a range of ruderal species have re-established on the gravel or hardcore surface. Vegetation cover in this habitat was generally over 50% cover and common species recorded included nettle (*Urtica dioica*), dandelion (*Taraxacum* agg.), broadleaf plantain (*Plantago major*), pineappleweed (*Matricaria discoidea*) and shepherd's-purse (*Capsella bursa-pastoris*).

Improved agricultural grassland (GA1)

Improved agricultural grassland is intensively managed or highly modified agricultural grassland that has been reseeded and/or regularly fertilised, and is now heavily grazed and or/used for silage making The classification includes regularly reseeded monoculture grasslands and rye-grass leys that are planted as part of arable rotation. These differ significantly from areas of permanent grassland. Improved agricultural grassland is typically species poor. Sward quality varies depending on soil type, fertility, drainage and management.

Improved agricultural grasslands are located primarily in the eastern and western sections of the UWF Grid Connection route with areas of this habitat located sporadically throughout the central sections where conifer plantations are more common. No arable rotation is present.

Amenity grassland (GA2)

This grassland type is improved or species poor and is managed for purposes other than grass production. It includes amenity, recreational or landscaped grasslands but excludes farmland. Most amenity grasslands have been reseeded and are regularly mown to maintain very short swards. Within the survey corridor, amenity grassland is typically associated with lawns and other managed grassland areas in gardens, parks, and grassy sports fields.

A very small portion of the survey corridor is comprised of amenity grasslands such as lawns.

Wet grassland (GS4)

This type of grassland can be found on flat or sloping ground in upland and lowland areas. It occurs on wet or waterlogged mineral or organic soils that are poorly-drained. On sloping ground, wet grassland is mainly confined to clay-rich gleys and loams, or organic soils that are wet but not waterlogged. This category includes areas of poorly drained farmland that have not recently been improved, and seasonally-flooded alluvial grasslands. Agricultural pasture not managed in recent years within the study area was classified as wet grassland.

This habitat occurs in poorly drained shallow soils primarily in the upland areas along the mid-section of the cable route but also at a variety of locations along the route where poor drainage was present. Species recorded within the wet grassland habitat were soft rush (*Juncus effusus*) and small sedges (*Carex* spp.) in addition to grasses such as Yorkshire fog (*Holcus lanatus*), creeping bent (*Agrostis stolonifera*) and tufted hair-grass (*Deschampsia caespitosa*). Wet grassland also occurs as a blend with improved agricultural grassland at a variety of locations within the study area.

Wet heath (HH3)

Vegetation with at least 25% cover of dwarf shrubs on peaty soils and shallow wet peats that typically have an average depth of 15-50cm is classified as wet heath. Wet heath can occur in upland and lowland areas and is widespread on the lower slopes of hills and mountains that are either too dry or too steep for deep peat accumulation. Wet heath communities occupy areas where peat depth and soil conditions are intermediate between that of heath and blanket bog i.e. peat depths of 0.5m – 1m. Wet heaths are found on areas of damp-moist rather than waterlogged peats, where hydrological regime usually involves a fluctuating water table (Rodwell, 1991).

A small area of wet heath occurs in the study area on the southwestern slopes of Mauherslieve in the central section of the UWF Grid Connection. This intact area of wet heath is dominated by ling heather (*Calluna vulgaris*) and cross-leaved heath (*Erica tetralix*) with the presence of species such as soft rush (*Juncus effuses*),

small sedges (*Carex* spp.), purple moor-grass (*Molinia caerulea*) and is a good representation of the habitat type.

Upland Blanket Bog (PB2)

This habitat was recorded within the survey corridor at Bleanbeg Bog adjacent to the route of the UWF Grid Connection. At this location, the majority of the bog has been previously drained and/or cut over for turbary. The upland blanket bog habitats were recorded as fragmented banks adjacent to the cut over sections. The surface of the banks supported abundant ling heather along with frequent bog asphodel (*Nartecium ossifragum*) and bog cotton (*Eriophorum angustifolium*). Purple moor grass, cross-leaved heath, deergrass (*Trichophorum cespitosum*) and green-ribbed Sedge (*Carex binervis*) occurred occasionally. Bilberry *(Vaccinium myrtillus*) occurred rarely. *Sphagnum* spp. hummocks were observed on the surface of these peat banks. Bog Rosemary (*Andromeda polifolia*) was recorded at the margin of a turbary track at Bleanbeg Bog. This species is classed as Least Concern in the Red Data List of Vascular Plants (Wyse Jackson *et al.*, 2016).

Cutover Blanket Bog (PB4)

This habitat is located adjacent to the route of the UWF Grid Connection at Bleanbeg Bog. There is evidence of previous and ongoing turf cutting at this location along with ongoing drainage. The bog surface has been excavated c. 1 to 1.5 m below the adjoining peat banks described above (PB2) leaving a flat area of peat that has been recolonised by abundant bog cotton. Green ribbed sedge is occasional. Deergrass, bog asphodel and purple moor grass are also frequently recorded with occasional ling heather and cross-leaved heath. No sphagnum was growing in this habitat and the dry surface is trafficked by excavators and tractors associated with peat extraction. The area is also used to dry out cut turf from the bank to the north that is being actively extracted. Evidence of dumping including garden waste was observed.

(Mixed) broadleaved woodland (WD1)

This category includes woodland areas with 75-100% cover of broadleaved trees, 0-25% cover of conifers. Trees may include native and non-native species. Plantations of broadleaved trees are included if the canopy height is greater than 5m or 4m in the case of wetland areas.

There are a number of small stands of (mixed) broadleaved woodland within the survey corridor along the UWF Grid Connection. These stands are primarily located adjacent to public roads and domestic dwellings and on the edges of agricultural grassland fields. One stand is located adjacent to the Newport (Mulkear) River in the townland of Oakhampton, approximately 2km east of Mountphilips. Species composition of these mixed broadleaved woodlands comprise of birch (*Betula* spp.), ash (*Fraxinus excelsior*), willow (*Salix* spp.), rowan (*Sorbus aucuparia*) and sycamore (*Acer pseudoplatanus*).

Mixed broadleaved/conifer woodland (WD2)

This category includes woodland areas with mixed stands of broadleaved trees and conifers, where both types have a minimum cover of 25% and maximum of 75%. Trees may either be native or non-native species. This habitat type occurs at two locations along the entire length of the survey corridor. Deciduous species recorded were birch, ash, willow, rowan and sycamore and conifers were composed of a mix of larch (*Larix decidua*) and Sitka spruce (*Picea sitchensis*).

Conifer plantation (WD4)

Conifer plantations are dense stands of planted conifers where the broadleaved component is less than 25% and the overriding interest is commercial timber production. Conifer plantations are characterized by even-ages stands of trees that are usually planted in regular rows, frequently within angular blocks. Species

diversity is low and single species stands are common. The majority of planted conifers are non-native species such as Sitka spruce, lodgepole pine (*Pinus contorta*), Norway spruce (*Picea abies*), and larches (*Larix* spp.).

Conifer plantation was frequently recorded within the survey corridor with the majority located throughout the central upland sections with some smaller plantations at various points throughout the corridor. Age classes of these plantations varied from first rotation to second rotation mature.

Riparian woodland (WN5)

This classification category includes wet woodlands of river margins and low islands that are subject to frequent flooding, or where water levels fluctuate as a result of tidal movement (low reaches of rivers).

Riparian woodland comprises a small proportion of the survey corridor and was recorded at two locations. Both areas of riparian woodland occur along first order streams in the western section of the survey corrdior. The easternmost area of riparian woodland is the largest of the two recorded and is not dominated by any one species. It is composed of mature willow species, hazel (*Corylus avellana*) and alder (*Alunus glutinosa*) with an understory of broadleaved herbs including nettle (*Urtica dioica*) and wood dock (*Rumex sanguineus*) together with a layer of ground ivy (*Glechoma hederacea*). The smaller area of this habitat is recorded bordering a stream approximately 200m east of the Mountphilips 110kV Substation site and is also composed of willow, hazel and alder as well as some holly (*Ilex aquifolium*).

Scrub (WS1)

This broad category includes areas that are dominated by at least 50% cover of shrubs, stunted trees or brambles. The canopy height is generally less than 5m, or 4m in the case of wetland areas. Scrub frequently develops as a precursor to woodland and is often found in inaccessible locations, or on abandoned or marginal farmland. In the absence of grazing and mowing, scrub can expand to replace grassland or heath vegetation. Trees are included as components of scrub if their growth is stunted as a result to exposure, poor soils or waterlogging. If tall trees are present, these should have a scattered distribution and should nothave a distinct canopy.

This habitat was recorded at numerous locations along the UWF Grid Connection. The majority of these areas were dominated by willow scrub and well-established gorse (*Ulex europaeus*). Understorey botanical species diversity was typically poor.

Improved Agricultural Grassland (GA1)/Scrub (WS1) Mosaic

This habitat was recorded at locations where former grassland habitat had started to be colonised by bramble (*Rubus fructicosus agg.*) and willow scrub due to absence of grazing and/or mowing. It was recorded at one location in Kilcommon.

Stone walls and other stonework (BL1)

This habitat was recorded at one location within the survey corridor for the UWF Grid Connection at the graveyard at Newross. The stone wall was a boundary/retaining wall for the graveyard.

Earth Banks (BL2)

Earth banks are a common type of field boundary in many parts of Ireland. Constructed from local materials such as peat, earth, gravel or stone, these narrow linear ridges are often bordered by drainage ditches.

There are a number of linear earth banks located primarily at the eastern end of the UWF Grid Connection and then sporadically throughout the remainder of the survey corridor. These banks are completely vegetated with common grass species and are typically species poor.

Eroding/Upland Rivers (FW1)

This habitat classifies natural watercourses in eroding conditions which are typically associated with the upland parts of river systems where gradients are steep and water flow is fast and turbulent. This habitat was mainly recorded as smaller streams in the upland areas of the

UWF Grid Connection. However, larger watercourses such as the Clare River were classified as an upland/eroding river within the survey corridor. The Clare River is hydrologically connected to the Clare Glen SAC and the Lower River Shannon SAC downstream.

Depositing/Lowland Rivers (FW2)

This category includes watercourses where fine sediments are deposited on the river bed. Depositing conditions are typical of lowland areas where gradients are low and water flow is slow and sluggish. In a natural state, these rivers erode laterally into their banks and meander across floodplains.

The Mulkear River and Bilboa River are examples of depositing/lowland rivers within the survey corridor. The Mulkear River and Bilboa River are part of the Lower River Shannon SAC.

Drainage Ditches (FW4)

This habitat was frequently encountered within the survey corridor around the margins of agricultural grasslands and also within conifer forestry. Generally, these drains showed evidence of previous excavation but had subsequently revegetated. Water levels and flow rates within the drains were often low or absent.

Hedgerows (WL1)

Hedgerows are defined as linear strips of shrubs, often occasional trees that typically form field or property boundaries. Most hedgerows originate from planting and many occur on the raised banks of earth that are derived from the excavation of associated drainage ditches. Dimensions of hedgerows vary considerably, depending largely on management and composition and are taken as being mainly less than 5m high and 4m wide.

Many hedgerows within the survey corridor are well developed and maintained along field boundaries and roadside margins. Species composition varied due to factors such as age, management, geology, soils and exposure. Hedgerows within the study area commonly supported a high proportion of hawthorn (*Cratagegus monogyna*), blackthorn (*Prunus spinosa*), gorse (*Ulex europaeus*), holly and bramble, in addition to other native trees such as ash, hazel (*Corylus avellana*) and willow. Climbing plants such as ivy (*Hedera hibernica*) and honeysuckle (*Lonicera periclymenum*) were also recorded at a number of hedgerows along the route.

Hedgerows (WL1)/ Treelines (WL2)

This habitat was recorded occasionally where hedgerow habitat and treeline habitat were present intermittently along a field boundary.

Treelines (WL2)

A treeline is a narrow row or single line of trees that is greater than 5m in height and typically occurs along field or property boundaries. This category includes tree-lined roads or avenues, narrow shelter belts with no more than a single line of trees and overgrown hedgerows that are dominated by trees.

The species composition of this habitat recorded within the study area was ash, beech (*Fagus sylvatica*), horse chestnut (*Aesculus hippocastanum*), sycamore and some conifers, including mature Sitka spruce.

Ornamental/non-native shrub (WS3)

This habitat type was recorded in close association with dwelling houses where non-native hedging plants had been planted around the boundary of the property. This habitat was recorded at Kilcommon.

UWF Related Works

The habitats within the survey corridor of the UWF Related Works comprise a mosaic of agricultural grassland, commercial forestry plantations, peatlands, heath, earth banks, wet grassland, acid grasslands, private roads and public roads.

Table 49 Habitats (non-linear) surveyed within a 100-m survey corridor of the UWF Related Works, the total of each habitat within the survey corridor and an evaluation of their conservation value.

Habitat Type	Area within Survey Corridor (ha)	Evaluation
BL3	5.12	Local Importance (Lower Value)
ED2	1.74	Local Importance (Lower Value)
ED3	0.63	Local Importance (Lower Value)
GA1	113.38	Local Importance (Lower Value)
GA1/GS4	1.70	Local Importance (Higher Value)
GA1/WS1	0.42	Local Importance (Higher Value)
GA2	0.27	Local Importance (Lower Value)
GS2	0.14	Local Importance (Higher Value)
GS3	1.58	Local Importance (Higher Value)
GS4	11.95	Local Importance (Higher Value)
GS4/WS1	0.49	Local Importance (Higher Value)
HH1/GS4	0.11	Local Importance (Higher Value)
HH3	2.32	Local Importance (Higher Value)
GS3/HH3	2.81	Local Importance (Higher Value)
PB2	2.03	County Importance
PB2/GS4	0.13	Local Importance (Higher Value)
PB4	0.10	Local Importance (Higher Value)
WD1	0.15	Local Importance (Higher Value)
WD4	42.45	Local Importance (Lower Value)
WL2	0.09	Local Importance (Higher Value)
WS1	1.68	Local Importance (Higher Value)
WS2	0.78	Local Importance (Higher Value)
WS2/GS4	0.43	Local Importance (Higher Value)

Table 50 Habitats (linear) surveyed within a 100-m survey corridor of the UWF Related Works, the total length of each habitat within the survey corridor and an evaluation of their conservation value.

Habitat Type	Length within Survey Corridor (m)	Evaluation
BL2	10429.54	Local importance (Lower value)
BL3	156.40	Local importance (Lower value)
FW1	693.78	County Importance; Local Importance (Higher Value)
FW2	433.92	Local Importance (Higher Value)
FW4	2800.05	Local importance (Lower value)
GS2	159.93	Local importance (Lower value)
WL1	702.00	Local Importance (Higher Value)
WL1/WL2	187.63	Local Importance (Higher Value)
WL2	721.43	Local Importance (Higher Value)

Earth Banks (BL2)

This was the most frequently encountered field boundary within the survey corridor along with post and wire fencing. The vegetation on these earth banks varied depending on location and altitude. Earth banks at higher elevations contained species such as heathers, bilberry, bramble and heath bedstraw typical of heath habitat. Species in the lowland earth banks included frequent bramble and gorse along with occasional hawthorn or blackthorn bushes, more typical of hedgerow or scrub habitats. Earth banks were generally 1.5 m high and c. 2 m thick. Wire and post fencing ran alongside to make the boundary stock proof. Some earth banks are in poor condition due to trampling by livestock and lack of maintenance.

Buildings and artificial surfaces (BL3)

This habitat was recorded along public roads, dwelling houses and farmyards and associated paved areas. Plant species were generally absent from this habitat or if present, restricted to common ruderal species.

Hedgerows (WL1)

Hedgerow habitat within the survey corridor was rarely recorded. The habitat, when present, comprised frequent hawthorn (*Crataegus monogyna*), bramble and gorse along with occasional blackthorn (*Prunus spinosa*) and elder (*Sambucus nigra*).

Hedgerows (WL1)/ Treelines (WL2)

This habitat was recorded occasionally where hedgerow habitat and treeline habitat were present intermittently along a field boundary.

Treelines (WL2)

Treeline habitats within the survey corridor were generally of two types; the first was dominated by mature Sitka spruce trees which were planted as shelter belts for dwellings, farmyards or along field boundaries for livestock. The second type of treeline consisted of broadleaved species including a mix of ash and sycamore.

Eroding/Upland Rivers (FW1)

The eroding/upland rivers habitat was recorded within the survey corridor as streams generally 0.5 to 1 m wetted width showing vertical erosion in the stream bed with steep banks. Boulders, cobbles and gravels were the main aggregates in the stream bed. Evidence of previous spate flows was observed but water levels were lower during the survey. Evidence of livestock poaching and subsequent siltation of watercourse was observed at one location.

Drainage Ditches (FW4)

This habitat was recorded around the margins of agricultural grasslands and also within conifer forestry plantations. Species present in the revegetated drains included abundant soft rush, hemlock water dropwort (*Oenanthe crocata*), wild angelica (*Angelica sylvestris*), nettle and bramble. Water levels and flow rates, if present, was often low.

Improved Agricultural Grassland (GA1)

This was the most frequently recorded habitat within the survey corridor of the UWF Related Works. Intensively management examples of the habitat were dominated by perennial rye grass (*Lolium perenne*) with Yorkshire fog (*Holcus lanatus*) and white clover (*Trifolium repens*) all occurring frequently. Daisy (*Bellis perennis*), ragwort (*Senecio jacobaea*), Common mouse-ear (*Cerastium fontanum*), broad-leaved dock (*Rumex obtusifolius*) and common sorrel (*Rumex acetosa*) were recorded occasionally.

In some less intensively managed and/or poorer drained areas within fields, soft rush was locally frequent along with frequent creeping buttercup (*Ranunculus repens*) and occasional meadow buttercup (*Ranunculus acris*). However, species diversity was generally low and ground conditions not sufficiently wet to include in the wet grassland habitat type, as well as evidence of agricultural improvement and/or intensive management.

Amenity Grassland (GA2)

Within the survey corridor, amenity grassland was associated with lawns and other managed grassland areas in gardens.

Dry-humid acid grassland (GS3)

The dry-humid acid grassland habitat was recorded in the upland areas of the survey corridor, at the margins of existing peatland habitats or area of former bog which has been historically harvested and has regenerated with wet heath, acid grassland or wet grassland habitats.

Sweet vernal grass (*Anthoxanthum odoratum*), mat-grass (*Nardus stricta*), common bent (*Agrostis capillaris*) and velvet bent (*Agrositis canina*) were frequently recorded grass species in this habitat. Purple moor grass and wavy hair grass (*Deschampsia flexuosa*) occurred occasionally along with green ribbed sedge, carination sedge (*Carex panicea*) and heath woodrush (*Luzula multiflora agg.*). Heath rush (*Juncus squarrosus*), flea sedge (*Carex pulicaris*) and great woodrush (*Luzula sylvatica*) occurred rarely. The forb element included frequent tormentil (*Potentilla erecta*), ling heather, cat's ear (*Hypochaeris radicata*) and heath milkwort (*Polygala serpyllifolia*).

In addition, heath bedstraw (*Galium saxatile*), devil's bit scabious (*Succisa pratensis*) and lousewort (*Pedicularis sylvatica*) were recorded at one location for this habitat.

Wet Grassland (GS4)

Wet grassland was frequently recorded in low lying areas, on poorly draining soils and adjacent to watercourses. Soft rush and creeping buttercup were locally abundant in patches within this habitat. Yorkshire fog, creeping bent (*Agrostis stolonifera*), marsh ragwort (*Senecio aquaticus*) were frequently recorded along with lesser spearwort (*Ranunculus flammula*), marsh bedstraw (*Galium palustre*), marsh foxtail (*Alopecurus geniculatus*) occurred occasionally.

Notably species rich fields were less frequently recorded and included sharp flowered rush (*Juncus acutiflorus*), sweet vernal grass, heath woodrush, marsh thistle (*Cirsium palustre*), greater bird's-foot-trefoil (*Lotus pedunculatus*), lesser stitchwort (*Stellaria graminea*), field horse tail (*Equisetum arvense*), oval sedge (*Carex ovalis),* devils bit scabious and heath spotted orchid (*Dactylorhiza maculata*).

Dry siliceous heath (HH1)

This habitat was located along firebreaks within the conifer plantation habitat where overlying peat soils had been excavated and the vegetation had recolonised the remaining shallow peat/ siliceous subsoil track. Species present included frequent ling heather and occasional bell heather along with tormentil. Gorse and bramble were also present rarely.

Wet Heath (HH3)

This habitat was recorded at the margins of existing upland blanket bog habitat where there was evidence of historic peat harvesting and subsequent vegetation regeneration on the shallower peat soils. Species present included heather with purple moor grass, heath rush and wavy hair grass. Tormentil and bilberry occurred occasionally with soft rush, bog cotton, green ribbed sedge, mat-grass and sweet vernal grass. Heath spotted orchid and deer grass occurred rarely.

Dry-humid acid grassland (GS3)/ Wet Heath (HH3) Mosaic

This habitat was recorded at locations where dry-humid acid grassland formed intimate mosaics with the adjoining wet heath habitat. The species composition present comprised those as outlined in the dry-humid acid grassland habitat above with the presence of wet heath species such as ling heather, bilberry and tormentil

Upland Blanket Bog (PB2)

Ling heather, purple moor grass and bog cotton were all frequently recorded in this habitat. Bell heather (*Erica cinerea*), Cross-leaved heath, tormentil, green ribbed sedge and deergrass were recorded occasionally. Heath rush occurred rarely.

Cutover Bog (PB4)

This habitat was recorded between banks of upland blanket bog which had been harvested for turf. The level of these cut over areas was 1 to 1.5 m below the surrounding bog. The peaty soil was waterlogged and species diversity was low with the habitat being dominated by Yorkshire fog and soft rush.

Conifer plantation (WD4)

The conifer plantation habitat within the survey corridor was dominated by Sitka spruce and was generally of a mature age class with trees 8 to 10 m high and the canopy fully closed. Understorey plants were generally absent due to heavy shade.

Immature woodland (WS2)

This habitat was recorded along the margins of recently planted conifer plantations, generally along public roads and watercourses. The species were generally broadleaved species such as frequent downy birch (*Betula pubescens*) along with occasional alder (*Alnus glutinosa*) and rowan. The trees in these planted buffer areas were generally c. 2.5 to 3 m high and immature.

Scrub (WS1)

The species composition of this habitat varied across the survey corridor. Scrub habitat included frequent gorse, bramble, hawthorn and willow. This habitat was recorded in areas of low intensity management such as adjacent to watercourses and conifer plantations, former pasture that is no longer grazed/mowed frequently.

Spoil and bare ground (ED2)

This habitat type was mainly recorded on unpaved farm tracks and, to a lesser extent, forestry roads within the survey corridor. These roads are c. 4 - 5 m wide and surfaced with hardcore or compacted earth for farm machinery, livestock or forestry machinery to access the forestry. Frequent use and/or regular maintenance/resurfacing keeps these habitats free of vegetation.

Recolonising bare ground (ED3)

This habitat was recorded along infrequently used farm tracks or yards which did not have regular maintenance or heavy traffic and so a range of ruderal species have re-established on the gravel or hardcore surface. Common species recorded included nettle, dandelion, broadleaf plantain, pineappleweed and shepherd's-purse.

UWF Replacement Forestry

The habitats within the UWF Replacement Forestry lands comprise of improved and wet grassland with earth banks, drainage ditches and streams dividing the fields. An area of scrub and conifer plantation is concentrated on the steep sides of a small glen through which the stream flows.

Additional habitats are described herein that occur within the Best Practice survey buffer however it is not proposed that these are planted with forestry. Results are included for completeness.

Table 51 Habitats (non-linear) surveyed within a 50-m buffer of the UWF Replacement Forestry, the total of each habitat within the survey corridor and an evaluation of their conservation value.

Habitat Type	Area within UWF Replacement Forestry lands (ha)	Evaluation
BL3	0.000001	Local Importance (Lower Value)
ED3	0.45	Local Importance (Lower Value)
GA1	8.92	Local Importance (Lower Value)
GS4	1.77	Local Importance (Lower Value)
WD1	0.18	Local Importance (Higher Value)
WD4	0.57	Local Importance (Lower Value)
WS1	0.59	Local Importance (Higher Value)

Table 52 Habitats (linear) surveyed within a 50-m buffer of the UWF Replacement Forestry, the total of each habitat within the survey corridor and an evaluation of their conservation value.

Habitat Type	Length within UWF Replacement Forestry lands (m)	Evaluation
BL2	748.86	Local importance (Lower value)
BL3	228.66	Local importance (Lower value)
FW1	489.44	National Importance; Local Importance (Higher Value)
FW4	314.32	Local importance (Lower value)
WL1	44.62	Local Importance (Higher Value)
WL2	89.50	Local Importance (Higher Value)

Earth Banks (BL2)

This was the most frequently encountered field boundary within the UWF Replacement Forestry lands and associated survey buffer. The vegetation on these earth banks included frequent bramble and gorse along with occasional hawthorn, willow spp. and bracken. Earth banks were generally 1.5 m high and c. 2 m thick. Wire and post fencing ran alongside to make the boundary stock proof.

Buildings and artificial surfaces (BL3)

This habitat was only recorded along the tarmacked surface of the public road that is located close to the western boundary of the UWF Replacement Forestry lands.

Hedgerows (WL1)

Hedgerow habitat was rarely recorded within the UWF Replacement Forestry lands. The habitat was recorded adjacent to an existing farm road which allows access to the lands via the public road. Species present comprised of frequent grey willow (*Salix cinerea*) and occasional eared willow (*Salix aurita*) as well as bramble and bracken.

Treeline (WL2)

Treelines were rarely recorded within the UWF Replacement Forestry lands. One treeline consisting of frequent ash (both mature and semi-mature trees) along with mature sycamore and Sitka spruce were located along the stream in the east of the survey area.

Eroding/Upland Rivers (FW1)

The eroding/upland rivers habitat was recorded within the UWF Replacement Forestry lands at the bottom of a small glen which runs from southwest to northeast through the study area. The stream was fast flowing with predominantly riffle morphology with occasional pools with a wetted width of c. 1.5 m and up to 0.5 m deep in pool with more shallow stretches over the riffles. Cobbles and gravels were the main aggregates in the stream bed. There was evidence of erosion on the banks of the stream. The majority of the stream is enclosed in scrub and conifer plantation.

The stream is a tributary of the Foilnaman (EPA Code 16F62) which is, in turn, a headwater stream of the Clodiagh River (EPA Code:16C02).

Drainage Ditches (FW4)

This habitat was recorded around the margins of agricultural grasslands, often associated with earth bank field boundaries. The drainage ditches within the UWF Replacement Forestry lands were dry or near stagnant during the site visit. The ditches were all vegetated with abundant soft rush, bramble, nettle along with occasional wild angelica.

Improved Agricultural Grassland (GA1)

This was the most frequently recorded habitat within the UWF Replacement Forestry lands. Species recorded included abundant perennial rye grass with frequent Yorkshire fog and white clover. Broad-leaved dock and creeping buttercup were recorded occasionally. The majority of fields within the UWF Replacement Forestry lands were being used for grazing cattle. One field showed evidence of recent mowing for baled silage.

Wet Grassland (GS4)

Wet grassland was recorded in the low-lying areas adjacent to the stream. Soft rush and creeping buttercup were abundant. Yorkshire fog, creeping bent and marsh ragwort were frequently recorded. Wild angelica was frequent at the margins of the stream.

Mixed Broadleaved Woodland (WD1)

This habitat was recorded along the margin of the conifer plantations within the UWF Replacement Forestry lands as a buffer between watercourses and the plantations. Species present included abundant alder with occasional ash. Trees were 6 to 8 m tall and semi mature.

Conifer plantation (WD4)

The conifer plantation habitat within the UWF Replacement Forestry survey corridor was confined to a small areas of Sitka spruce that has been planted on the steeply sloping margins of the small glen. The plantation was semi-mature and closed canopy with the trees c. 6 to 8 m tall.

Scrub (WS1)

This habitat was recorded within the small glen, adjacent to the stream. The species composition consisted of frequent willow spp. and bramble. Bracken was locally dominant in patches. Mature ash trees and hazel shrubs occurred rarely.

Recolonising bare ground (ED3)

This habitat was recorded along the existing farm tracks within the UWF Replacement Forestry lands. Species present consisted of perennial rye grass, annual meadow grass and broadleaf plantain.

UWF Other Activities

Haul Route Activities

The habitats along the Haul Route Activities locations mainly comprise of public road with associated margin vegetation often comprising grassy verges, ornamental planting, hedgerows and treelines and scrub.

Table 53 Habitats (non-linear) surveyed within a 100-m survey corridor of the UWF Other Activities, the total of each habitat within the survey corridor and an evaluation of their conservation value.

Habitat Type	Area within Survey Corridor (ha)	Evaluation
BC4	0.2	Local Importance (Lower Value)
BL3	8.2	Local Importance (Lower Value)
ED2	0.2	Local Importance (Lower Value)
FW1	0.4	County Importance; Local Importance (Higher Value)
GA1	13.0	Local Importance (Lower Value)
GA2	1.7	Local Importance (Lower Value)
GS2	3.9	Local Importance (Lower Value)
GS4	1.1	Local Importance (Lower Value)
HH1	0.4	Local Importance (Lower Value)
WD1	5.1	Local Importance (Higher Value)
WD4	0.3	Local Importance (Lower Value)
WL2	0.2	Local Importance (Higher Value)
WS1	1.3	Local Importance (Higher Value)
WS2	0.3	Local Importance (Lower Value)

Table 54 Habitats (linear) surveyed within a 100-m survey corridor of the UWF Other Activities, the total of each habitat within the survey corridor and an evaluation of their conservation value.

Habitat Type	Length within Survey Corridor (m)	Evaluation
BL1	207.57	Local importance (Lower value)
BL2	29.61	Local importance (Lower value)
ED2	57.22	Local importance (Lower value)
GS2	1617.89	Local importance (Lower value)
FW1	277.06	County Importance; Local Importance (Higher Value)
FW4	16.17	Local importance (Lower value)
HD1	111.88	Local importance (Lower value)
WL1	1761.73	Local Importance (Higher Value)
WL2	268.91	Local Importance (Higher Value)

Stone walls (BL1)

Bare stone walls occur along the road corridor, as a road boundary, or forming the border for ornamental planting within residential areas.

Earth Banks (BL2)

The road corridor along the haul route, particularly in the Upperchurch area is characterised by earth banks, created during the road construction. These banks are associated with hedgerows and field boundaries or are commonly vegetated with dry grassy verge communities.

Buildings and artificial surfaces (BL3)

This habitat type included all dwellings, paved areas, footpaths and the roadway within the survey corridor. In general, these artificial surfaces are of low ecological value. However, some buildings may be of ecological value to roosting bats.

Spoil and bare ground (ED2)

This habitat type was recorded in one location at an unpaved farm tracks within the survey corridor.

Dry Meadow / Grassy Verge (GS2)

Grassy verges occurred along the road corridor throughout the haul route study area. The verge width varied; however, the botanical composition was found to be relatively homogenous with two distinct categories identified. The verge associated with recent road development and managed national roads was species poor, characterised by improved grass seed mix including rye grass and bent grass species with a low forb component such as daisy, dandelion, chickweed (*Stellaria media*) and plantain spp. Grassy verges south of the N7 motorway and west of Thurles were dominated by grasses including cock's foot grass (*Dactylis glomerata*), meadow foxtail (*Alopecurus pratensis*), Yorkshire fog and false oat grass (*Arrhenatherum elatius*) with forbs characteristic of a hedgerow understory including creeping buttercup, hogweed (*Heracleum sphondylium*), cow parsley (*Anthriscus sylvestris*), vetch (*Vicia* spp.), nettle and foxglove (*Digitalis purpurea)*.

Eroding/Upland Watercourse (FW1)

The road corridor along the UWF other activities crosses a number of minor first and second order streams. A portion of the route on the R498 follows the Nenagh River corridor in the area of Latteragh, Co. Tipperary. Ecological evaluation: The Nenagh River is evaluated as being of County Importance; while the minor streams crossed by the route are evaluated as of Local importance (Higher Value).

Drainage Ditches (FW4)

This habitat was infrequently encountered within the survey corridor, only being recorded at one location associated with the edge of a farm roadway and earth bank.

Dense Bracken (HD1)

Small areas of bracken (*Pteridium aquilinum*) cover occur on higher ground adjacent to the road corridor.

Hedgerow (WL1)

Linear hedgerow features occur throughout the rural road network within the UWF Other Activities survey corridor, associated with the road corridor and agricultural field boundaries adjoining the road. Hedgerows were dominated by native species including hawthorn, blackthorn, elder, wych elm (*Ulmus glabra*) and hazel. Along the road verge, regular maintenance kept ash and sycamore growth in check.

Treeline (WL2)

Treelines were associated with the road corridor and agricultural field boundaries. Ash and sycamore dominated, with occasional pedunculate oak (*Quercus robur*) and conifers including Sitka spruce, *Pinus* spp. and *Cupressus* spp.

Wet Grassland (GS4)

No wet grassland occurs along the road verge; however, a number of field parcels adjacent to the road was classified as such, dominated by soft rush, nettles, Yorkshire fog and Yellow iris (*Iris pseudacorus*).

Conifer Plantation (WD4)

Due west of Thurles on higher ground blocks of conifer plantation were recorded adjacent to or set back from the road. These were dominated by Sitka spruce.

Scrub (WS1)

Willow scrub and maintained sycamore, dense bramble and unmanaged hedgerow were classified as scrub habitat, occurring frequently throughout the study area.

Immature woodland (WS2)

Plantations of immature woodland were recorded adjacent to the road route used as ornamental planting, screening coniferous plantation or as commercial broadleaved plantations.

Mixed Broadleaved Woodland (WD1)

Limited areas of mature broadleaved woodland were recorded along the route, in all locations this habitat was found to be dominated or compromised by non-native species including beech and sycamore.

Dry Siliceous Heath (HH1)

Occurs on earth banks created along the road verge and on areas of road cut. Dominated by ling heather with bilberry, foxglove, tormentil, hard fern (*Blechnum spicant*), gorse and bracken. The area and extent of this habitat along the road corridor is significantly restricted and is not connected to dry heath habitats in the wider upland landscape.

Recolonising Bare Ground (ED3)

Bare ground adjacent to the road corridor, or set back from the road, resulting from road maintenance or agricultural works.

Flowerbeds and Borders (BC4)

Man-made ornamental borders and planted flowerbeds which contain non-native shrub and flower species.

Overhead Line Activities

Overhead Line Activities are associated with the existing overhead 110kV line between Killonan ESBN Station (just east of Limerick City) and ESBN Angle Mast Structure No. 90 (2.3 km north of Mountphilips substation). These activities will be carried out by ESBN or ESBN contractors. Activities include (a) re-sagging/correcting the tension, and (b) fibre-wrapping.

The relevant sections of the Killonan to Nenagh overhead line are across open farmland and near Killonan, around the perimeter of an industrial estate. In order to gain access to the ESBN structures for ESBN contractor crews and equipment, the local public road network in the vicinity of the line will be used and from there they will gain access through private land, utilising existing private track or road, wherever possible. This access already exists at each location for line maintenance and no change to the established access is anticipated.

A total of 18 habitats were recorded within a 50-metre buffer of the Overhead Line Activities. The majority of the study area was composed of improved agricultural grassland. Table 56 lists the structure numbers and the habitats located at each structure.

Site surveys were carried out by INIS ecologists Mr Howard Williams, Mr. Chris Cullen, Ms. Jennifer Pearson and Mr. Peter O'Connor from 16th to 19th January 2018 inclusive. Habitats surrounding each structure and underneath the line were recorded and classified using Fossit (2000) classification and target notes were made. Incidental observations of birds and signs/observations of non-volant mammals were also recorded.

Habitat Description of Overhead Line Activities Study Area

Improved agricultural grassland GA1

The majority of the study area consisted of improved agricultural grassland habitat. These habitats are species poor, some fields were poorly drain with approximately 40% Soft Rush (*Juncus effuses*) cover. Rye-grasses (*Lolium spp*.) were dominant. Yorkshire-fog (*Holcus lanatus*), Creeping Buttercup (*Ranunculus repens*) and docks (*Rumex spp*.) were frequent. Creeping Bent (*Agrostis stolonifera*) was also frequent in some poorly drain fields. This habitat was present at 54 of the 90 structures i.e. Angle Mast (AM), Intermediate Tower (INT) or Intermediate Pole (IMP) sites.

Amenity Grassland GA2

A small section of amenity grassland was encountered during the survey within the Annacotty Business Park. This habitat was species poor. Yorkshire fog, Rye-grasses and Creeping Buttercup were common. This habitat was present at AM 19.

Wet grassland GS4

Entire fields and some sections within improved grassland fields were classified as wet grassland. These habitats had wet or waterlogged soils. Soft Rush was abundant. Yorkshire Fog and Creeping Buttercup were frequent. Hard Rush (*Juncus inflexus*) and Iris sp. (*Iris sp.*) were occasionally encountered. This habitat was present at IMP 20, AM 21 and IMPs 46, 47 and 87.

Oak-ash-hazel woodland WN2

A small section of this habitat was recorded within the study area. Oak, Ash and Hazel were common. This habitat was located south west AM 90, 50 metres from the nearest point on the overhead line.

Riparian woodland WN5

A section of this habitat was recorded along the Ballykinlalee stream (EPA No: IE_SH_25B770660). Alder, Willow and Ash were present. No structures are present within this habitat, the overhead line passes over this habitat.

Wet willow-alder-ash woodland WN6

The habitat wet willow-alder-ash woodland was recorded on a number of occasions. Willow species (Salix spp.) were common. Alder (*Alnus glutinosa*) was frequent. Ash (*Fraxinus excelsior*) was occasional to frequent. The understory consisted of Bramble (*Rubus ulmifolius*) on occasion. Creeping Bent, Ivy (*Hedera helix*), Hart's-tongue Fern (*Phyllitis scolopendrium*) and Lady-fern (Athyrium filix-femina) was also recorded. This habitat was present at poles IMP 62 and IMP 63.

Mixed broadleaved/conifer woodland WD2

Sections of mixed broadleaved/conifer woodland were recorded within the study area. Fir (A*bies sp*.) and Pine (*Pinus sp*) species were common. Birch (*Betula sp.*) and Alder were frequent. No structues are located within this habitat. IMP 53 is located on the border of this habitat; the overhead line is approximently 7 to 15 metres form this habitat.

Conifer Plantation WD4

Large stands of mature conifer plantation were recorded within the study area. Conifer species were of even age. In some cases, plantation was bordered by broadleaved trees such as Hazel, Willow and Alder. One section of young conifer plantation was also recorded. No structures are located within this habitat. The closest structure, AM 58, is located 6 metres from this habitat.

Scrub WS1

Areas of dense scrub were recorded frequently. This habitat occurred in corridors between conifer plantation amongst other areas. European Gorse (*Ulex europaeus*) and Bramble were common. Willows, Hawthorn (*Crataegus monogyna*) and Blackthorn (*Prunus spinosa*) also formed this habitat. This habitat is present at 24 of the 90 AM/IMP/INT sites.

Broadleaved Woodland WD1/ Wet Grassland GS4

A mosaic habitat of broadleaved woodland and wet grassland habitat was recorded within the Annacotty Business Park. Within this habitat Willow and Elder were recorded. Soft Rush and Yorkshire Fog were frequent. No structures were present within this habitat, the overhead line is within 1 metre of this habitat.

Cutover Bog PB4

IMP 66 and the proximal surrounding area is located in cutover bog habitat. This bog has been used for extensive turf cutting.

Ornamental/non-native shrub WS3

Ornamental/non-native shrub habitat was recorded as linear features proximal to domestic dwellings. Escallonia (*Escallonia macrantha*) was abundant in one location.

Hedgerows WL1

Hedgerows were frequently recorded as linear boundaries to improved agricultural fields, wet grassland and other habitats. Blackthorn and Hawthorn were common. Ash and Bramble were frequent. Elder (*Sambucus nigra*) and Ivy were occasional. European Gorse was occasional and common within certain hedgerows. This habitat was present at 11 of the AM/IMP/INT sites, see table 56.

Treelines WL2

A number or field boundaries contained hedgerow which were dominated by large trees. Ash, Hazel, Horse Chestnut (*Aesculus hippocastanum*) and Beech (*Fagus sylvatica*), Elm, Hawthorn, Blackthorn were all recorded. This habitat was present at IMP 67 and IMP 69.

Drainage Ditches FW2

Drainage ditches were commonly recorded along linear features such as hedgerows and treelines. Within the ditches Common Reed and Willow were frequently recorded.

Eutrophic Lake FL1

A lake was recorded within the same improved grassland field as IMP 75. Pondweeds (*Potamogeton sp.)* and Brooklime (*Veronica beccabunga*) were frequent. Common Reed (*Phragmites australis*) and Hard Rush boarded the lake.

Depositing/lowland rivers FW2

The river Mulkear was encountered along the survey route, poles are located either side of the river and the overhead lines pass over the river. The section of river that was surveyed was classified as a depositing lowland river. At the time of survey, the river was high and fast-flowing. It is estimated that the river was 20-25 metres wide. The stream West Clyduff passes through the Annacotty Business Park from the south to the north. This habitat is present near AM 32, IMP 34, IMP 35, IMP 72 and IMP 89.

Buildings and artificial surfaces BL3

Buildings and hardstanding composed of concrete, tarmac and hard core were recorded during the study. Buildings encountered included substations, industrial and domestic buildings.

Watercourse crossings

A total of 11 water crossings are proposed for the overhead lines activites. Watercoursecrossings W1, W2, W3, W4, W5, W6 were classified as FW4 due to their artificial man-made nature. Water crossings W7, W8, W9, W10 and W11 were classified as FW2 due to the presence of fine sediments. Pole 86 is located in close proximity to the Ballykinlalee stream (EPA code: IE_SH_25B770660). Pole 2 is located approximately 20 metres south of the Groody River (EPA code: 1E_SH_25G050200). Table 55 outlines the watercourse crossings along the overhead lines activities.

Table 55 Watercourse crossings - Overhead Line Activties.

Water-course_No	Watercourse Description	Watercourse habitat type	Existing crossing
W1	c. 1 m wide, c. 1 m deep, standing water	FW4	Yes - 3 metres wide
W2	c. 1 m wide, c. 1 m deep, ditch was almost dry approximately 40 metres east of the proposed crossing location	FW4	Yes - 3 metres wide
W3	C. 2 m wide and 40 cm deep, peat (100), standing water	FW4	No

Water-course_No	Watercourse Description	Watercourse habitat type	Existing crossing
W4	c. 50 cm wide, c. 5cm deep, mud (100) standing water	FW4	No
W5	c. 1 metre wide, c. 2 metres deep, water flowing slowly	FW4	No
W6	c. 1.5 metres wide, c. 30cm deep	FW4	No
W7	c. 1 metre wide, c. 3cm deep Stone (60), silt and mud (40)	FW2	No
W8	c. 1 metre wide, Sand (20), stone (50) and rock (30), fast flowing	FW2	No
W9	c. 1.5 metres wide, c. 15cm deep, fast flowing, silt (80) and stone (20), fast flowing	FW2	No
W10	c. 1.5 metres wide, c. 15cm, silt (70), pebble (10) and stone (20), fast flowing	FW2	3 metes wide
W11	c. 2.5 metres wide, c. 20cm deep, mud (100), slow flowing	FW2	3 metes wide

All watercourses will be crossed by clear span bridge or bog mats. The bog mats or bridges will be in place for maximum one day at any location. No instream works are required to successfully complete the Overhead Lines activities.

Water crossing 3; FW4 Drainage ditch

Water crossing 10; FW2 lowland depositing

Table 56 Outlines the habitats recorded at each pole at the Overhead Line Activities.

Structure number	Structure type*	Habitats at Pole location
1	AM	BL3
2	INT	GA1
3	AM	GA1
4	INT	GA1, HL1
5	AM	WS1
6	INT	GA1
7	INT	GA1
8	INT	GA1
9	INT	GA1
10	INT	GA1
11	AM	GA1, WL1
12	IMP	GA1
13	INT	GA1
14	INT	GA1
15	INT	GA1
16	INT	GA1
17	INT	GA1, WL1
18	INT	WS1
19	AM	GA2

20	IMP	GS4
21	AM	GS4
22	IMP	BL3, WS1
23	AM	BL3 (and standing water)
24	AM	GA1
25	IMP	GA1, WL1
26	INT	GA1
27	IMP	GA1
28	IMP	GA1
29	IMP	GA1
30	IMP	GA1
31	IMP	GA1
32	AM	GA1, WL1, FW4
33	IMP	GA1
34	IMP	GA1, WL1, FW4
35	IMP	GA1, WL1, FW4
36	IMP	GA1, WL1
37	IMP	GA1, WL1
38	IMP	GA1, WL1
39	IMP	GA1
40	AM	GA1, WS1
41	IMP	GA1
42	IMP	GA1, WL1, WS1
43	IMP	GA1, WS1
44	IMP	GA1, HL2
45	IMP	GA1
46	IMP	GS4
47	IMP	GS4
48	AM	WS1
49	AM	WS1
50	IMP	WS1
51	IMP	GA1
52	IMP	GA1

53	IMP	WS1
54	IMP	WS4
55	IMP	WS4
56	IMP	WS4
57	IMP	GM1
58	AM	WS1
59	IMP	WS1
60	IMP	WS1
61	IMP	WS4
62	IMP	WN6
63	IMP	WN6
64	IMP	HD1/burnt
65	IMP	WS1
66	IMP	PB4
67	IMP	WS1, WL2
68	IMP	WS1
69	IMP	GA1, WL2
70	IMP	GA1
71	IMP	GA1
72	IMP	GA1, FW4
73	IMP	GA1, WS1
74	IMP	GA1, WS1
75	IMP	GA1
76	IMP	GA1
77	IMP	GA1
78	AM	WS4
79	IMP	GA1
80	IMP	GA1, HL2
81	IMP	GA1
82	IMP	WS1
83	IMP	WS1
84	IMP	WS1
85	IMP	GA1

86	IMP	GA1
87	IMP	GS4
88	IMP	WS1
89	IMP	GA1, FW4
90	AM	WS1, WL1

*Angle Mast (AM), Intermediate Tower (INT), Intermediate Pole (IMP)

Habitats Directive 92/43/EEC Annex I Habitat Assessments

UWF Related Works

Wet heath (HH3) habitat identified during the habitat survey at Foilnaman (Tubine 21) was assessed for correspondence to the habitat 'Northern Atlantic wet heaths with *Erica tetralix* (4010) again using the methodology outlined by Perrin *et al.*, (2014). **The habitat did not meet the required criteria to be classified as Annex I quality habitat,** primarily due to the absence of *Erica tetralix* within 20 m of the relevé.

The dry-humid acid grassland (GS3)/wet heath (HH3) mosaic habitat identified during the habitat survey at Shevry (around Turbine 2 and the borrow pit) was assessed for correspondence to the Annex habitats 'Northern Atlantic wet heaths with *Erica tetralix* (4010)' and the priority habitat 'Species-rich *Nardus* grasslands (6230)'. **This habitat did not meet the criteria presented in Perrin *et al.*,(2014) or O'Neill *et al.*, (2013) to be classified as Annex I quality habitat.**

Rare/Protected Plant Species

Small White orchid (*Pseudorchis albida*)

Desktop reviews indicated that Small White orchid (*Pseudorchis albida*) has been recorded within the R86 and R96 10km squares. The BSBI database holds a record in tetrad (2 * 2 km square) R86P (BSBI database http://bsbi.org/maps?taxonid=2cd4p9h.c3v, accessed 19/09/2017). The NBDC database shows a record from June 2009 in the the Silvermines Mountains at Knockanroe in the monad (1 * 1 km square) R8469 (http://maps.biodiversityireland.ie/#/Map, accessed 19/09/2017).

This species is listed in Schedule A of the Flora (Protection) Order, 2015 and is classed as Vulnerable in the Red Data List of Vascular Plants (Wyse Jackson *et al.*, 2016). **This species was not recorded during the habitat surveys for the project**. The desktop data indicates that the historic locations for this plant are c. 7 km north of the Whole UWF Project

Killarney Fern (*Trichomanes speciosum*)

The desktop review also showed that Killarney Fern (*Trichomanes speciosum*) has historically been recorded in the R86 hectad (10km square). This species is listed in Schedule A of the Flora (Protection) Order, 2015 and is classed as Least Concern in the Red Data List of Vascular Plants (Wyse Jackson *et al.*, 2016). No recent records exist for the species within hectads through which the Whole UWF Project will pass. **This species was not recorded during the habitat survey**.

Bog Rosemary (*Andromeda polifolia*)

Bog Rosemary (*Andromeda polifolia*) was recorded incidentally at Bleanbeg Bog during a Merlin survey in April 2017. This species is classed as Least Concern in the Red Data List of Vascular Plants (Wyse Jackson *et al.*, 2016). The species was previously unrecorded for the hectad R76 in either BSBI or NBDC databases. The plant was located c. 120 m northwest of the Whole UWF Project.

Plant Species List

A full Botanical list of species recorded, across all Project Elements is herein presented.
Table 57 List of plant species recorded during habitat surveys for the Whole UWF Project.

Common Name	Scientific Name
Alder	*Alunus glutinosa*
Annual meadow grass	*Poa annua*
Ash	*Fraxinus excelsior*
Beech	*Fagus sylvatica*
Bell heather	*Erica cinerea*
Bilberry	*Vaccinium myrtillus*
Birch	*Betula spp.*
Blackthorn	*Prunus spinosa*
Bog asphodel	*Narthecium ossifragum*
Bog cotton	*Eriophorum angustifolium*
Bracken	*Pteridium aquilinum*
Bramble	*Rubus fructicosus agg.*
Broadleaf plantain	*Plantago major*
Broad-leaved dock	*Rumex obtusifolius*
Brooklime	*Veronica beccabunga*
Carination sedge	*Carex panicea*
Cat's ear	*Hypochaeris radicata*
Cock's foot grass	*Dactylis glomerata*
Common bent	*Agrostis capillaris*
Common chickweed	*Stellaria media*
Common hogweed	*Heracleum sphondylium*
Common mouse-ear	*Cerastium fontanum*
Common Reed	*Phragmites australis*
Common sorrel	*Rumex acetosa*
Cow parsley	*Anthriscus sylvestris*
Creeping bent	*Agrostis stolonifera*
Creeping buttercup	*Ranunculus repens*
Cross-leaved Heath	*Erica tetralix*
Daisy	*Bellis perennis*
Dandelion	*Taraxacum agg.*
Deergrass	*Trichophorum cespitosum*
Devil's bit scabious	*Succisa pratensis*
Downy birch	*Betula pubescens*
Eared willow	Salix aurita
Early purple orchid	*Orchis mascula*
Elder	*Sambucus nigra*
Escallonia	*Escallonia macrantha*
European larch	*Larix decidua*

Common Name	Scientific Name
False oat grass	*Arrhenatherum elatius*
Field horse tail	*Equisetum arvense*
Flea sedge	*Carex pulicaris*
Foxglove	*Digitalis purpurea*
Gorse	*Ulex europaeus*
Great woodrush	*Luzula sylvatica*
Greater bird's-foot-trefoil	*Lotus pedunculatus*
Green-ribbed sedge	*Carex binervis*
Grey willow	*Salix cinerea*
Ground Ivy	*Glechoma hederacea*
Hard fern	*Blechnum spicant*
Hard Rush	*Juncus inflexus*
Hart's-tongue Fern	*Phyllitis scolopendrium*
Hawthorn	*Crataegus monogyna*
Hazel	*Corylus avellana*
Heath bedstraw	*Galium saxatile*
Heath milkwort	*Polygala serpyllifolia*
Heath rush	*Juncus squarrosus*
Heath spotted orchid	*Dactylorhiza maculata*
Heath woodrush	*Luzula multiflora agg.*
Hemlock water dropwort	*Oenanthe crocata*
Holly	*Ilex aquifolium*
Honeysuckle	*Lonicera periclymenum*
Horse chestnut	*Aesculus hippocastanum*
Iris sp	*Iris sp.*
Ivy	*Hedera hibernica*
Lesser spearwort	*Ranunculus flammula*
Lesser stitchwort	*Stellaria graminea*
Ling heather	*Calluna vulgaris*
Lodgepole pine	*Pinus contorta*
Lousewort	*Pedicularis sylvatica*
Marsh bedstraw	*Galium palustre*
Marsh foxtail	*Alopecurus geniculatus*
Marsh ragwort	*Senecio aquaticus*
Marsh thistle	*Cirsium palustre*
Mat-grass	*Nardus stricta*
Meadow buttercup	*Ranunculus acris*
Meadow fox-tail	*Alopecurus pratensis*
Nettle	*Urtica dioica*
Norway spruce	*Picea abies*
Oval sedge	*Carex ovalis*

Common Name	Scientific Name
Pedunculate oak	*Quercus robur*
Perennial rye grass	*Lolium perenne*
Pineappleweed	*Matricaria discoidea*
Pondweed sp	*Potamogeton sp*
Purple Moor-grass	*Molinia caerulea*
Ragwort	*Senecio jacobaea*
Rowan	*Sorbus aucuparia*
Sharp flowered rush	*Juncus acutiflorus*
Shepherd's-purse	*Capsella bursa-pastoris*
Sitka spruce	*Picea sitchensis*
Snowberry	*Symphoricarpos albus*
Soft rush	*Juncus effusus*
Sweet vernal grass	*Anthoxanthum odoratum*
Sycamore	*Acer pseudoplatanus*
Tormentil	*Potentilla erecta*
Tufted hair-grass	*Deschampsia caespitosa*
Velvet bent	*Agrositis canina*
Vetch spp.	*Vicia spp.*
Wavy hair grass	*Deschampsia flexuosa*
White clover	*Trifolium repens*
Wild angelica	*Angelica sylvestris*
Willow spp.	*Salix spp.*
Wood dock	*Rumex sanguineus*
Wych elm	*Ulmus glabra*
Yellow iris	*Iris pseudacorus*
Yorkshire fog	*Holcus lanatus*

Plate 7: Example of a public road which was classified as Buildings and artificial surfaces (BL3)

3

Plate 8: Example of a farm track which was classified as spoil and bare ground (ED2)

Plate 9: Example of a forestry road which was classified as spoil and bare ground (ED2)

Plate 10: Example of a bog track which was classified as spoil and bare ground (ED2)

Plate 11: The Newport (Mulkear) River which was classified as a depositing/lowland river (FW2)

Plate 12: Example of a stream which was classified as depositing/lowland river (FW2)

Plate 13: Example of a drainage ditch (FW4)

Plate 14: Example of improved grassland habitat (GA1)

Plate 15: Example of wet grassland habitat (GS4) with abundant by soft rush (*Juncus effusus*)

Plate 16: Example of wet grassland habitat (GS4)

Plate 17: Example of wet heath habitat (HH3)

Plate 18: Example of upland blanket bog (PB2)

Plate 19: Example of cutover bog (PB4)

Plate 20: Example of mixed broadleaved woodland habitat (WD1)

Plate 21: Example of conifer plantation habitat (WD4)

Plate 22: Example of scrub habitat (WS1)

Plate 23: Example of mixed broadleaved / conifer woodland habitat (WD2)

Plate 24: Example of hedgerow habitat (WL1)

Plate 25: Example of treeline habitat composed of conifer trees (WL2)

Plate 26: Example of treeline habitat composed of broadleaved trees (WL2)

Plate 27: Example of recently-felled woodland habitat (WS5)

Plate 28: Example of riparian woodland habitat (WN5)

Plate 29: Example of recolonising bare ground habitat (ED3)

Plate 30: Example of earth banks habitat (BL2) associated with drainage ditch (FW4)

A8-1.2.4.7 General Bird Species

Table 58 Results of Countryside Bird Surveys undertaken along transects T1 to T7 during the breeding season of 2016.

Red = Red-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of highest conservation priority

Orange = Amber-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of lesser conservation priority

Green = Green-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of least conservation priority

White = Not assessed/omitted from the Birds of Conservation Concern (Colhoun and Cummins, 2013) list

Transect No.	1 - Knockcur-raghbola Com-mons		2 - Knocknabansha		3 - Laghile		4 - Baurnadomeeny		5 - Killeen		6 - Oakhampton		7 - Mountphilips	
Visit	May-16	Jun-16	May-16	Jun-16	May-16	Jun-16	May-16	Jun-16	May-16	Jun-16	May-16	Jun-16	May-16	Jun-16
Species														
Barn Swallow	1	4	1	6		3	1		1	2	2	2	2	7
Blackbird	4	4	1	2	3	1	3	2	8	5	5	5	13	1
Blackcap		1							2	3	3	3	3	4
Blue Tit	1										1	1	1	3
Bullfinch										4		1		
Chaffinch	6	3	2	1	4			2	23	16	11	13	7	8
Chiffchaff									3	1	5		1	1
Coal Tit		2				1			1		3			1
Cuckoo								1		1				
Dunnock		1			1			1	2	1		1	4	4
Goldcrest	2	2			1	2			6	2	1	2		3
Goldfinch												3		1

Transect No.	1 - Knockcur-raghbola Com-mons		2 - Knocknabansha		3 - Laghile		4 - Baurnadomeeny		5 - Killeen		6 - Oakhampton		7 - Mountphilips	
Visit	May-16	Jun-16	May-16	Jun-16	May-16	Jun-16	May-16	Jun-16	May-16	Jun-16	May-16	Jun-16	May-16	Jun-16
Grasshopper Warbler	1							1					1	
Great Tit									3		1	1	1	
Greenfinch										1	1	1	4	
Hen Harrier								1						
Hooded Crow		2						2				3		2
House Sparrow			1	4							2	1		
Jackdaw									2	1	1	3	3	
Jay														1
Linnet			4				2	1				1	4	1
Magpie		2					1	1			1	1		2
Mallard								1			2			
Meadow Pipit	3	1	3	4			11	14	2	2	1			
Mistle Thrush	1	1			1			3				1	1	
Moorhen														2
Pheasant									1	2		1	1	1
Pied Wagtail													1	
Redpoll		2				1		1						
Reed Bunting	1							1		3				2
Robin	5	3			6	5	2	2	8	3	11	7	12	5
Rook		10	70	2					2	5	15	21	9	10

Transect No.	1 - Knockcur-raghbola Com-mons		2 - Knocknabansha		3 - Laghile		4 - Baurnadomeeny		5 - Killeen		6 - Oakhampton		7 - Mountphilips	
Visit	**May-16**	**Jun-16**	**May-16**	**Jun-16**	**May-16**	**Jun-16**	**May-16**	**Jun-16**	**May-16**	**Jun-16**	**May-16**	**Jun-16**	**May-16**	**Jun-16**
Siskin						1							1	
Skylark			1	2			5	3						
Song Thrush	4	6			1	2				2		5	4	
Sparrowhawk					1									
Starling											1			
Stonechat								4		2				3
Wheatear			1											
Whitethroat	1						1	2						
Willow Warbler	1						5	5	16	11	2		6	3
Wood Pigeon	1							2	3	3	5	2	2	3
Wren	3	4	1		3	2	8	3	25	14	11	15	22	14
Total Abundance	**35**	**48**	**85**	**21**	**21**	**18**	**39**	**53**	**108**	**84**	**85**	**94**	**103**	**82**
Species Diversity	**15**	**16**	**10**	**7**	**9**	**9**	**10**	**21**	**17**	**21**	**21**	**23**	**22**	**23**

Table 59 Results of winter bird transect surveys undertaken along transects T1 to T4 during the non-breeding season of 2016/17.

Red = Red-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of highest conservation priority

Orange = Amber-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of lesser conservation priority

Green = Green-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of least conservation priority

White = Not assessed/omitted from the Birds of Conservation Concern (Colhoun and Cummins, 2013) list

Transect No.	1 - Knockcurraghbola Commons				2 - Knocknabansha				3 - Laghile				4 - Baurnadomeeny			
Visit	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17
Species									N/A							
Kestrel					1											
Golden Plover					4								7			
Snipe	1				2								1	1	1	
Wood Pigeon																
Meadow Pipit					15	7							6			
Pied Wagtail					1	1		1								
Grey Wagtail																
Dunnock	1		1		1		1						1		1	
Robin	3		3	3	4		2	2		5	9	1		3	3	
Stonechat													3			
Song Thrush				1			1			1		1				
Mistle Thrush	1							1								
Blackbird	3	1	2		1		1			4		1	1		1	1

Transect No.	1 - Knockcurraghbola Commons				2 - Knocknabansha				3 - Laghile				4 - Baurnadomeeny			
Visit	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17
Redwing			5			1									3	
Fieldfare		14				130										
Goldcrest			1							1	3					
Wren	2		1		3		1			1	2		3	1	2	
Great Tit				1							1	1				
Coal Tit	3									2						
Blue Tit	1									1						
Long-tailed Tit										2						
Magpie	2					2		1				1				
Jay																
Jackdaw					9	12										
Rook	2				20	7		8					1			1
Hooded Crow					14	3		1								
Raven																
Starling		50				100										
House Sparrow																
Chaffinch	3			1	1	1		2			4	3		1		2
Treecreeper																
Bullfinch																

Transect No.	1 - Knockcurraghbola Commons				2 - Knocknabansha				3 - Laghile				4 - Baurnadomeeny			
Visit	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17
Reed Bunting																
Total Abundance	22	65	13	6	76	264	6	16	N/A	17	19	8	23	6	11	4
Species Diversity	11	3	6	4	13	10	5	7	N/A	8	5	6	8	4	6	3

Table 60 Results of winter bird transect surveys undertaken along transects T5 to T7 during the non-breeding season of 2016/17.

Red = Red-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of highest conservation priority

Orange = Amber-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of lesser conservation priority

Green = Green-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of least conservation priority

White = Not assessed/omitted from the Birds of Conservation Concern (Colhoun and Cummins, 2013) list

Transect No.	5 - Killeenen				6 - Oakhampton				7 - Mountphilips			
Visit	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17
Species												
Kestrel												
Golden Plover												
Snipe												
Wood Pigeon							1	1	1			
Meadow Pipit	1			1					15	13		
Pied Wagtail						2	1		1			1
Grey Wagtail					2							
Dunnock	1		1		4		1	1	1	4	1	

Transect No.	5 - Killeenen				6 - Oakhampton				7 - Mountphilips			
Visit	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17	Nov-16	Dec-16	Jan-17	Feb-17
Robin	7	1	3		6	11	10	1	3	6	4	
Stonechat												
Song Thrush							1		1	5	2	2
Mistle Thrush												
Blackbird	3		2		7	4	4		4	3	1	1
Redwing						20				3	10	
Fieldfare					10							
Goldcrest	2		2									
Wren	5	5	2		2	4			2	2	1	
Great Tit			1				1				2	
Coal Tit					1	2			1	3	1	
Blue Tit	2					3	1	2				
Long-tailed Tit	2				8							
Magpie					2			1				1
Jay										2		
Jackdaw					2							
Rook	1	1		7	30			11	2			5
Hooded Crow		3										
Raven		1										
Starling								10	11			
House Sparrow												

Transect No.	5 - Killeenen				6 - Oakhampton				7 - Mountphilips			
Visit	**Nov-16**	**Dec-16**	**Jan-17**	**Feb-17**	**Nov-16**	**Dec-16**	**Jan-17**	**Feb-17**	**Nov-16**	**Dec-16**	**Jan-17**	**Feb-17**
Chaffinch	2	1		2	26	2	24	3	1	1		
Treecreeper								1	1			
Bullfinch					1				1			
Reed Bunting									1			
Total Abundance	**26**	**12**	**11**	**10**	**101**	**48**	**44**	**31**	**46**	**42**	**22**	**10**
Species Diversity	**10**	**6**	**6**	**3**	**13**	**8**	**9**	**9**	**15**	**9**	**8**	**5**

Table 61 Results of Countryside Bird Survey undertaken along seven transects T1 to T7 during the breeding season of 2017.

Red = Red-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of highest conservation priority

Orange = Amber-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of lesser conservation priority

Green = Green-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of least conservation priority

White = Not assessed/omitted from the Birds of Conservation Concern (Colhoun and Cummins, 2013) list

Transect No.	1 - Knockcur-raghbola Com-mons		2 - Knocknabansha		3 - Laghile		4 - Baurnadomeeny		5 - Killeenen		6 - Oakhampton		7 - Mountphilips	
Visit	Apr-17	June-17	Apr-17	June-17	Apr-17	June-17	Apr-17	June-17	Apr-17	June-17	Apr-17	June-17	Apr-17	June-17
Species														
Barn Swallow	1	1		5								1		
Blackbird	1	1	2	3	5	7	3		4	1	11	2	7	4
Blackcap		1		2						2		4	1	
Blue Tit	1								2	1	3	2	1	
Bullfinch					2									
Chaffinch	8	2	4	5	10	13		1	10	8	5	1	2	3
Chiffchaff		1									3	1	2	
Coal Tit	1	3		6	2	4			7	5	4	4	5	6
Dunnock		1	1	1	2	4	3	1	1		2			
Fieldfare													4	
Goldcrest			2	1	3	6			3	2	1	3		1
Goldfinch											2			
Grasshopper Warbler										1				

Transect No.	1 - Knockcur-raghbola Com-mons		2 - Knocknabansha		3 - Laghile		4 - Baurnadomeeny		5 - Killeenen		6 - Oakhampton		7 - Mountphilips	
Visit	Apr-17	June-17	Apr-17	June-17	Apr-17	June-17	Apr-17	June-17	Apr-17	June-17	Apr-17	June-17	Apr-17	June-17
Great Tit	2			2	1				1		4	1		
Hooded Crow	1		1	1					2		1	1	2	1
House Martin		3												
House Sparrow											1			
Jackdaw				3										
Jay												3		1
Magpie		3	3	3						3		2		4
Mallard													2	
Meadow Pipit	1	3					8	19						2
Pheasant	1		2			1	4	2	2		1			
Pied Wagtail											1			
Redpoll			3											
Robin	2	1	4	1	9	1			8		9	2	4	
Rook	3		15	30	2		1	14		2		16	10	
Skylark	3						2	3						
Song Thrush	7	1	2	2	2	3	1		3	2			5	3
Greenfinch														
Sparrowhawk					1									
Starling			1								7			
Stonechat							1	2						2

Transect No.	1 - Knockcur-raghbola Com-mons		2 - Knocknabansha		3 - Laghile		4 - Baurnadomeeny		5 - Killeenen		6 - Oakhampton		7 - Mountphilips	
Visit	**Apr-17**	**June-17**	**Apr-17**	**June-17**	**Apr-17**	**June-17**	**Apr-17**	**June-17**	**Apr-17**	**June-17**	**Apr-17**	**June-17**	**Apr-17**	**June-17**
Swift								1						
Tree Creeper											1			
Willow Warbler	6	6	8	3			2	1	7	12		2	1	2
Wood Pigeon	5	3	4	10	1	2			7	2	4	3	4	4
Wren	13	12	9	14	5	10	8	7	13	11	9	8	13	9
Total Abun-dance	**56**	**42**	**61**	**92**	**45**	**51**	**33**	**51**	**70**	**52**	**69**	**56**	**63**	**42**
Species Diversity	**16**	**15**	**15**	**17**	**13**	**10**	**10**	**10**	**14**	**13**	**18**	**17**	**15**	**13**

Table 62 Results of winter bird transect surveys undertaken along transects T1 to T7 during the non-breeding season of 2017/18 (November 2017 to December 2017).

Red = Red-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of highest conservation priority.

Orange = Amber-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of lesser conservation priority.

Green = Green-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of least conservation priority.

White = Not assessed/omitted from the Birds of Conservation Concern (Colhoun and Cummins, 2013) list.

Transect No.	1 - Knockcur-raghbola Com-mons		2 - Knocknabansha		3 - Laghile		4 - Baurnadomeeny		5 - Killeenen		6 - Oakhampton		7 - Mountphilips	
Visit	Nov-17	Dec-17	Nov-17	Dec-17	Nov-17	Dec-17	Nov-17	Dec-17	Nov-17	Dec-17	Nov-17	Dec-17	Nov-17	Dec-17
Species														
Blackbird	1	0	0	1	1	2	2	1	2	0	6	0	8	1
Blue Tit	0	1	0	1	0	1	0	1	0	0	1	0	1	0
Bullfinch	0	1	0	1	1	0	0	0	0	0	3	0	2	0
Chaffinch	0	0	0	0	1	1	0	0	0	0	0	0	1	0
Coal Tit	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Dunnock	0	1	0	1	1	1	1	0	0	0	0	0	0	0
Goldcrest	0	2	1	0	0	0	0	0	0	0	0	0	2	0
Great Tit	0	0	0	0	1	0	0	0	1	0	5	0	0	0
Grey Wagtail	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Hooded Crow	1	0	0	2	0	2	0	9	0	4	1	0	3	0
House Sparrow	0	0	0	0	0	0	0	0	0	0	0	0	5	0
Jackdaw	0	2	0	6	0	0	0	2	0	0	0	2	1	2
Jay	0	0	0	0	0	0	0	0	0	0	1	0	1	0
Kestrel	0	0	0	0	0	0	0	0	1	0	0	0	0	0

Transect No.	1 - Knockcur-raghbola Com-mons		2 - Knocknabansha		3 - Laghile		4 - Baurnadomeeny		5 - Killeenen		6 - Oakhampton		7 - Mountphilips	
Visit	**Nov-17**	**Dec-17**	**Nov-17**	**Dec-17**	**Nov-17**	**Dec-17**	**Nov-17**	**Dec-17**	**Nov-17**	**Dec-17**	**Nov-17**	**Dec-17**	**Nov-17**	**Dec-17**
Long-tailed Tit	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magpie	0	0	0	1	0	0	0	0	1	2	0	0	1	0
Meadow Pipit	20	1	9	2	1	8	6	3	0	0	0	0	1	**0**
Mistle Thrush	0	0	0	0	1	0	0	0	0	0	0	1	0	0
Pheasant	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Pied Wagtail	0	0	1	0	0	2	0	3	0	0	2	0	0	0
Raven	2	0	0	0	0	0	0	0	0	0	1	0	0	0
Robin	2	1	0	1	0	1	2	0	1	1	8	1	9	0
Rook	15	0	13	12	0	0	0	6	0	0	7	15	2	4
Snipe	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Song Thrush	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Starling	40	0	52	0	0	0	0	0	0	0	0	10	50	**0**
Wood Pigeon	0	0	0	0	1	0	0	0	0	0	1	0	1	0
Fieldfare	0	0	0	15	0	0	0	2	0	10	0	9	0	0
Redwing	0	0	0	20	0	0	0	0	0	0	0	0	0	0
Wren	0	1	0	1	1	1	0	0	0	0	1	0	1	0
Goldfinch	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Total Abundance	**81**	**10**	**76**	**64**	**4**	**20**	**12**	**29**	**2**	**17**	**38**	**38**	**91**	**9**
Species Diversity	**7**	**8**	**5**	**13**	**4**	**10**	**5**	**10**	**2**	**4**	**13**	**6**	**18**	**4**

Table 63 Results of winter bird transect surveys undertaken along transects T1 to T7 during the non-breeding season of 2017/18 (January to February 2018).

Red = Red-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of highest conservation priority

Orange = Amber-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of lesser conservation priority

Green = Green-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of least conservation priority

White = Not assessed/omitted from the Birds of Conservation Concern (Colhoun and Cummins, 2013) list

Transect No.	1 - Knockcur-raghbola Com-mons		2 - Knocknabansha		3 - Laghile		4 - Baurnadomeeny		5 - Killeenen		6 - Oakhampton		7 - Mountphilips	
Visit	**Jan-18**	**Feb-18**	**Jan-18**	**Feb-18**	**Jan-18**	**Feb-18**	**Jan-18**	**Feb-18**	**Jan-18**	**Feb-18**	**Jan-18**	**Feb-18**	**Jan-18**	**Feb-18**
Species														
Blackbird	1	2	0	1	2	3	1	2	1	2	2	5	2	0
Blue Tit	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Bullfinch	0	0	0	0	1	1	0	0	0	0	0	0	0	1
Chaffinch	0	0	0	0	3	0	0	0	0	4	0	1	0	2
Coal Tit	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dunnock	2	0	0	1	4	0	0	0	0	3	1	1	0	1
Goldcrest	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Great Tit	0	0	0	0	0	0	0	0	0	2	0	2	1	0
Grey Wagtail	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hooded Crow	7	1	0	0	0	0	2	0	0	2	0	0	2	0
House Sparrow	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Jackdaw	7	0	0	38	0	0	0	0	0	0	0	4	0	4
Jay	0	0	0	0	0	0	0	0	1	0	0	0	0	0

Transect No.	1 - Knockcur-raghbola Com-mons		2 - Knocknabansha		3 - Laghile		4 - Baurnadomeeny		5 - Killeenen		6 - Oakhampton		7 - Mountphilips	
Visit	Jan-18	Feb-18	Jan-18	Feb-18	Jan-18	Feb-18	Jan-18	Feb-18	Jan-18	Feb-18	Jan-18	Feb-18	Jan-18	Feb-18
Kestrel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-tailed Tit	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Magpie	0	0	0	0	0	0	0	0	0	0	0	4	0	0
Meadow Pipit	0	19	3	10	0	0	2	0	0	0	0	0	0	0
Mistle Thrush	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pheasant	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Pied Wagtail	2	0	0	1	0	2	0	0	0	0	0	0	0	0
Raven	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Robin	2	4	1	3	0	4	1	0	0	5	2	4	1	0
Rook	2	0	0	8	3	0	20	0	70	10	20	24	0	30
Snipe	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Song Thrush	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Starling	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wood Pigeon	0	0	0	0	0	0	0	0	0	0	0	5	0	0
Stonechat	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Fieldfare	0	0	0	0	0	0	0	0	0	0	0	10	0	0
Wren	0	0	0	0	0	0	0	4	2	0	2	3	0	0
Total Abundance	**23**	**25**	**6**	**63**	**13**	**10**	**6**	**29**	**73**	**29**	**27**	**63**	**6**	**42**
Species Diversity	**7**	**4**	**3**	**8**	**5**	**4**	**4**	**6**	**4**	**8**	**5**	**11**	**4**	**8**

Incidental Bird Recordings at Overhead Line Activities Study Area

All incidental sightings of birds were recorded within the overhead lines activities study area. Table 64 lists the bird species and the total number of each species recorded. A total of 64 bird species consisting of 109 individual birds were recorded.

Table 64 List of birds recorded during survey, total count and Birds of Conservation Concern in Ireland status for each species encountered.

Species	BOCCI status (Colhoun and Cummins, 2013)	Total Count
Blackbird	**Green**	7
Blue Tit	**Green**	3
Bullfinch	**Green**	5
Chaffinch	**Green**	22
Coal Tit	**Green**	2
Goldcrest	**Amber**	2
Great Tit	**Green**	6
House Sparrow	**Amber**	6
Jay	**Green**	2
Long-tailed Tit	**Green**	5
Pied Wagtail	**Green**	1
Robin	**Amber**	9
Rook	**Green**	2
Snipe	**Amber**	11
Song Thrush	**N/A**	2
Starling	**Amber**	5
Stonechat	**Amber**	1
Wood Pigeon	**Green**	3
Little Egret	**Green**	1

Magpie	**Green**	6
Goldfinch	**Green**	5
Redwing	**Green**	1
Wren	**Green**	2
Species Diversity		**23**
Total Abundance		**109**

Kingfisher Survey

Kingfisher surveys following the methodology presented in National Roads Authority (2008) was undertaken on the 8-11th March 2016. Watercourse crossings were evaluated for any evidence of nest holes within 300m of crossing locations (in tandem with Otter surveys). In each case banks were inspected for evidence of Kingfisher, and general suitability of banks in proximity to crossing locations for nesting Kingfisher. Target notes were made on suitable nesting banks, and any observed nest holes. No nest holes, suitable nest banks or visual observations of Kingfisher were noted.

Red Grouse Survey

Red Grouse tape lure surveys, under NPWS license, were undertaken at suitable habitats along the WWFP during 2017. The survey at Goulmore on the southwest flank of Mauherslieve was undertaken on 23rd March 2017. The survey was undertaken in partially overcast, dry conditions with a light (F2) NE wind. No Red Grouse were observed directly or heard to respond to the tape lure during the survey. No incidental evidence such as feathers, droppings, etc. were recorded during transects.

The survey at Bleanbeg Bog was undertaken on 30th March 2017. The survey was undertaken in overcast, dry conditions with a light (F2) SW wind. A single male Red Grouse was observed to fly away from the observer during the survey. The bird was recorded at 579061 E 663255 N (ITM) (outside the construction area boundaries). No incidental evidence such as feathers, droppings, etc. were recorded during transects.

Merlin Survey

A total of four visits were made to Bleanbeg Bog for Merlin surveys during the 2017 breeding season; 27th April, 30th May, 22nd June and 31st July. No direct observations of Merlin or evidence of breeding Merlin were recorded during the surveys.

A8-1.2.4.8 General Bird Species Recorded and Corresponding Sensitivity Rating

Table 65, below, lists all species recorded across all surveys and all project elements. The corresponding sensitivity rating in line with the criteria outlined in the Biodiversity Chapter is also provided. Species included here includes those recorded from standardised survey effort and additionally anecdotal observations. Not all species will have been recorded as present at the location of works pertinent to the development under consideration.

Table 65 Bird Sensitivity Rating for bird species recorded across all bird surveys.

Red = Red-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of highest conservation priority

Orange = Amber-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of lesser conservation priority

Green = Green-listed species in the Birds of Conservation Concern (Colhoun and Cummins, 2013) are those of which are of least conservation priority

White = Not assessed/omitted from the Birds of Conservation Concern (Colhoun and Cummins, 2013) list

Species	BOCCI Status	EU Birds Directive	Sensitivity Rating
Barn Swallow	Amber	-	Low
Blackbird	Green	-	Negligible
Blackcap	Green	-	Negligible
Blue Tit	Green	-	Negligible
Bullfinch	Green	-	Negligible
Buzzard	Green	-	Negligible
Chaffinch	Green	-	Negligible
Chiffchaff	Green	-	Negligible
Coal Tit	Green	-	Negligible
Collared Dove	Green	-	Negligible
Common Snipe	Amber	-	Low
Crossbill	Green	-	Negligible
Cuckoo	Green	-	Negligible
Curlew	Red	-	**High**
Dunnock	Green	-	Negligible
Fieldfare	N/A	-	Negligible

Species	BOCCI Status	EU Birds Directive	Sensitivity Rating
Goldcrest	Amber	-	Low
Golden Plover	Red	Annex I	**High**
Goldfinch	Green	-	Negligible
Grasshopper Warbler	Green	-	Negligible
Great Tit	Green	-	Negligible
Greenfinch	Amber	-	Low
Grey Wagtail	Red	-	Low
Hen Harrier	Amber	Annex I	**Very High**
Hooded Crow	Green	-	Negligible
House Martin	Green	-	Negligible
House Sparrow	Amber	-	Low
Jackdaw	Green	-	Negligible
Jay	Green	-	Negligible
Kestrel	Amber	-	Low
Lesser Redpoll	Green	-	Negligible
Linnet	Amber	-	Low
Magpie	Green	-	Negligible
Mallard	Green	-	Negligible
Meadow Pipit	Red	-	Medium
Mistle Thrush	Amber	-	Low
Moorhen	Green	-	Negligible
Peregrine Falcon	Green	Annex I	Low
Pheasant	N/A	-	Negligible
Pied Wagtail	Green	-	Negligible
Raven	Green	-	Negligible
Red Grouse	Red	-	Medium
Redwing	N/A	-	Negligible
Reed Bunting	Green	-	Negligible
Robin	Amber	-	Low

Species	BOCCI Status	EU Birds Directive	Sensitivity Rating
Rook	Green	-	Negligible
Sand Martin	Amber	-	Low
Sedge Warbler	Green	-	Negligible
Siskin	Green	-	Negligible
Skylark	Amber	-	Low
Song Thrush	Green	-	Negligible
Sparrowhawk	Amber	-	Low
Starling	Amber	-	Low
Stonechat	Amber	-	Low
Swift	Amber	-	Low
Tree Creeper	Green	-	Negligible
Wheatear	Amber	-	Low
Whitethroat	Green	-	Negligible
Willow Warbler	Green	-	Negligible
Wood Pigeon	Green	-	Negligible
Woodcock	Red	-	Low
Wren	Green	-	Negligible

A8-1.2.4.9 Non-Volant Mammals

Detail on Badger observations/evidence are herein included in the table below. We would note that the location of setts is not provided here but in the confidential Annex.

Table 66 Observations of badger recorded during surveys for the Whole UWF Project.

Observation ID	Species	Evidence	Easting (ITM)	Northing (ITM)	Notes
1	Badger	Badger tracks/print	583604	660790	
2	Badger	Badger snuffle hole	583618	660805	
3	Badger	Badger tracks/print	583618	660805	
4	Badger	Badger tracks/print	583834	660803	Lots of tracks here
5	Badger	Badger tracks/print	583677	660793	
6	Badger	Badger snuffle hole	583785	660849	
7	Badger	Badger tracks/print	583818	660854	
8	Badger	Badger tracks/print	583813	660839	
9	Badger	Badger snuffle hole	583827	660839	All over the area
10	Badger	Badger snuffle hole	583911	660809	
11	Badger	Badger snuffle hole	583919	660810	
12	Badger	Badger tracks/print	583942	660861	
13	Badger	Badger snuffle hole	583942	660861	
14	Badger	Badger tracks/print	584075	660766	
15	Badger	Badger snuffle hole	584102	660765	
16	Badger	Badger tracks/print	583967	660655	
17	Badger	Badger tracks/print	583763	660655	
18	Badger	Badger tracks/print	583740	660627	
19	Badger	Badger tracks/print	583666	660634	
24	Badger	Badger tracks/print	583144	661182	
25	Badger	Badger tracks/print	582869	661449	

Observation ID	Species	Evidence	Easting (ITM)	Northing (ITM)	Notes
26	Badger	Badger tracks/print	582845	661477	
27	Badger	Badger snuffle hole	582491	661804	Lots of snuffle holes here
32	Badger	Badger tracks/print	580374	661747	In mud on track
33	Badger	Badger tracks/print	582469	661868	In mud on track
35	Badger	Badger tracks/print	594777	660632	
37	Badger	Badger snuffle hole	591771	659964	
38	Badger	Badger tracks/pad	591768	659965	
40	Badger	Badger tracks/print	589544	659817	
42	Badger	Badger tracks/print	589533	659777	
45	Badger	Badger snuffle hole	589574	659927	
47	Badger	Badger snuffle hole	589561	660002	
48	Badger	Badger snuffle hole	589532	659971	
51	Badger	Badger tracks/print	586278	660309	
52	Badger	Badger tracks/print	585525	660330	
53	Badger	Badger snuffle hole	585370	660382	
54	Badger	Badger tracks/print	585243	660432	
55	Badger	Badger snuffle hole	585160	660488	
57	Badger	Badger snuffle hole	585107	660410	
58	Badger	Badger snuffle hole	584884	660554	
59	Badger	Badger snuffle hole	584416	660749	
60	Badger	Badger latrine/scat	584412	660743	
61	Badger	Badger latrine/scat	584263	660742	
62	Badger	Badger latrine/scat	584031	660905	
63	Badger	Badger snuffle hole	583554	661902	
66	Badger	Badger snuffle hole	582305	661864	
67	Badger	Badger snuffle hole	581021	661934	
68	Badger	Badger scat and print	580824	661872	

Observation ID	Species	Evidence	Easting (ITM)	Northing (ITM)	Notes
69	Badger	Badger scat and print	580385	662105	
70	Badger	Badger tracks/print	579860	662320	
72	Badger	Badger snuffle hole	576891	663200	
73	Badger	Badger snuffle hole	576082	663734	
74	Badger	Badger tracks/print	575835	663896	
75	Badger	Badger latrine/scat	575498	664056	
76	Badger	Badger snuffle hole	573775	664423	
77	Badger	Badger tracks/print	573278	664416	
78	Badger	Badger tracks/print	573199	664513	
79	Badger	Badger tracks/print	573089	664611	
80	Badger	Badger tracks/print	573034	664481	
86	Badger	Badger tracks/print	583839	662244	
89	Badger	Badger snuffle hole	583922	661633	
90	Badger	Badger tracks/print	584197	661365	
91	Badger	Badger snuffle hole	584192	661125	
92	Badger	Badger tracks/print	584206	661142	
93	Badger	Badger snuffle hole	584214	661147	
94	Badger	Badger tracks/print	584264	661108	
95	Badger	Badger tracks/print	584279	660981	
96	Badger	Badger tracks/print	584217	660875	
97	Badger	Badger tracks/print	578850	662999	
101	Badger	Badger tracks/print	578652	663054	
109	Badger	Badger tracks/print	578856	662996	Trail of badger prints all along cutover bog 'track'
112	Badger	Badger tracks/print	584237	661108	Badger print along muddy poached cow path
119	Badger	Badger latrine/scat	582822	661663	Badger latrine on edge of narrow path between hedgebanks
120	Badger	Badger tracks/print	582815	661671	Prints on muddy poached ground on narrow path between hedge-banks

Observation ID	Species	Evidence	Easting (ITM)	Northing (ITM)	Notes
123	Badger	Badger tracks/print	574733	664143	Badger Pad in farm track down to field on banks of Newport (Mul-kear) River
137	Badger	Badger tracks/print	591669	659538	In mud on forestry track
150	Badger	Badger tracks/print	572468	664451	
153	Badger	Badger latrine/scat	572278	664412	Small holes with scat inside along edge of hedgerow in field
154	Badger	Badger latrine/scat	572251	664437	Small holes with scat inside along edge of hedgerow in field
155	Badger	Badger latrine/scat	572220	664438	Small holes with scat inside along edge of hedgerow in field
156	Badger	Badger latrine/scat	572187	664435	Small holes with scat inside along edge of hedgerow in field
157	Badger	Badger latrine/scat	572114	664432	Small holes with scat inside along edge of hedgerow in field
158	Badger	Badger latrine/scat	572052	664432	Small holes with scat inside along edge of hedgerow in field
163	Badger	Badger Print	594687	661526	Print on muddy farm track
164	Badger	Badger Latrine	594690	661471	Latrine on field edge. 3 droppings in 3 excavations.

Table 67 Observations of otter recorded during surveys for the Whole UWF Project.

Observation ID	Species	Evidence	Easting (ITM)	Northing (ITM)	Notes
22	Either Mink or Otter	Mink or Otter	583987	660771	Attributed to Otter although possibly Mink
30	Otter	Otter path	573602	664395	Along field and into scrub on banks of Newport (Mulkear)
31	Otter	Otter slide	574657	663947	On riverbank into Newport (Mulkear)
46	Otter	Otter tracks/print	589574	659933	
50	Otter	Otter tracks/print	589680	660357	
160	Otter	Otter spraint	583481	660727	Count of 10 spraint on boulder under bridge
161	Otter	Otter spraint	583500	660727	Count of 1 spraint on mossy boulder upstream of bridge

Table 68 Observations of all other non-volant mammals recorded during surveys for the Whole UWF Project.

Observation ID	Species	Evidence	Easting (ITM)	Northing (ITM)	Notes
34	Deer sp.	Deer tracks/slot	594802	660625	
41	Deer sp.	Deer tracks/slot	589544	659817	
43	Deer sp.	Deer tracks/slot	589525	659746	
81	Deer sp.	Deer tracks/slot	583342	662286	
82	Deer sp.	Deer tracks/slot	583428	662332	
83	Deer sp.	Deer tracks/slot	583533	662444	
84	Deer sp.	Deer tracks/slot	583777	662359	
85	Deer sp.	Deer tracks/slot	583800	662280	
87	Deer sp.	Deer tracks/slot	583971	661717	
88	Deer sp.	Deer tracks/slot	583954	661766	
98	Deer sp.	Deer tracks/slot	578808	663007	
99	Deer sp.	Deer tracks/slot	578773	663018	
100	Deer sp.	Deer tracks/slot	578689	663047	
102	Deer sp.	Deer tracks/slot	578003	663012	
103	Deer sp.	Deer tracks/slot	576672	663245	
104	Deer sp.	Deer tracks/slot	576658	663225	
105	Deer sp.	Deer bark stripping	576874	663199	Bark stripping on grey willow
106	Deer sp.	Deer tracks/slot	577055	663163	Slot and crossing point on forestry access road
107	Deer sp.	Deer tracks/slot	577928	662992	
110	Deer sp.	Deer tracks/slot	578908	662999	Series of prints all along cutover bog 'track'
111	Deer sp.	Deer droppings	578775	663025	Droppings in bog habitat next to cutover bog 'track'
127	Deer sp.	Deer tracks/slot	590636	659789	Deer slots in mud
138	Deer sp.	Deer tracks/slot	591710	659547	In mud on forestry track
143	Deer sp.	Deer tracks/slot	572567	664537	Slots and droppings on track
125	Fallow Deer	Live Animal	576399	662967	3 Deer observed at edge of forestry at Castlewaller

Observation ID	Species	Evidence	Easting (ITM)	Northing (ITM)	Notes
126	Fallow Deer	Live Animal	577193	663988	2 Deer observed at edge of forestry at Fiddane
71	Pine Marten	Pine Marten scat	579786	662361	
108	Pine Marten	Pine Marten scat	578055	663013	Scat on prominent rock at edge of forestry access road. Track leading into forest. PM smell. Hair and vertebrae in scat.
122	Pine Marten	Live Animal	591753	659592	Running across forestry track during CBS transect
133	Pine Marten	Pine Marten scat	591470	659524	Fur main component
36	Fox	Fox tracks/print	591755	659983	
113	Fox	Fox scat	584242	661108	Fox droppings with blackberries evident prominently on access path
114	Fox	Fox scat	584275	661053	Fox droppings with blackberries evident prominently on access path
115	Fox	Fox scat	584278	661011	Fox droppings with blackberries evident prominently on access path
116	Fox	Fox scat	583924	661712	Fox droppings on forestry access path
117	Fox	Fox scat	583119	661674	Fox droppings on farm road next to forestry
118	Fox	Fox scat	583001	661750	Fox droppings under rowan tree on hedgebank on narrow path
130	Fox	Fox scat	590796	659706	In middle of forestry track
131	Fox	Fox scat	590840	659673	In middle of forestry track
132	Fox	Fox scat	591031	659583	In middle of forestry track
134	Fox	Fox scat	591489	659524	On forestry track
135	Fox	Fox scat	591627	659521	Edge of forestry track
147	Fox	Fox tracks/print	572470	664456	Fox print in mud
148	Fox	Fox scat	572451	664462	Fox scat on top of GWT shrew in track within field
159	Fox	Fox scat	580458	661920	Fox dropping on mound of spoil/earth at corner of field
162	Fox	Fox Scat	594483	661518	Droppings on edge of farm track
165	Fox	Fox Scat	594689	661471	Droppings at mammal crossing point on earth bank.
167	Fox	Fox Scat	594584	661694	Dropping on mammal trail near crossing point of stream
56	Irish Hare	Hare tracks/print	585107	660410	
124	Irish Hare	Live Animal	574697	664256	Live animal in field adjacent to CBS transect route

Observation ID	Species	Evidence	Easting (ITM)	Northing (ITM)	Notes
140	Squirrel sp.	Pine cone feeding sign	591862	659677	Evidence from Sitka spruce pine cone at edge of forestry
142	Squirrel sp.	Hazelnut feeding sign	572568	664538	Split hazelnut shell with distinctive notch on tip
139	Wood Mouse	Pine cone feeding sign	591859	659675	Evidence from Sitka spruce pine cone at edge of forestry

Table 69 Observations of invasive non-volant mammals recorded during surveys for the Whole UWF Project.

Observation ID	Species	Evidence	Easting (ITM)	Northing (ITM)	Notes
149	Greater white toothed shrew	Corpse	572451	664462	GWT shrew under fox scat
44	Mink	Mink scat	589955	659868	
49	Mink	Mink scat	589586	660097	
22	Mink or Otter	Mink or Otter Print	583987	660771	
136	Rabbit	Rabbit Burrow	591666	659516	Edge of forestry in bank

Overhead Line Activities Mammal records

Incidental records of mammal signs and individuals were made during surveys with the overhead line activietes study area, findings are detailed below.

Otter

An old Otter holt was recorded within the bank of a drainage ditch shared by watercourse crossing 2 (W2). An otter pathway located 80 metres west of AM 3 was recorded leading from the Groody River over a grassland field and into an adjoining stream.

Badger

No active Badger setts were recorded within close proximity to the poles. An old badger sett was recorded within the hedgerow 180 metres north east AM 78.

Fox

The smell of fox was recorded along a hedgerow leading to water crossing 1 (W1).

Deer

A herd of 6 deer, Fallow, were observed in the conifer planation adjacent to IMP 83.

Rabbit

Rabbit burrows were recorded on occasion within some of the hedgerows. A rabbit was observed adjacent to Annacotty Business Park.

Mammal pathways

Mammal pathways were recorded frequently within hedgerows and through treelines. These could be used by a number of mammals including Badger and Fox.

Plate 31: Deer slot in mud.

Plate 32: Badger print in mud.

Plate 33: Otter spraint on boulder under bridge.

Plate 34: Greater white toothed shrew and fox droppings on track in field.

Plate 35: Badger snuffle hole in foreground with main sett entrance under Hawthorn tree in background.

Plate 36: Badger sett entrance with bedding scattered outside entrance.

Plate 37: Deer slot in mud on track entering forestry.

Plate 38: Evidence of bark stripping by deer on willow at the edge of a forestry track.

A8-1.2.4.10 Amphibians/Reptiles

Table 70 Incidental observations of amphibians and reptiles recorded during surveys for the Whole UWF Project.

Obser-vation ID	Species	Easting (ITM)	Northing (ITM)	Location	Date	Notes
1	Frog	580390	662081	Kileenen	05/04/2017	Tadpoles in puddle on road
2	Frog	580423	662065	Kileenen	05/04/2017	Tadpoles in puddle in field
3	Frog	583961	660727	Bealaclave	22/09/2016	Adult in wet grassland
4	Frog	593269	661083	Knockmaroe	13/07/2017	Adult in disturbed ground near mobile phone mast
5	Frog	593127	661667	Grousehall	13/07/2017	Adult in species rich wet grassland
6	Frog	594368	661161	Foilnaman	19/05/2017	Adult in improved grassland next to plantation
7	Frog	573746	664413	Oakhampton	18/05/2017	Adult in grassland
8	Frog	590370	659703	Kilcommon	19/05/2017	Adult in wet grassland
9	Vivip-arous Lizard	595169	659348	Shevry	13/07/2017	In acid grassland

A8-1.2.4.11 Invertebrates-Marsh Fritillary

Table 71 Observations of Marsh Fritillary recorded during surveys for the Whole UWF Project.

Observation ID	Easting (ITM)	Northing (ITM)	Evidence	Year	Location
1	583585	660748	Larval Web	Sep-16	Bealaclave
2	583577	660743	Larval Web	Sep-16	Bealaclave
3	583567	660755	2 Caterpillars	Apr-17	Bealaclave
4	583589	660745	1 Caterpillar	Apr-17	Bealaclave
5	583588	660745	1 Caterpillar	Apr-17	Bealaclave
6	583586	660746	1 Caterpillar	Apr-17	Bealaclave
7	583583	660749	12 Caterpillars	Apr-17	Bealaclave
8	583584	660749	40 Caterpillars	Apr-17	Bealaclave
9	583586	660749	1 Caterpillar	Apr-17	Bealaclave
10	583583	660750	11 Caterpillars	Apr-17	Bealaclave
11	584915	660445	Larval Web	Sep-16	Baurnadomeeny
12	584916	660469	Larval Web	Sep-16	Baurnadomeeny
13	584905	660498	51 Caterpillars	Apr-17	Baurnadomeeny
14	584952	660508	31 Caterpillars	Apr-17	Baurnadomeeny
15	584948	660508	16 Caterpillars	Apr-17	Baurnadomeeny
16	584949	660506	2 Caterpillars	Apr-17	Baurnadomeeny
17	584930	660506	34 Caterpillars	Apr-17	Baurnadomeeny
18	584930	660498	7 Caterpillars	Apr-17	Baurnadomeeny
19	584932	660495	Larval Web	Apr-17	Baurnadomeeny
20	584932	660495	20 Caterpillars	Apr-17	Baurnadomeeny
21	584930	660494	41 Caterpillars	Apr-17	Baurnadomeeny
22	584928	660491	3 Caterpillars	Apr-17	Baurnadomeeny
23	584931	660489	30 Caterpillars	Apr-17	Baurnadomeeny
24	584931	660488	12 Caterpillars	Apr-17	Baurnadomeeny
25	584934	660503	25 Caterpillars	Apr-17	Baurnadomeeny
26	584918	660471	34 Caterpillars	Apr-17	Baurnadomeeny
27	584922	660469	17 Caterpillars	Apr-17	Baurnadomeeny
28	584937	660462	10 Caterpillars	Apr-17	Baurnadomeeny
29	584943	660441	14 Caterpillars	Apr-17	Baurnadomeeny
30	584936	660438	23 Caterpillars	Apr-17	Baurnadomeeny
31	584927	660443	35 Caterpillars	Apr-17	Baurnadomeeny
32	584910	660466	10 Caterpillars	Apr-17	Baurnadomeeny
33	584928	660580	26 Caterpillars	Apr-17	Baurnadomeeny
34	584926	660587	23 Caterpillars	Apr-17	Baurnadomeeny
35	584921	660591	65 Caterpillars	Apr-17	Baurnadomeeny
36	584882	660474	26 Caterpillars	Apr-17	Baurnadomeeny
37	584884	660470	28 Caterpillars	Apr-17	Baurnadomeeny

Observation ID	Easting (ITM)	Northing (ITM)	Evidence	Year	Location
38	584928	660478	Mating Adults	Jun-17	Baurnadomeeny
39	584931	660485	Mating Adults	Jun-17	Baurnadomeeny
40	584932	660488	Single Adult	Jun-17	Baurnadomeeny
41	584931	660482	Single Adult	Jun-17	Baurnadomeeny
42	583597	660756	Larval Web	Sep-17	Bealaclave
43	584897	660504	Larval Web	Sep-17	Baurnadomeeny
44	584902	660499	Larval Web	Sep-17	Baurnadomeeny
45	584918	660507	Larval Web	Sep-17	Baurnadomeeny
46	584920	660513	2 Larval Webs	Sep-17	Baurnadomeeny
47	584946	660526	Larval Web	Sep-17	Baurnadomeeny
48	584924	660506	Larval Web	Sep-17	Baurnadomeeny
49	584920	660501	Larval Web	Sep-17	Baurnadomeeny
50	584929	660484	Larval Web	Sep-17	Baurnadomeeny
51	584932	660484	Larval Web	Sep-17	Baurnadomeeny
52	584934	660484	Larval Web	Sep-17	Baurnadomeeny
53	584935	660485	Larval Web	Sep-17	Baurnadomeeny
54	584933	660481	3 Larval Webs	Sep-17	Baurnadomeeny
55	584995	660531	Larval Web	Sep-17	Baurnadomeeny
56	595775	659918	Larval Web	Sep-17	Shevry
57	595732	659852	Larval Web	Sep-17	Shevry
58	595751	659829	Larval Web	Sep-17	Shevry
59	595775	659815	Larval Web	Sep-17	Shevry

Plate 39: Wet grassland rich in Devil's bit scabious at Bealaclave where Marsh Fritillary webs were recorded.

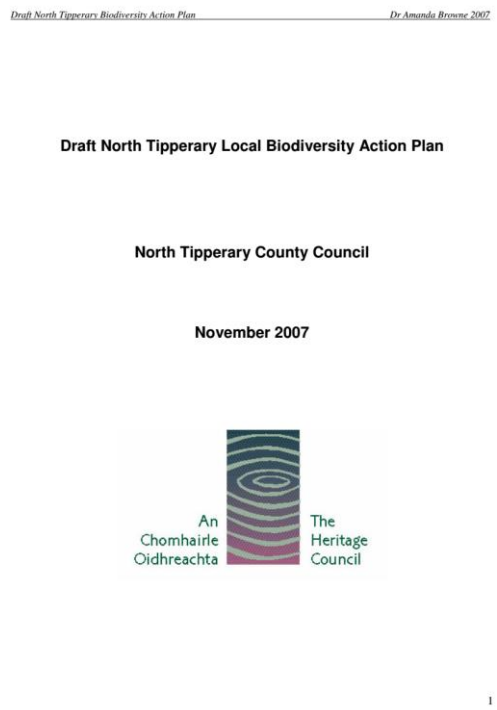
Plate 40: Wet grassland at Shevry which contained patches of Devil's bit scabious where Marsh Fritillary webs were recorded.

Plate 41: Wet Heath/Wet Grassland mosaic at Baurnadomeeny which contained widespread patches of Devil's bit scabious where Marsh Fritillary webs were recorded.

Plate 42: Example of Marsh Fritillary larvae basking outside the larval web at the base of a Devil's bit scabious plant in Belaclave.

A8-1.2.5 Policy Context

Draft North Tipperary Local Biodiversity Action Plan (North Tipperary County Council, 2007)


Draft North Tipperary Biodiversity Action Plan Dr Amanda Browne 2007

Draft North Tipperary Local Biodiversity Action Plan

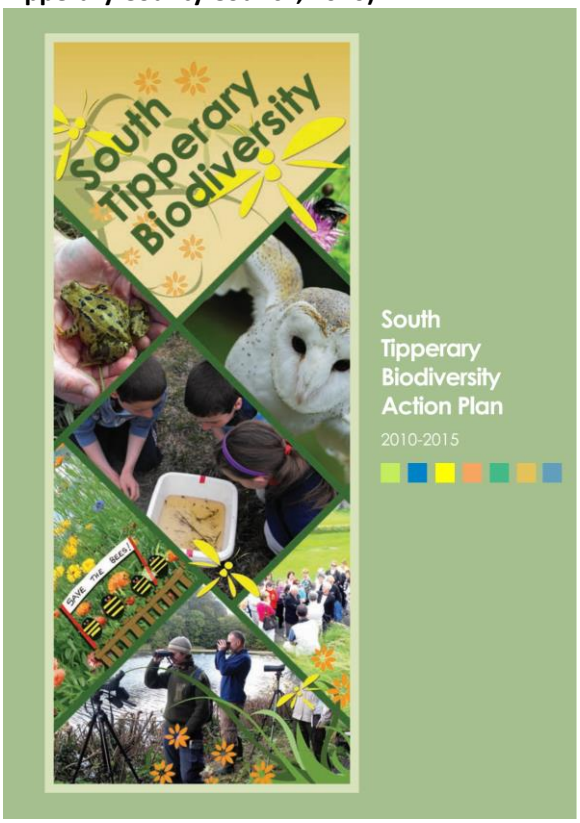
North Tipperary County Council

November 2007

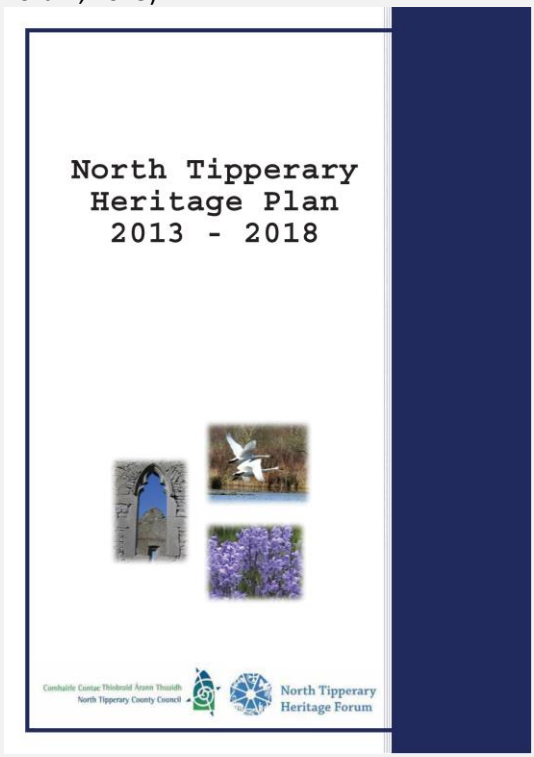
An Chomhairle Oidhreachta The Heritage Council

1

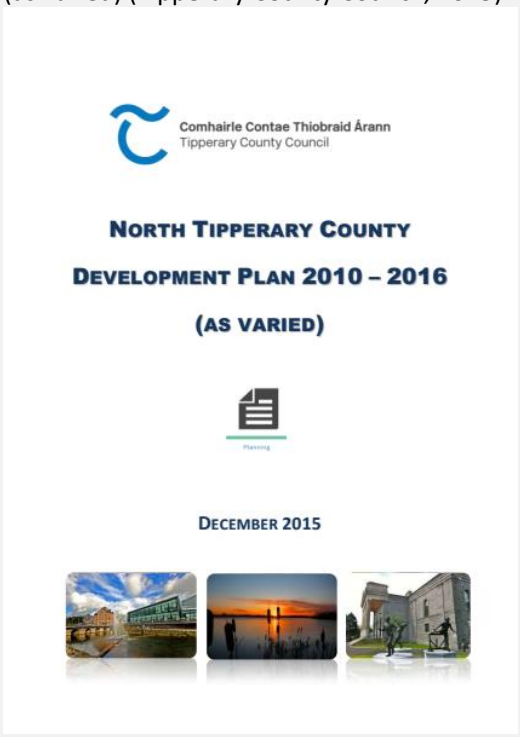
South Tipperary Biodiversity Action Plan (South Tipperary County Council, 2010)



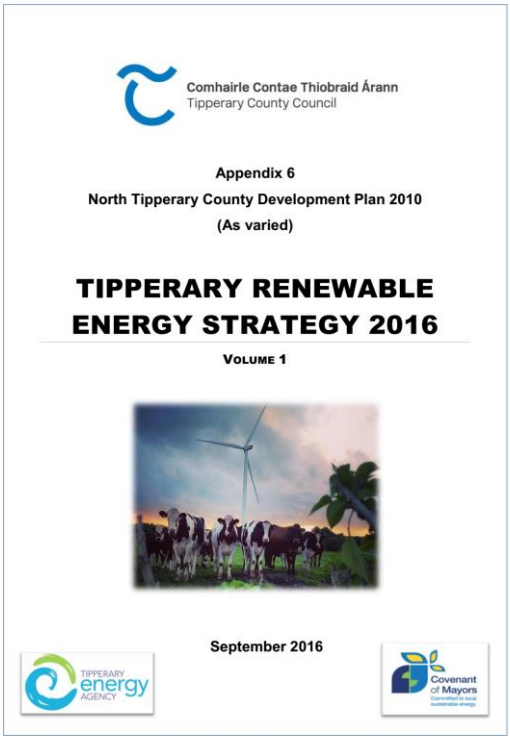
North Tipperary Heritage Plan 2013 – 2018 (North Tipperary County Council and North Tipperary Heritage Forum, 2013)

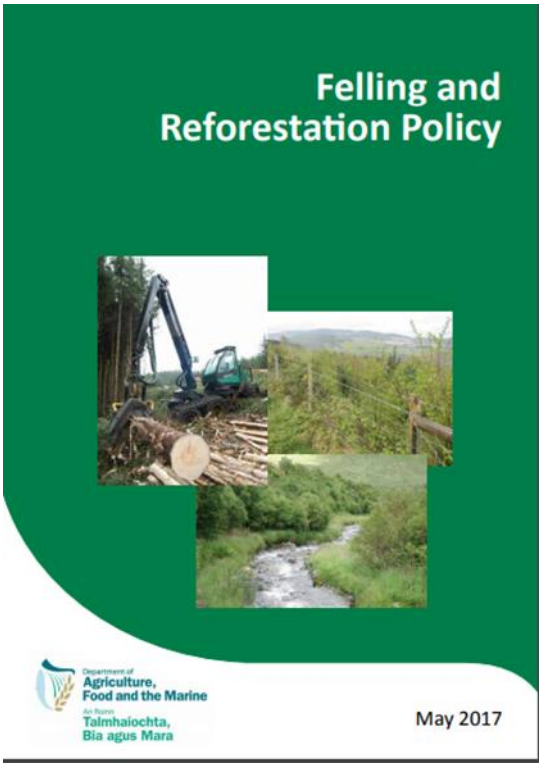


North Tipperary County Development Plan 2010 - 2016 (as varied) (Tipperary County Council, 2015)



Tipperary Renewable Energy Strategy 2016 Volume 1 (Tipperary County Council, 2016)





Department of Agriculture, Food and the Marine (2017). Felling and Reforestation Policy.

A8-1.3 Impact Calculations

A8-1.3.1.1 Birds

The following table summarises the habitat impact calculations in respect of those General Bird Species scoped in for evaluation as per Chapter 8.

Table 72 Summary Impact calculations for General Bird Species within the Whole UWF Project.

Species	Golden Plover	Meadow Pipit	Curlew	Hen Harrier (Foraging)
Total Suitable Habitat within WWFP (ha)	**348.53**	**353.44**	**67.28**	**598.68**
Total Suitable Habitat within Windfarm Grid Connection (ha)	197.89	199.95	53.19	388.49
Total Suitable Habitat within Windfarm Ancillary Activities (ha)	19.72	20.14	5.42	27.18
Total Suitable Habitat within Windfarm Related Works (ha)	120.24	122.67	6.90	170.98
Total Suitable Habitat within Windfarm Replacement Forestry (ha)	10.68	10.68	1.77	12.03
Total Permanent Land Take within WWFP (ha)	**6.94**	**6.94**	**1.14**	**9.58**
Total Permanent Land Take within Windfarm Grid Connection (ha)	2.77	2.77	0.63	5.12
Total Permanent Land Take within Windfarm Ancillary Activities (ha)	0.00	0.00	0.00	0.00
Total Permanent Land Take within Windfarm Related Works (ha)	0.19	0.19	0.07	0.48
Total Permanent Land Take within Windfarm Replacement Forestry (ha)	3.98	3.98	0.44	3.99
Total Permanent land take as percentage of Total Suitable Habitat within WWFP (%)	**1.99**	**1.96**	**1.69**	**1.60**
Total Permanent land take as percentage of Total Suitable Habitat within Windfarm Grid Connection (%)	1.40	1.39	1.18	1.32
Total Permanent land take as percentage of Total Suitable Habitat within Windfarm Ancillary Activities (%)	0.00	0.00	0.00	0.00
Total Permanent land take as percentage of Total Suitable Habitat within Windfarm Related Works (%)	0.16	0.15	1.03	0.28
Total Permanent land take as percentage of Total Suitable Habitat within Windfarm Replacement Forestry (%)	37.27	37.27	24.86	33.17

Golden Plover: Suitable habitat defined asImproved Agricultural grassland, wet grassland, upland blanket bog, cutover bog, or mosaics of same present within the respective Project Element boundary.

Meadow Pipit: Suitable habitat defined as Improved Agricultural grassland, wet grassland or mosaics of same present within the respective Project Element boundary.

Curlew: Suitable Habitat defined as Wet grassland, Upland Blanket Bog or mosaics of same present within the respective Project Element boundary.

Hen Harrier Foraging: Suitable Foraging Habitat defined as Improved Agricultural Grassland (on a precautionary basis evaluated as suitable for foraging); Wet Grassland, Wet Grassland and Scrub Mosaic, Deciduous Woodland, Coniferous Plantation (all age classes present and inclusive of forest rides) , and Scrub present within the respective Project Element boundary.

A8-1.3.1.2 Habitats

The following tables details total areas present within each Project Element of those habitats evaluated as of Local Importance (Higher Value) or above, as per the Best Practice guidance referenced in Chapter 8. The respective proportion of the overall study area covered by each, in addition to the total area of permanent land use change (or habitat loss) and what proportion of the study area that represents is also presented.

Table 73 Impact calculations for habitats greater than Local Importance (Higher Value) in the UWF Grid Connection element of the Whole UWF Project.

Habitat Type	Evaluation	Total Area Present (ha)	Percentage of Overall Study Area (%)	Area of Habitat Permanently Lost (ha)	Proportion of Study Area Habitat Lost (%)
FW2	International Importance	0.11	0.03	0.00	0.000
GS4	Local Importance (Higher Value)	42.46	10.42	0.27	0.626
GS4/HH3	Local Importance (Higher Value)	0.21	0.05	0.00	0.000
GS4/WS1	Local Importance (Higher Value)	1.56	0.38	0.04	2.717
HH3	National Importance	2.06	0.51	0.00	0.000
PB2	National Importance	1.38	0.34	0.00	0.000
PB4	Local Importance (Higher Value)	2.05	0.50	0.00	0.000
WD1	Local Importance (Higher Value)	5.92	1.45	0.09	1.575
WD2	Local Importance (Higher Value)	1.89	0.46	0.00	0.000
WN5	Local Importance (Higher Value)	0.81	0.20	0.00	0.000
WS1	Local Importance (Higher Value)	15.09	3.70	0.11	0.723
WS5	Local Importance (Higher Value)	3.93	0.97	0.00	0.000
	Total	**77.48**	**19.01**	**0.51**	**0.659**

Table 74 Impact calculations for habitats greater than Local Importance (Higher Value) in the UWF Related Works element of the Whole UWF Project.

Habitat Type	Evaluation	Total Area Present (ha)	Percentage of Overall Study Area (%)	Area of Habitat Permanently Lost (ha)	Proportion of Study Area Habitat Lost (%)
GA1/GS4	Local Importance (Higher Value)	1.70	0.892	0.000	0.000
GA1/WS1	Local Importance (Higher Value)	0.42	0.220	0.000	0.000
GS2	Local Importance (Higher Value)	0.14	0.073	0.000	0.000
GS3	Local Importance (Higher Value)	1.58	0.829	0.000	0.000
GS3/HH3	Local Importance (Higher Value)	2.81	1.475	0.000	0.000
GS4	Local Importance (Higher Value)	11.95	6.273	0.066	0.551
GS4/WS1	Local Importance (Higher Value)	0.49	0.257	0.000	0.000
HH1/GS4	Local Importance (Higher Value)	0.11	0.058	0.000	0.000
HH3	Local Importance (Higher Value)	2.32	1.218	0.000	0.000
PB2	County Importance	2.03	1.066	0.005	0.251
PB2/GS4	Local Importance (Higher Value)	0.13	0.068	0.000	0.000
PB4	Local Importance (Higher Value)	0.10	0.051	0.000	0.000
WD1	Local Importance (Higher Value)	0.15	0.079	0.000	0.000
WL2	Local Importance (Higher Value)	0.09	0.046	0.000	0.000
WS1	Local Importance (Higher Value)	1.68	0.882	0.004	0.237
WS2	Local Importance (Higher Value)	0.78	0.411	0.000	0.000
WS2/GS4	Local Importance (Higher Value)	0.43	0.227	0.000	0.000
	Total	**26.91**	**14.125**	**0.075**	**0.278**

Table 75 Impact calculations for habitats greater than Local Importance (Higher Value) in the UWF Replacement Forestry element of the Whole UWF Project.

Habitat Type	Evaluation	Total Area Present (ha)	Percentage of Overall Study Area (%)	Area of Habitat Permanently Lost (ha)	Proportion of Study Area Habitat Lost (%)
WD1	Local Importance (Higher Value)	0.18	1.56	0.000	0
WS1	Local Importance (Higher Value)	0.59	5.10	0.000	0
	Total	**0.77**	**6.66**	**0.00**	**0.00**

Table 76 Impact calculations for habitats greater than Local Importance (Higher Value) in the UWF Other Activities element of the Whole UWF Project.

Habitat Type	Evaluation	Total Area Present (ha)	Percentage of Overall Study Area (%)	Area of Habitat Permanently Lost (ha)	Proportion of Study Area Habitat Lost (%)
FW1	County Importance; Local Importance (Higher Value)	0.39	1.1	0.000	0.000
WD1	Local Importance (Higher Value)	5.15	14.2	0.000	0.000
WL2	Local Importance (Higher Value)	0.2	0.5	0.000	0.000
WS1	Local Importance (Higher Value)	1.3	3.6	0.000	0.000
Total		**7.05**	**19.39**	**0.00**	**0.00**

Note: The habitat impact for the Upperchurch Windfarm element of the Whole UWF Project has been previously assessed in the EIS[1].

[1] Ecopower Developments Ltd. (2012) Upperchurch Windfarm Environmental Impact Statement prepared by Malachy Walsh and Partners (MMW)

Tables 13-22 and 13-23 from the EIS, summarising the total habitat loss, are herein re-produced for completeness.

TABLE 13-22: TABLE SUMMARISING HABITAT LOSS AS A RESULT OF THE PROPOSED DEVELOPMENT.

Habitat	Selection as key ecological receptor	Total area of habitat (ha) within the study area.	Percentage of total habitat within the study area (%)	Area of habitat to be lost (ha).	Percentage of total habitat loss (%)
Improved Agricultural Grassland (GA1)	Yes	228.34	42.53	5.98	1.11
Wet Grassland (GS4)	Yes	19.94	3.71	0.5	0.09
Mosaic of Improved Grassland (GA1) & Wet Grassland (GS4)	Yes	11.44	2.13	0.3	0.06
Mosaic Wet Heath (HH3) & Upland Blanket Bog (PB3)	Yes	15.54	2.89	0.01	0.002
Acid Grassland (GS3)	Yes	20.34	4.68	0.57	0.11
Mosiac Upland Blanket Bog (PB3) & Acidic Grassland (GS3)	Yes	3.16	3.79	0.45	0.08
Upland Blanket Bog (PB2)	Yes	25.13	0.59	0	0
Coniferous Plantation (WD4)	No	202.2	37.66	1.18	0.22
Spoil and Bare Ground (ED2)	No	4.3	0.80	0.66	0.12
Buildings and Artificial Surfaces (BL3)	No	4.2	0.78	-	-
Neutral Grassland (GS1)	Yes	2.25	0.42	0	0.00
Total (ha) (excluding FW1, FW4, WL1 and WL2)		**536.84 ha**	**100%**	**9.65Ha**	**1.79%**

TABLE 13-23: SUMMARISING LINEAR LENGTH OF HABITAT LOST AS A RESULT OF THE PROPOSED DEVELOPMENT.

Habitat	Selection as key ecological receptor	Total linear length of habitat (meters) within the study area..	Percentage of total habitat within the study area (%)	Area of habitat to be lost (m).	Percentage of total habitat loss (%)
Eroding/Upland River (FW1)	Yes	1486.88	-	0	-
Drainage Ditches (FW4)	Yes	1258.5	-	48.1	-
Hedgerow (WL1)	Yes	24968.69	-	980.77	-
Treelines (WL2)	Yes	668.73	-	-	-

Plate 43: Tables 13-22 and 13-23 from the Upperchurch Windfarm EIS.

Table 77 Impact calculations for permanent hedgerow and tree removal in the UWF Grid Connection element of the Whole UWF Project.

Project Element	UWF Grid Connection
Permanent Hedgerow Removal (m)	45
Permanent Mature Tree Removal	26
Permanent Immature Tree Removal	4

Table 78 Impact calculations for hedgerow and tree removal in the UWF Related Works element of the Whole UWF Project.

Project Element	UWF Related Works
Permanent Hedgerow Removal (m)	170
Permanent Mature Tree Removal	1
Permanent Immature Tree Removal	3

Table 79 Impact calculations for hedgerow and tree removal in the UWF Replacement Forestry element of the Whole UWF Project.

Project Element	UWF Replacement Forestry
Permanent Hedgerow Removal (m)	0
Permanent Mature Tree Removal	0
Permanent Immature Tree Removal	0

Table 80 Impact calculations for hedgerow and tree removal in the Upperchurch Windfarm element of the Whole UWF Project.

Project Element	Upperchurch Windfarm
Permanent Hedgerow Removal (m)	980.77
Permanent Mature Tree Removal	24
Permanent Immature Tree Removal	0

Table 81 Impact calculations for hedgerow and tree removal in the UWF Other Activities element of the Whole UWF Project.

Project Element	UWF Other Activities
Permanent Hedgerow Removal (m)	0
Permanent Mature Tree Removal	0
Permanent Immature Tree Removal	0

A8-1.3.1.3 Invertebrates

Table 82 Impact calculations for suitable Marsh Fritillary habitat for the Whole UWF Project.

Site	Baurnadomeeny	Bealaclave	Shevry	Total
MF Suitable Habitat Area (ha)	0.57	0.10	0.54	1.21
MF Suitable Habitat Overlap (ha)	0.003	0.00	0.06	0.06
Overlap Area as % of Total Suitable Habitat	0.52	0.049	11.48	5.35
Permanent Land Take (ha)	-	-	0.06	0.06
% of Suitable MF Habitat being Permanently Lost	-	-	5.11	5.11

A8-1.4 Cumulative Impact of the Whole UWF Project with Other Projects/Activities

Table 83 details the cumulative receptor scoping from which Spatial Boundaries in respect of the in-combination appraisal of each receptor as identified were evaluated.

Table 83 Spatial boundary for cumulative impact assessment for each of the identified receptors

Environmental Component	Regional Issues of Concern	Receptors	Indicators	Spatial Boundary for Cumulative
Designated Sites	Threats and Pressures as per Conservation Objectives	European Sites	Adverse effects on integrity of site	Whole UWF Project boundary plus 15km
Designated Sites	Threats and Pressures as per Conservation Objectives	European Sites	Reduction in Favourable Conservation Status of Qualifying Interest/Special Conservation Interest	Whole UWF Project boundary plus 15km
Designated Sites (National)	Threats and Pressures as available	NHA's and pNHA's	Any trends, pressures as identified in available literature	Whole UWF Project boundary plus 15km
Birds	Habitat Loss	Hen Harrier	Reduction in Habitat Extent within SPA/Silvermines Mountains	SPA plus 5km
Birds	Protection of Nests outside SPA's	Hen Harrier	Reduction in habitat ex-situ to SPA but contiguous	SPA plus 5km
Birds	Population Reduction	Hen Harrier	Reduction in Population Extent within SPA/Silvermines Mountains	SPA plus 5km
Birds	Protection of Nests outside SPA's	Hen Harrier	Reduction in Population Extent ex-situ to SPA but contiguous	SPA plus 5km
Birds	Habitat Loss	General Birds	Reduction in Biodiversity due to habitat change	1km (or townland)
Habitats	Non-native invasive plant species	Japanese Knotweed, Himalayan Knotweed, Giant Hogweed, Rhododendron, Cherry Laurel, Himalayan Balsam	Increase in range	100m
Habitats	Retention of trees in developments	HNV trees	Direct loss without replacement	100m
Flora	Alteration or damage of Flora Protection Order (2015) species or habitat	FPO species	Reduction in range/habitat extent	100m

Environmental Component	Regional Issues of Concern	Receptors	Indicators	Spatial Boundary for Cumulative
Fauna	Alien Mammals	Greater White Toothed Shrew	Increase in range	2km
Fauna	Alien Mammals	American Mink	Increase in range	100m
Fauna	Alien Mammals	Grey Squirrel	Increase in range	100m
Habitats	Retention of 'typical high nature value' hedges	Hedgerows	Reduction in connectivity due to severance	100m
Habitats	Loss of Semi-natural grassland	Upland grassland Silvermines mountains	reduction in area	100m
Habitats	Overgrazing/Burning/Peat Extraction/Afforestation	Heaths	Area reduction/habitat degradation	100m
Habitats	Development/Overgrazing/Afforestation/Peat Extraction/Dumping/Recreational Use/Invasive Species	Peatlands	Habitat Degradation/ loss	100m
Aquatic Habitats	Pollution	Freshwater Pearl Mussel	Reduction in water quality	Downstream catchment
Aquatic Habitats	Pollution	Salmonids	Reduction in water quality	Downstream catchment
Aquatic Habitats	Pollution	Sea Lamprey	Reduction in water quality	Downstream catchment
Aquatic Habitats	Pollution	Eel	Reduction in water quality	Downstream catchment
Aquatic Habitats	Pollution	Trout	Reduction in water quality	Downstream catchment
Aquatic Habitats	Drainage	Freshwater Pearl Mussel	Reduction in habitat	Downstream catchment
Aquatic Habitats	Drainage	Salmonids	Reduction in habitat	Downstream catchment
Aquatic Habitats	Drainage	Sea Lamprey	Reduction in habitat	Downstream catchment
Aquatic Habitats	Drainage	Eel	Reduction in habitat	Downstream catchment
Aquatic Habitats	Drainage	Trout	Reduction in habitat	Downstream catchment
Aquatic Habitats	Engineering	Freshwater Pearl Mussel	Effective Habitat Loss (loss of passage)	Downstream catchment
Aquatic Habitats	Engineering	Salmonids	Effective Habitat Loss (loss of passage)	Downstream catchment
Aquatic Habitats	Engineering	Sea Lamprey	Effective Habitat Loss (loss of passage)	Downstream catchment
Aquatic Habitats	Engineering	Eel	Effective Habitat Loss (loss of passage)	Downstream catchment
Aquatic Habitats	Engineering	Trout	Effective Habitat Loss (loss of passage)	Downstream catchment

Environmental Component	Regional Issues of Concern	Receptors	Indicators	Spatial Boundary for Cumulative
Aquatic Habitats	Land Management Practice	Freshwater Pearl Mussel	loss of habitat (drainage) / alteration of physical features (habitats)	Downstream catchment
Aquatic Habitats	Land Management Practice	Salmonids	loss of habitat (drainage) / alteration of physical features (habitats)	Downstream catchment
Aquatic Habitats	Land Management Practice	Sea Lamprey	loss of habitat (drainage) / alteration of physical features (habitats)	Downstream catchment
Aquatic Habitats	Land Management Practice	Eel	loss of habitat (drainage) / alteration of physical features (habitats)	Downstream catchment
Aquatic Habitats	Land Management Practice	Trout	loss of habitat (drainage) / alteration of physical features (habitats)	Downstream catchment
Invertebrates	Identification and Protection of Breeding Sites	Marsh Fritillary	Inadvertent loss of colonies	2km
Amphibians	No information on distribution	Frog	Reduction in population through mortality	100m
Amphibians	No information on distribution	Frog	Reduction in population through secondary effects/habitat loss	100m
Reptiles	No information	Lizard	Reduction in population through secondary effects/habitat loss	100m
Mammals - Bats	Bridge roosts	All Bat Species	Loss of habitat	300m
Mammals - Bats	Valuable habitats	All Bat Species	Habitat Severance	300m
Mammals - Bats	Protection of Roosts	All Bat Species	Roost loss	300m
Other mammals	Destruction and Fragmentation of Habitats	Badger	Loss of Setts	2km
Other mammals	Destruction and Fragmentation of Habitats	Irish Hare	Loss of habitat	100m
Other mammals	Destruction and Fragmentation of Habitats	Red Squirrel	loss of habitat	100m
	Destruction and Fragmentation of Habitats	Otter	Loss of Habitat	7km
	Road Construction	Badger	Mortality (traffic)	2km
	Road Construction	Other Mammals	Mortality (traffic)	100m

All planning applications within15km of the construction area boundaries

Table 84 Other Plans or Projects and Activiites within the Spatial Boundary for Cumulative Evaluation

Name	Industry	Details	Location	Status	Planning Authority	Planning Ref
Bunkimalta Windfarm	Energy	16 wind turbines, each having a rated electrical output of approximately 2,500 - 3,000 kilowatts, access tracks, a fenced Electrical Transformer Station comprising a single-storey Control Building and Substation, an effluent treatment system, three anemometer masts, repository areas, borrow pits and all associated site works, above and below ground. modifications to the existing entrance from the L-2163 to the Keeper Hill Coillte Forest. installation of approximately 22.25km of 38kV underground cable (UGC) between Bunkimalta Wind Farm and Nenagh 110kV substation, to be installed primarily in public roads. Bunkimalta Windfarm is located c.3.5km to the north of the UWF Grid Connection, and c.11km to the northwest of the UWF Related Works, and c.12.5km to the northwest of the UWF Replacement Forestry.	Bunkimalta, Keeper Hill, Co. Tipperary, Co. Tipperary	Consented	Tipperary	13510035 16600433 16600432
Castlewaller Windfarm	Energy	16 turbines (each with a maximum hub height of 100m, maximum rotor diameter of 90m, and with a total tip height of 145m), one permanent meteorological mast, 2 borrow pits, a sub-station including a control building, new internal access roads, upgrading of existing internal access roads, expansion of drainage system, turbine hardstands, wastewater holding tank, underground cables and ancillary works. The UWF Grid Connection 110kV UGC route passes through the footprint of the consented windfarm.	Castlewaller, Newport, Co. Tipperary	Consented	Tipperary	16600472, 11510251.
Killuragh Digester Plant	Energy	construction of a digester plant, associated ABP building and associated site works to process farm slurry and other organic material to provide renewable energy and fertilizer	Killuragh, Pallasgreen, Co Limerick	Consented	Limerick	111066
Newport Distributor Road	Civil	Distributor Road between R503 and local road (Murroe Road) in Newport Village and associated site works including footpaths, lighting, cycletracks, drainage, etc	Tullow, Newport, Co. Tipperary	Consented	Tipperary	07511157, 13510103
Housing Development Doon	Re-sidential	Construction of 25 no. houses consisting of 5 no. 4 bed detached dwellings, 20 no. 3 bed semi-detached dwellings, a bored well,	Bottle Hill, Doon, Co Limerick	Consented	Limerick	16530

Name	Industry	Details	Location	Status	Planning Authority	Planning Ref
		entrance and roads together with associated site works and services				
Housing Developments, Annacotty	Re-sidential	Construction of 48 dwellings at Annacotty & construction of 240 dwellings in three areas/lots at Walkers Road	Annacotty, Co Limerick	Consented	Limerick	137026 137094
Gortnahalla Turbine	Energy	Single wind generator with a maximum output set at 500kw, hub height 65m	Gortnahalla, Upperchurch, Co. Tipperary	Built or Expired	Tipperary	12510368
Thurles Regional Water Treatment Works	Utilities	The construction of a water treatment plant and outfall to the River Suir. The water treatment plant will consist of a water treatment and administration building, sludge dewatering building, ESB sub-station, generator & oil tank enclosure, raw water balancing tank, clear water tanks, sludge balancing tank, sludge thickening and sludge holding tank, washwater tank, sludge skip and emergency sludge storage area, chemical storage tanks, washwater storage tank and all associated site development and site excavation works above and below ground	Bohernacrusha, Killeenyarda, Holycross, Co. Tipperary	Consented	Tipperary	16600877
Industrial / warehouse Units, Thurles	Industrial	1 No. Light Industrial/Warehousing building (gross floor area 2360.6sq.m.). The development consists of (1) 1 No. Building of total floor area 2360.6sq.m. subdivided into Units. (2) Roundabout and Access Road from Nenagh Road (R498) complete with necessary improvement works and road markings. (3) Car parking and loading areas. (4) Landscaping. (5) Site development works to facilitate the site. (6) Foul water pumping station and all associated works	Bawntameena, Nenagh Road, Thurles, Co. Tipperary	Consented	Tipperary	16600037
Agriculture – Turkey Tunnel & Pig Unit	Agri-culture	a loose turkey poly tunnel, open feeding yard, slatted tank in existing house now used for pigs, change of use from hay barn/loose shed to pig shed/milling shed grain store	Gortussa, Dundrum, Co. Tipperary	Consented	Tipperary	14600343
Agriculture - Milking Parlour	Agri-culture	(1) a dairy cubicle house complete with under-ground slatted tanks, (2) a walled silage base, (3) a general agricultural shed, (4) an extension to existing calf house incorporating the existing farm yard manure slab, the demolition of existing animal house and all associated site works.	Portnard, Cappamore, Co. Limerick	Consented	Limerick	15255

Name	Industry	Details	Location	Status	Planning Authority	Planning Ref
Agriculture – Milking Parlour	Agri-culture	(1) milking parlour and dairy, (2) unroofed easy-feed layout for dairy cows, (3) geomembrane lined slurry lagoon and all ancillary works	Bunkey, Lisnagry,, Co Limerick	Consented	Limerick	15194
Agricultural sheds and stores	Agri-culture	1) to construct a slatted cubicle dairy building complete with underground slatted tank, (2) to erect a circular slurry storage tower, (3) to construct 2 x walled silage stores with associated concrete area for the storage of round bales, (4) to construct 5 x individual feed store buildings, (5) to construct farm yard manure storage building, (6) to construct fodder storage buildings	Killuragh, Pallasgreen, Co. Limerick	Consented	Limerick	17133
Forestry	Activity	Commercial conifer forestry plantations throughout the Slievefelim to Silvermine Mountains upland area	n/a	Ongoing	n/a	n/a
Agriculture	Activity	Dry stock farming, mainly cattle, along with some dairy farming, throughout the Slievefelim to Silvermine Mountains upland area.	n/a	Ongoing	n/a	n/a

A8-1.5 References

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A8-1.6 Detailed Biodiversity Mapping

A8-1.7 Confidential Annex

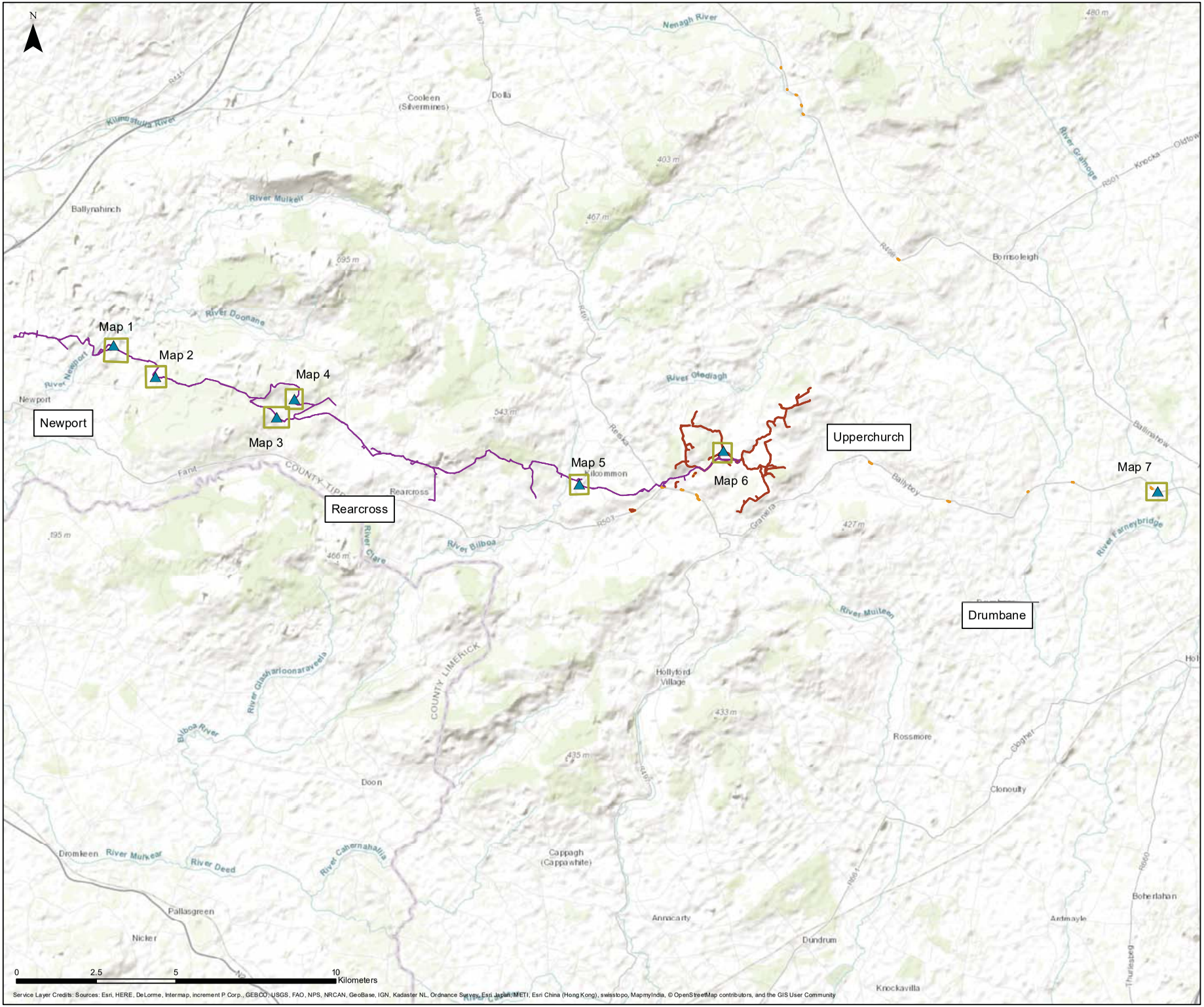
The Confidential Annex contains highly sensitive information on protected species that are vulnerable to persecution. It may be reviewed by the planning officers of the Competent Authorities and by the Statutory Consultees (e.g. the National Parks and Wildlife Service), but should not be published on any online system or made available in any other public format.

The Confidential Annex is not for general public dissemination due to its highly sensitive nature.

It is therefore not included in this public copy of Appendix 8.1.

Members of the public can view this confidential annex, upon appointment, at the premises of the Competent Authority

A8-1.6 Detailed Biodiversity Mapping



Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure. A8 - 1.Terrestrial Habitats: Invasive Species Locations Overview Map

Legend:

- Infestation Location
- UWF Grid Connection Construction Works Area
- UWF Related Works Construction Works Area
- Other Activities Construction Works Boundary

For illustrative purposes only. Map not to scale

REFERENCE DOCUMENT

Drawn:	Checked:	Authorised:
POC	CC	HW

Date:	Map Reference:
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E: info@inisenv.ie
W: www.inisecology.com
W: www.inisenv.ie

INIS Ecology
Suite 11, Shannon Commercial Properties,
Information Age Park, Gort Road,
Ennis, Co. Clare

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure. A8 - 1.Terrestrial Habitats: Invasive Species Locations
Map 1 of 7

Legend:

- Himalayan Knotweed
- UWF Grid Connection Construction Works Area

For illustrative purposes only. Map not to scale

REFERENCE DOCUMENT

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Project: Whole Windfarm Project

Title:
Figure. A8 - 1.Terrestrial Habitats: Invasive Species Locations
Map 2 of 7

Legend:

- Japanese Knotweed
- UWF Grid Connection Construction Works Area

For illustrative purposes only. Map not to scale

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Project: Whole Windfarm Project

Title:
Figure. A8 - 1.Terrestrial Habitats: Invasive Species Locations
Map 3 of 7

Legend:

- Japanese Knotweed
- UWF Grid Connection Construction Works Area

For illustrative purposes only. Map not to scale

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Title:
Figure. A8 - 1.Terrestrial Habitats: Invasive Species Locations
Map 4 of 7

Legend:

- Japanese Knotweed
- Construction Works Boundary

For illustrative purposes only. Map not to scale

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Title:
Figure. A8 - 1.Terrestrial Habitats: Invasive Species Locations
Map 5 of 7

Legend:

- Japanese Knotweed
- UWF Grid Connection Construction Works Area

For illustrative purposes only. Map not to scale

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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure. A8 - 1.Terrestrial Habitats: Invasive Species Locations
Map 6 of 7

Legend:

- Japanese Knotweed
- UWF Related Works Construction Works Area

For illustrative purposes only. Map not to scale

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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure. A8 - 1.Terrestrial Habitats: Invasive Species Locations
Map 7 of 7

Legend:

- Japanese Knotweed
- Other Activities Construction Works Boundary

For illustrative purposes only. Map not to scale

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Drawn:	Checked:	Authorised:
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Date:	Map Reference:
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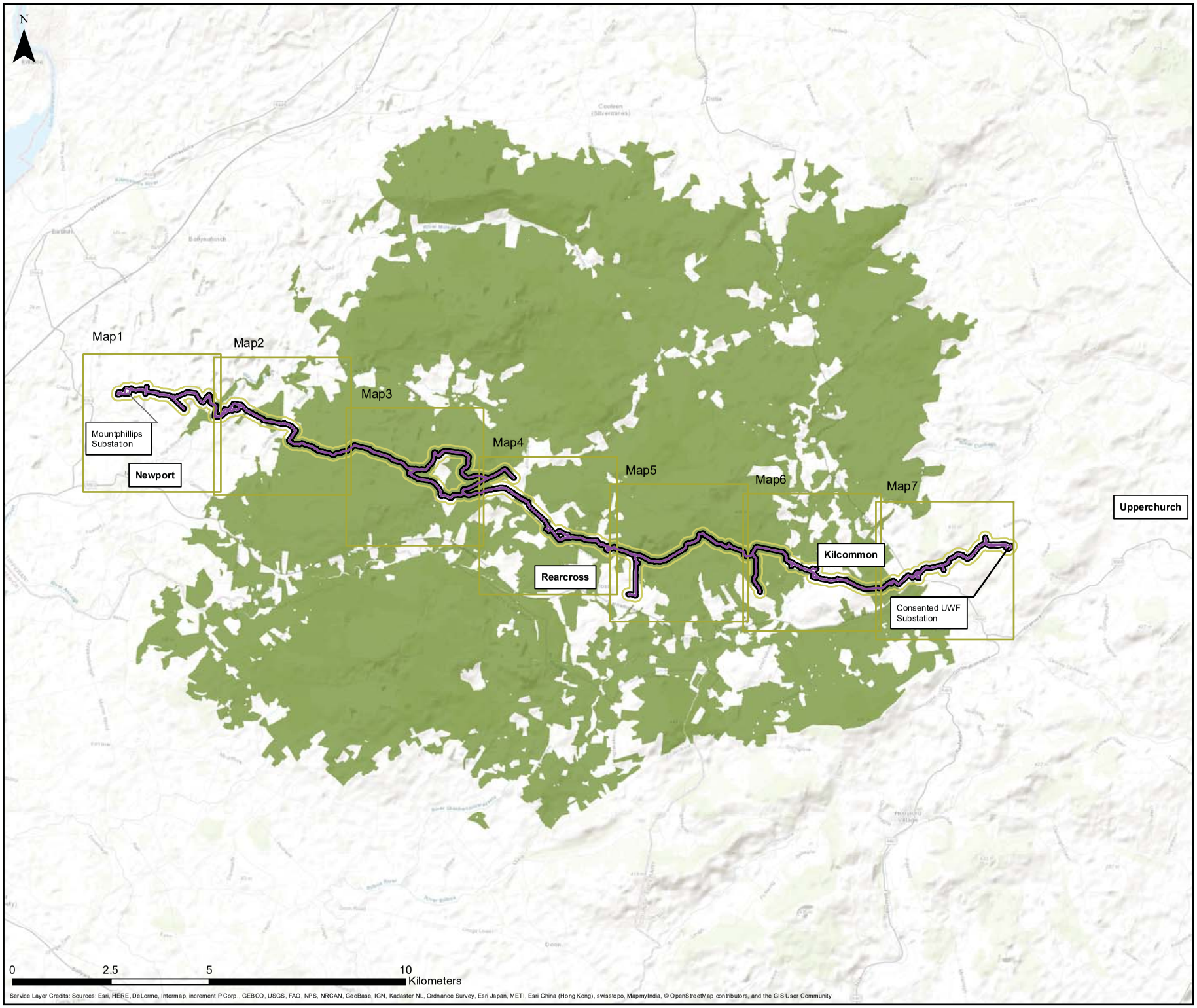

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 2: Bats within the UWF Grid Connection Study Area.
Overview Map

Legend:
- UWF Grid Connection Construction Works Area
- Study Area Boundary (150m)
- Study Area Boundary (50m)
- Slievefelim SPA

For illustrative purposes only. Map not to scale

REFERENCE DOCUMENT

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Date:	Map Reference:
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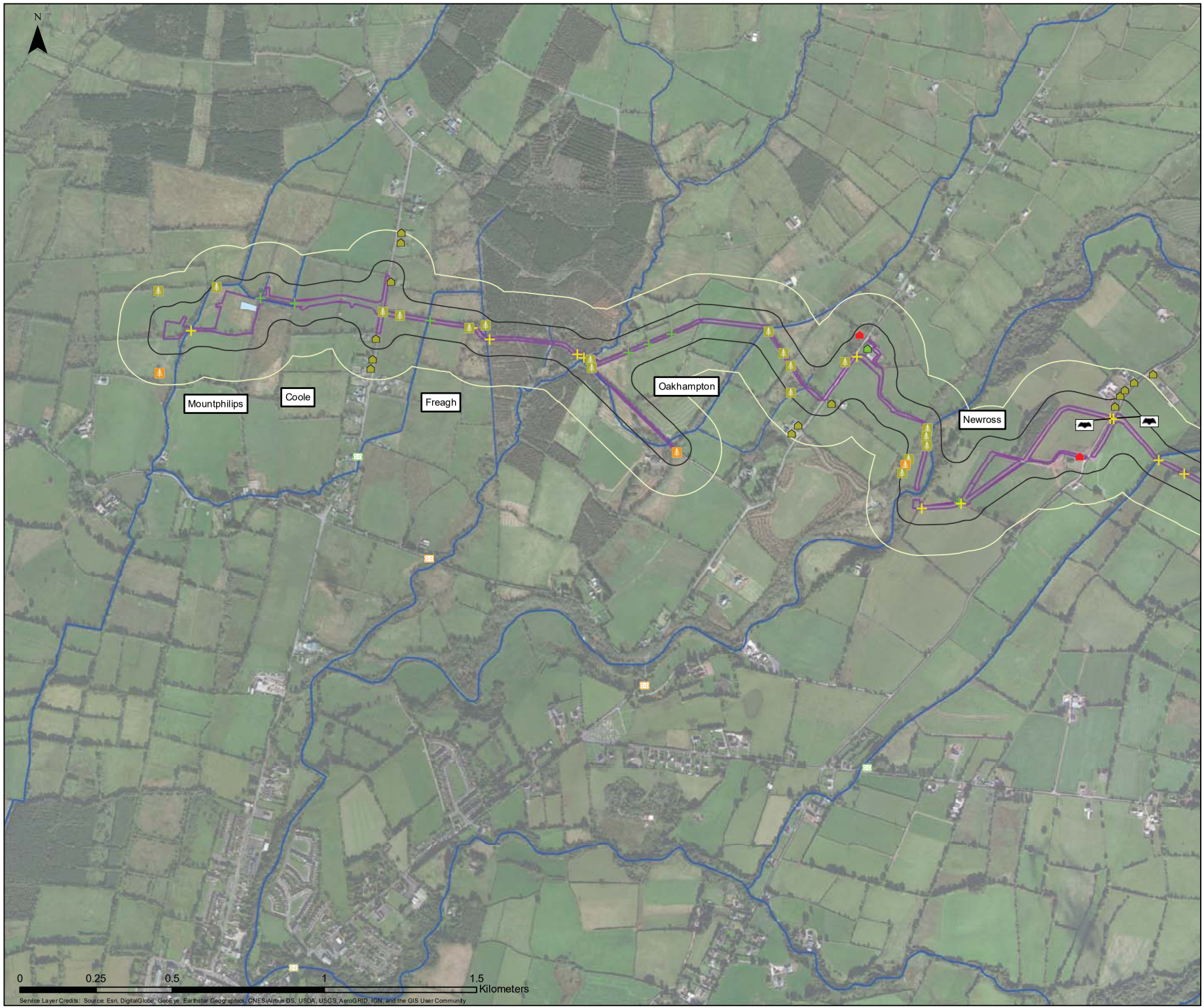

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 2: Bats within the UWF Grid Connection Study Area.
Map 1 of 7

Legend:

- *Bat Crossing Locations*

Bat Roost Suitability: *

Bridges
- Moderate
- Low
- Negligible

Trees
- Moderate
- Low

Buildings
- High
- Low
- Negligible

- Study Area Boundary (50 m)
- Study Area Boundary (150m)
- Temporary hedge/tree removal and pruning
- Permanent hedge/tree removal
- UWF Grid Connection Construction Works Area
- Temporary Construction Compound
- Watercourses
- UWF Grid Connection Construction Works Area

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

For illustrative purposes only. Map not to scale

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Drawn:	Checked:	Authorised:
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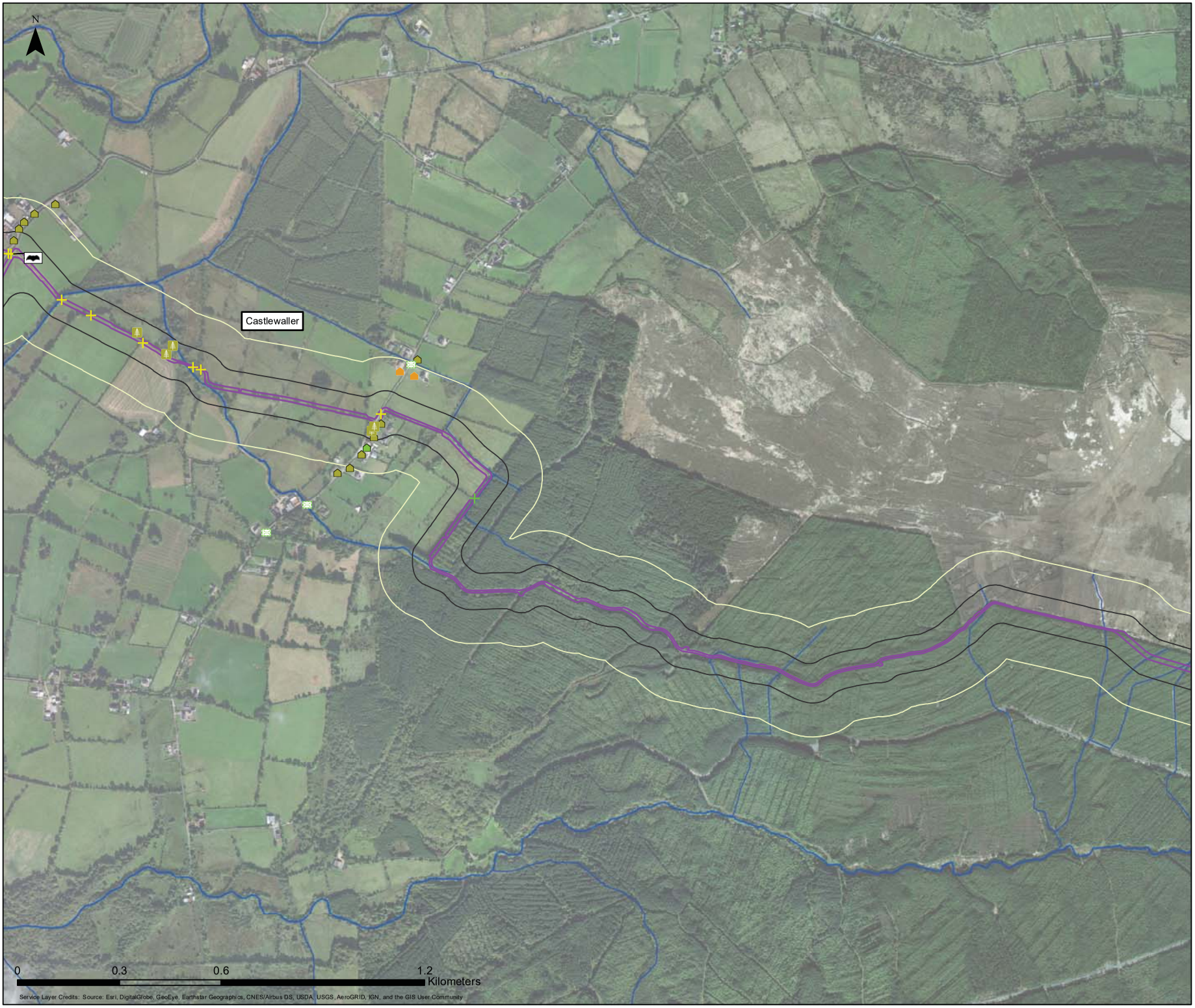

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 2: Bats within the UWF Grid Connection Study Area.
Map 2 of 7

Legend:

Bat Crossing Locations

Bat Roost Suitability:*

Bridges
- Negligible

Trees
- Low

Buildings
- Moderate
- Low
- Negligible

- Study Area Boundary (50 m)
- Study Area Boundary (150m)
- Temporary hedge/tree removal and pruning
- Permanent hedge/tree removal
- UWF Grid Connection Construction Works Area
- Watercourses

REFERENCE DOCUMENT

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

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Drawn:	Checked:	Authorised:
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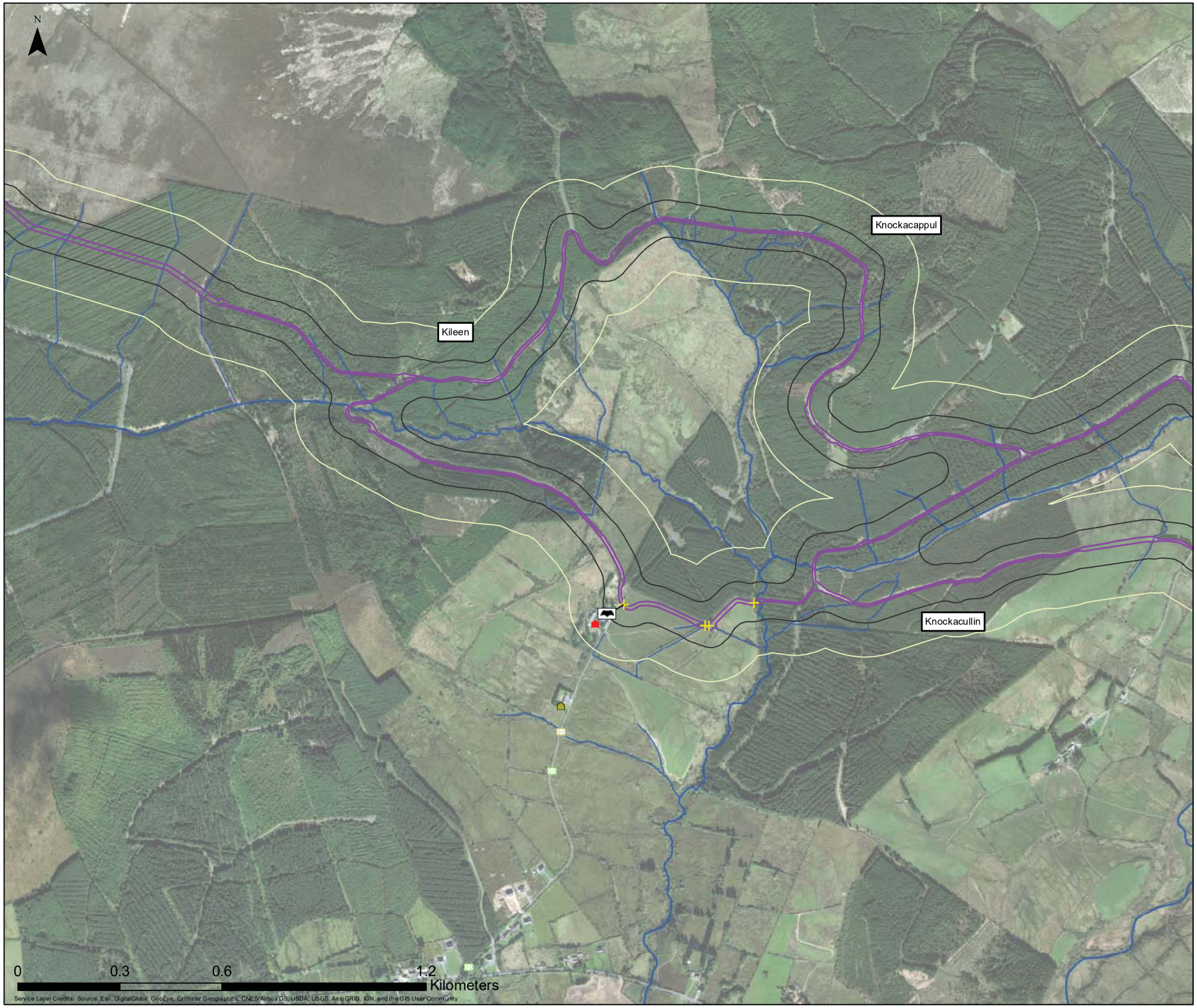

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 2: Bats within the UWF Grid Connection Study Area.
Map 3 of 7

Legend:

- *Bat Crossing Locations*

Bat Roost Suitability:*

Bridges
- Low
- Negligible

Buildings
- High
- Low

- Study Area Boundary (50 m)
- Study Area Boundary (150m)
- Temporary hedge/tree removal and pruning
- Watercourses
- UWF Grid Connection Construction Works Area

REFERENCE DOCUMENT

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

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Drawn:	Checked:	Authorised:
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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 2: Bats within the UWF Grid Connection Study Area.
Map 4 of 7

Legend:

Bat Roost Suitability:*

Bridges
- Low
- Negligible

Trees
- Low

Buildings
- High
- Moderate
- Low
- Negligible

- Study Area Boundary (50 m)
- Study Area Boundary (150m)
- UWF Grid Connection Construction Works Area
- Watercourses
- Temporary hedge/tree removal and pruning
- Permanent hedge/tree removal

REFERENCE DOCUMENT

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

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Drawn:	Checked:	Authorised:
POC	CC	HW

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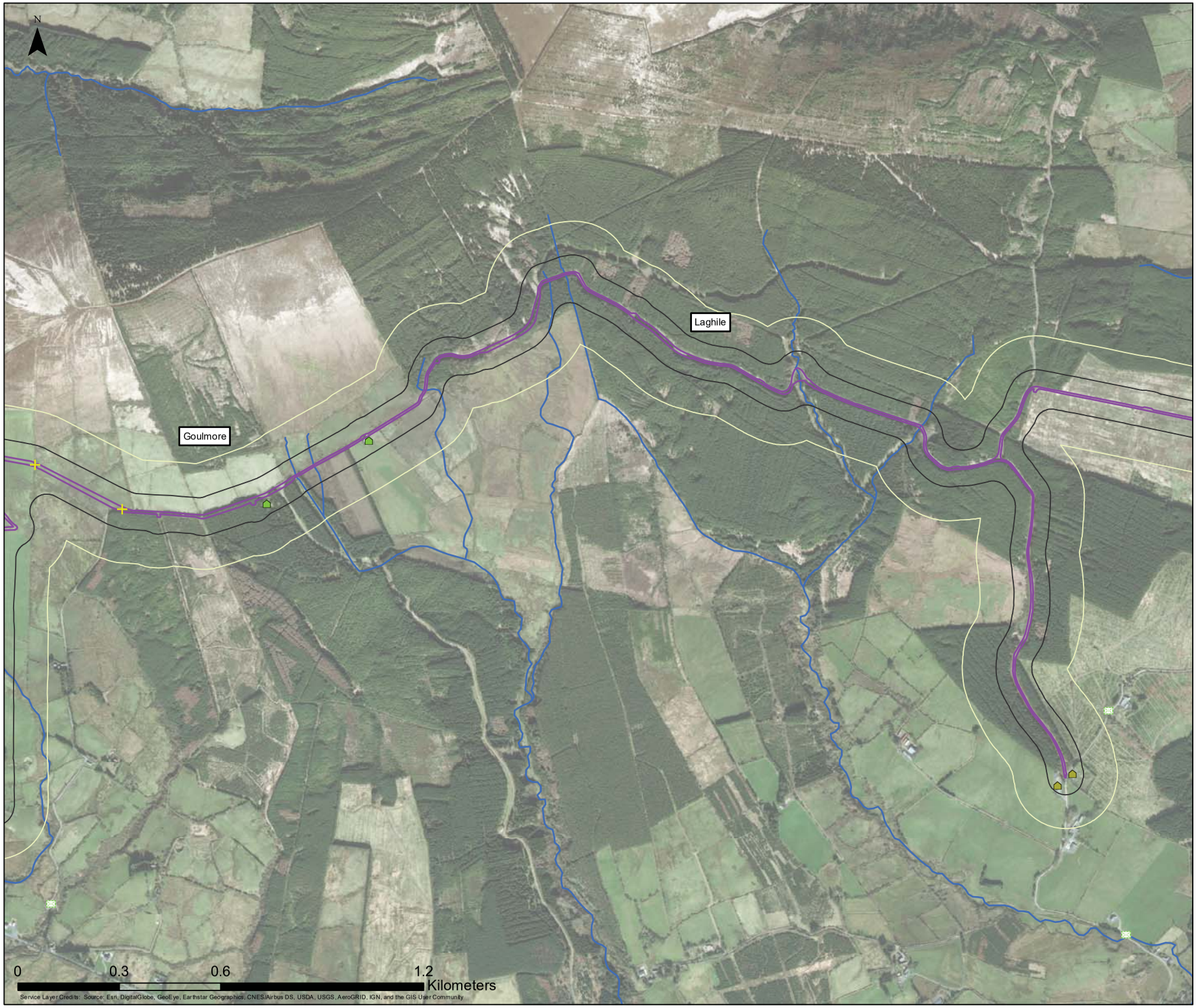

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 2: Bats within the UWF Grid Connection Study Area.
Map 5 of 7

Legend:

Bat Roost Suitability:*

Bridges
- Negligible

Buildings
- Low
- Negligible

- Study Area Boundary (50 m)
- Study Area Boundary (150m)
- UWF Grid Connection Construction Works Area
- Watercourses
- Temporary hedge/tree removal and pruning

REFERENCE DOCUMENT

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

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Drawn:	Checked:	Authorised:
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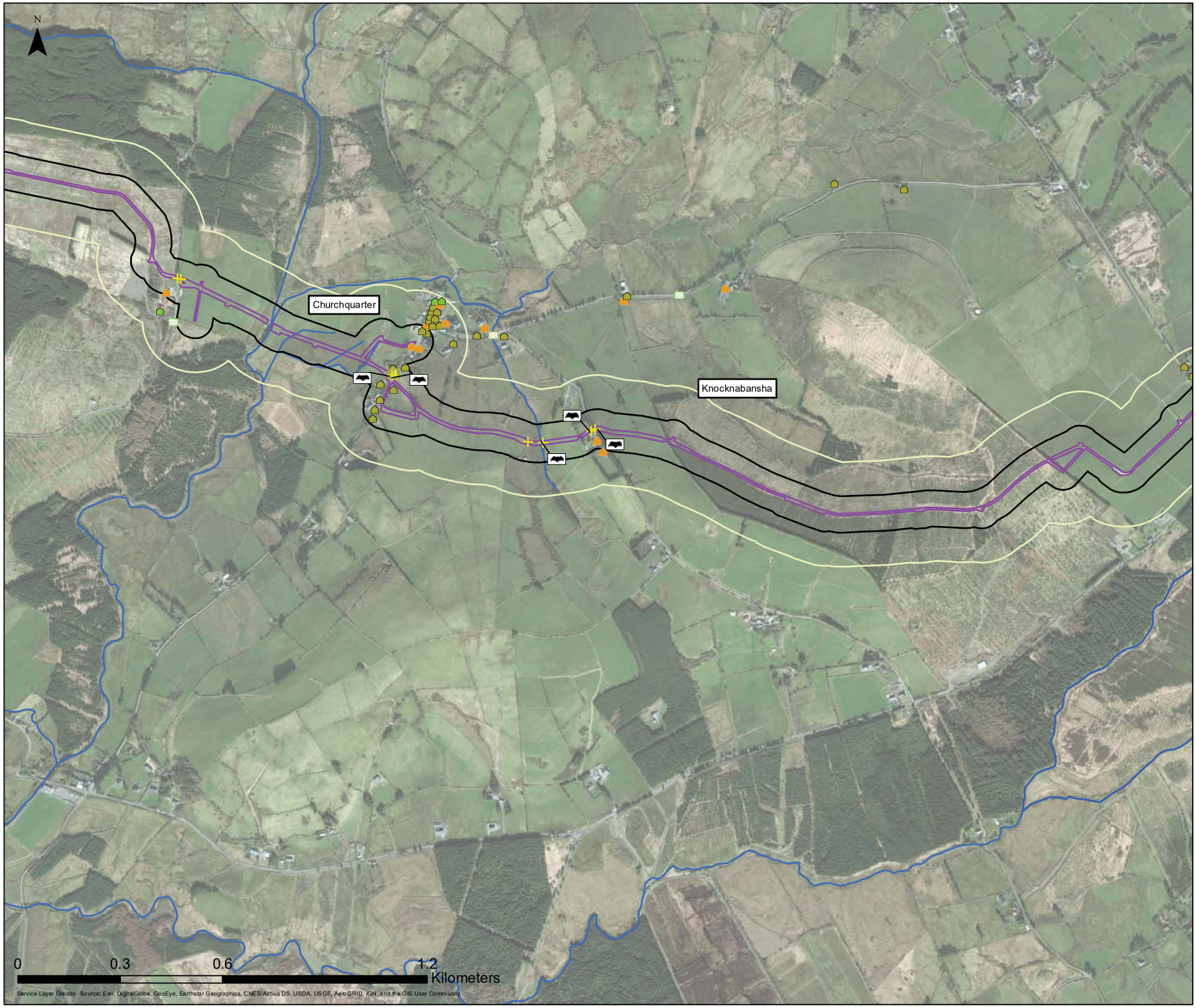

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 2: Bats within the UWF Grid Connection Study Area.
Map 6 of 7

Legend:

- *Bat Crossing Locations*

Bat Roost Suitability:*

Bridges
- Low
- Negligible

Trees
- Low

Buildings
- Moderate
- Low
- Negligible

- Study Area Boundary (50m)
- Study Area Boundary (150m)
- UWF Grid Connection Construction Works Area
- Watercourses
- Temporary hedge/tree removal and pruning

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

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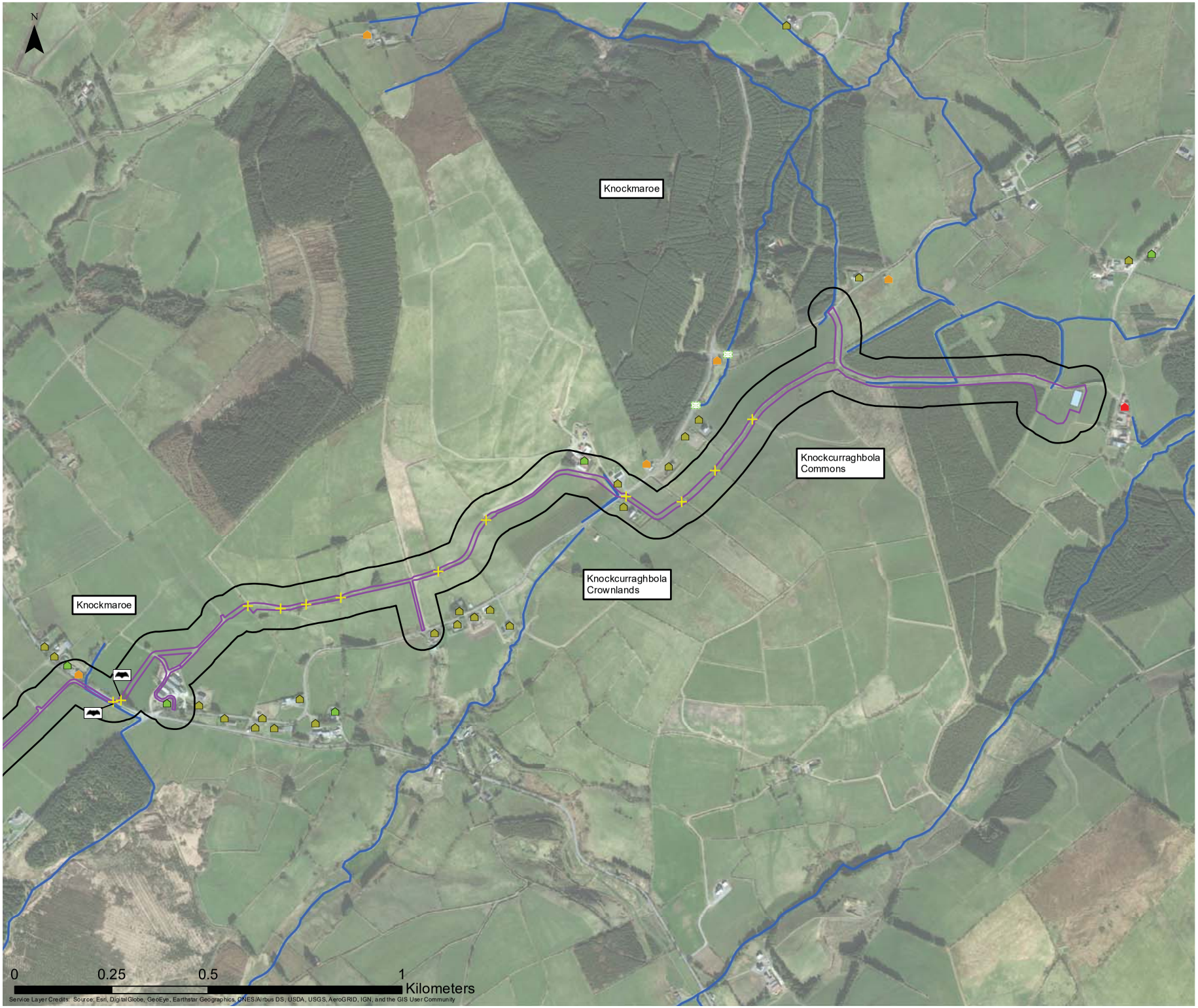

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 2: Bats within the UWF Grid Connection Study Area.
Map 7 of 7

Legend:

- *Bat Crossing Locations*

Bat Roost Suitability:*

- Temporary hedge/tree removal and pruning

Bridges

Rating

- Negligible

Buildings

Rating

- High
- Moderate
- Low
- Negligible
- UWF Grid Connection Construction Works Area
- Study Area Boundary (50m)
- Watercourses
- Temporary Construction Compound

REFERENCE DOCUMENT

** Buildings identified are those evaluated as having some suitability for bats. Any other buildings visible on mapping are either outside the study area or are considered to have zero suitability for bats*

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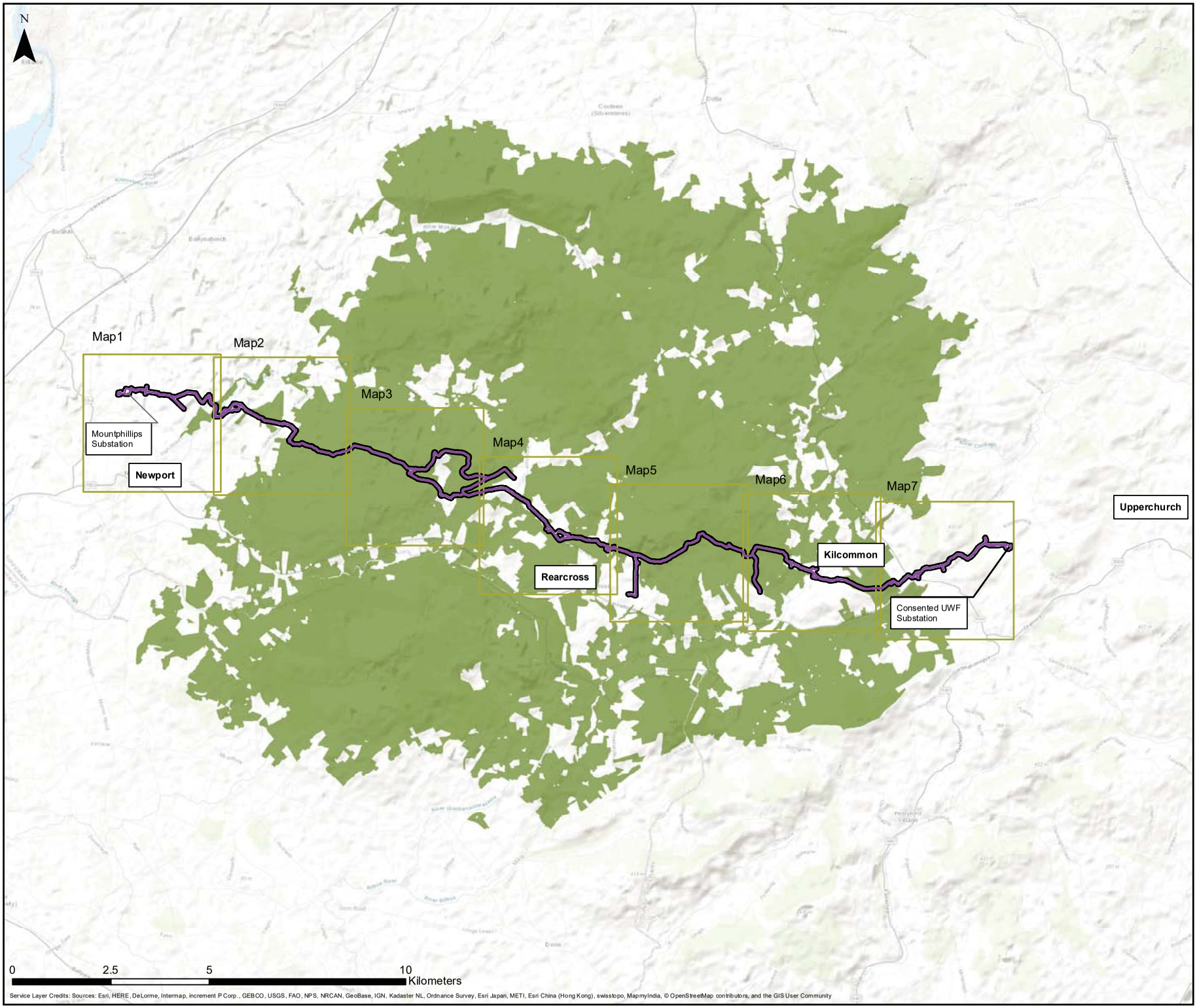

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 3: Non-Volant Mammals within the UWF Grid Connection Study Area. Overview Map

Legend:

- UWF Grid Connection Construction Works Area
- Study Area Boundary (50m)
- Slievefelim SPA

For illustrative purposes only. Map not to scale

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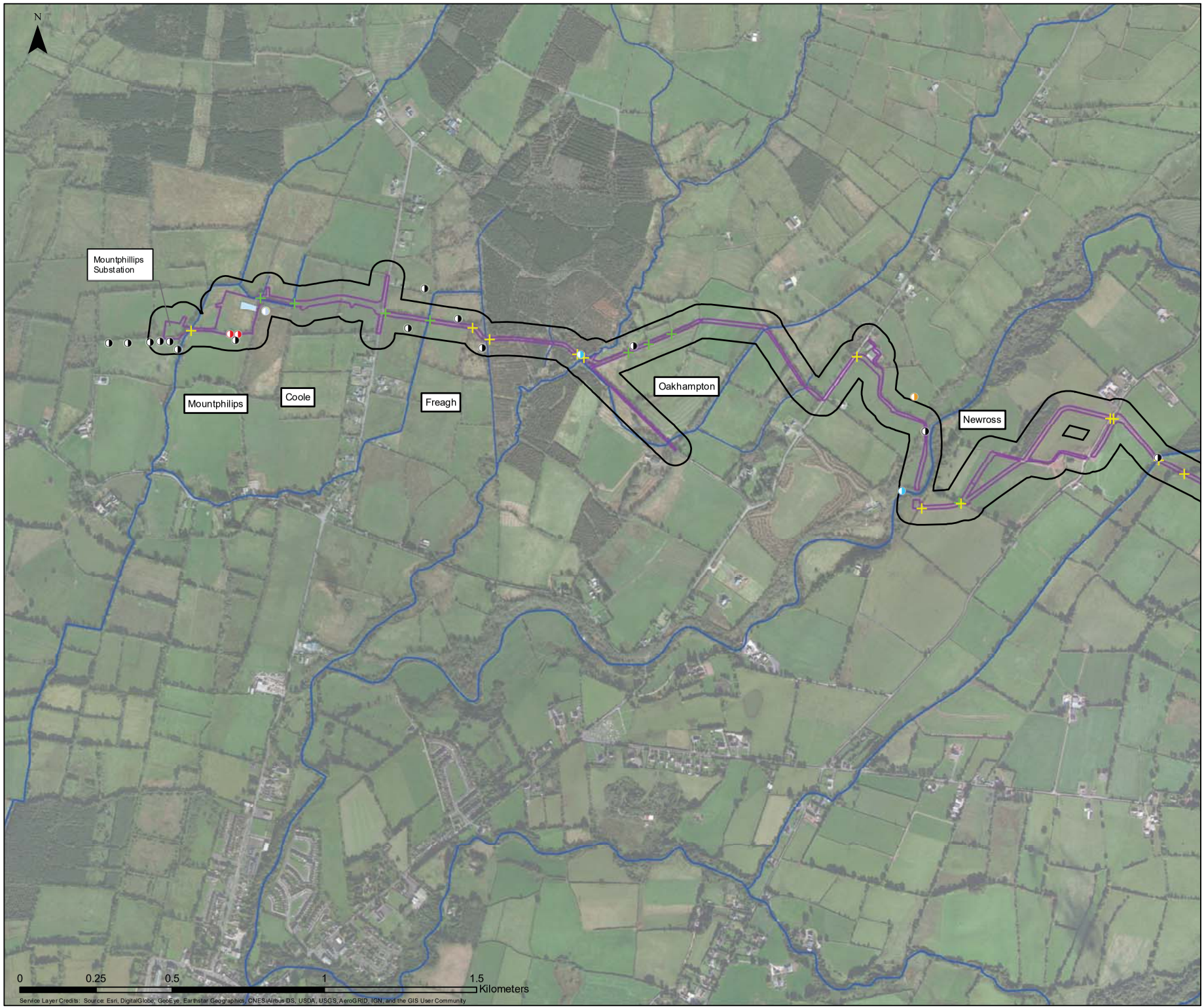

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 3: Non-Volant Mammals within the UWF Grid Connection Study Area.
Map 1 of 7

Legend:

- Badger (Tracks,snuffle hole, latrine, scat)
- Deer sp.
- Fox
- Irish Hare
- Otter (Tracks, path, slide,spraint)
- Squirrel sp.
- Temporary hedge/tree removal and pruning
- Permanent hedge/tree removal
- UWF Grid Connection Construction Works Area
- Study Area Boundary (50m)
- Temporary Construction Compound
- Watercourses

For illustrative purposes only. Map not to scale

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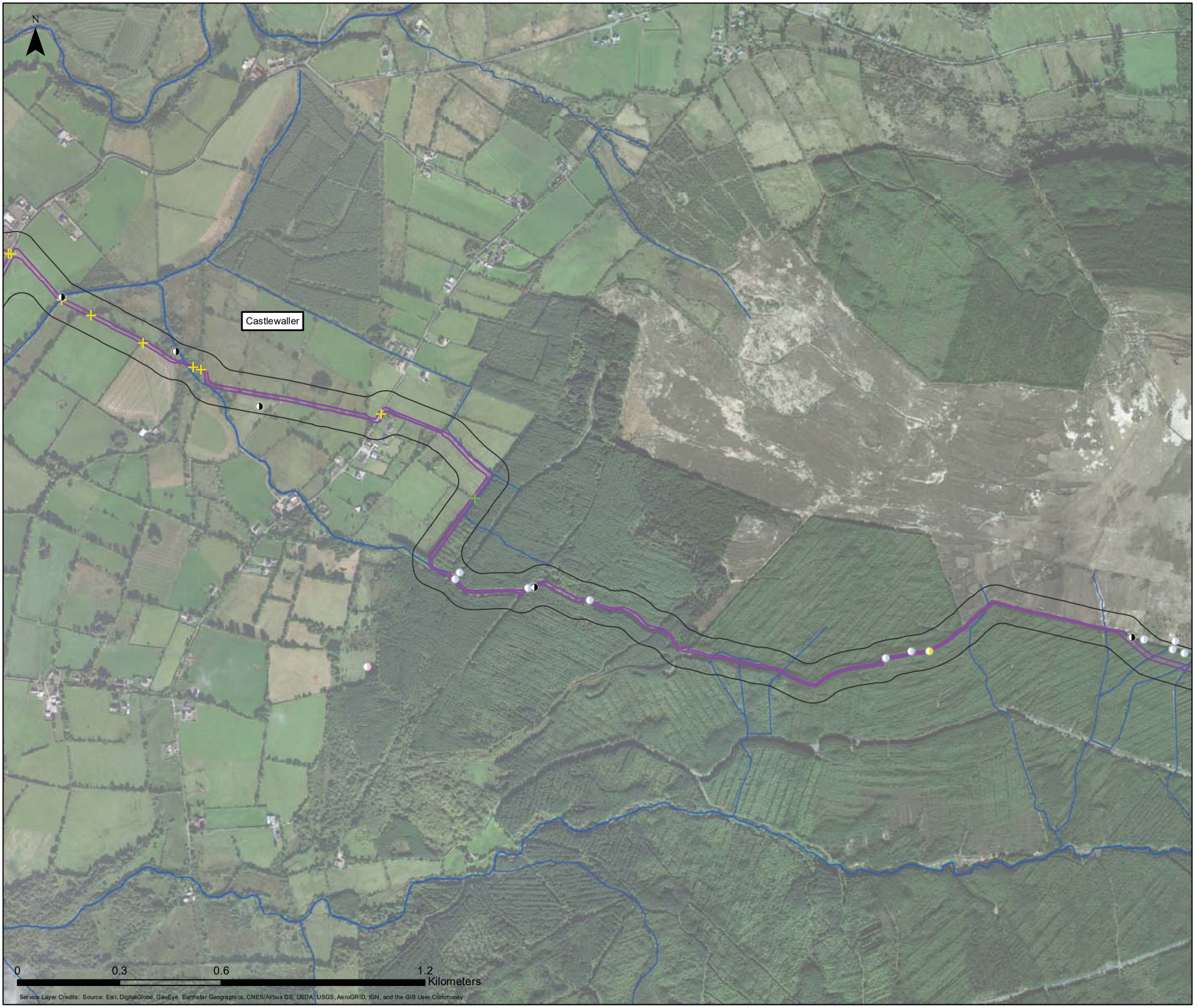

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 3: Non-Volant Mammals within the UWF Grid Connection Study Area.
Map 2 of 7

Legend:

- Badger (Tracks,snuffle hole, latrine, scat)
- Deer sp.
- Fallow Deer
- Pine Marten
- Study Area Boundary (50 m)
- Watercourses
- UWF Grid Connection Construction Works Area
- Temporary hedge/tree removal and pruning
- Permanent hedge/tree removal

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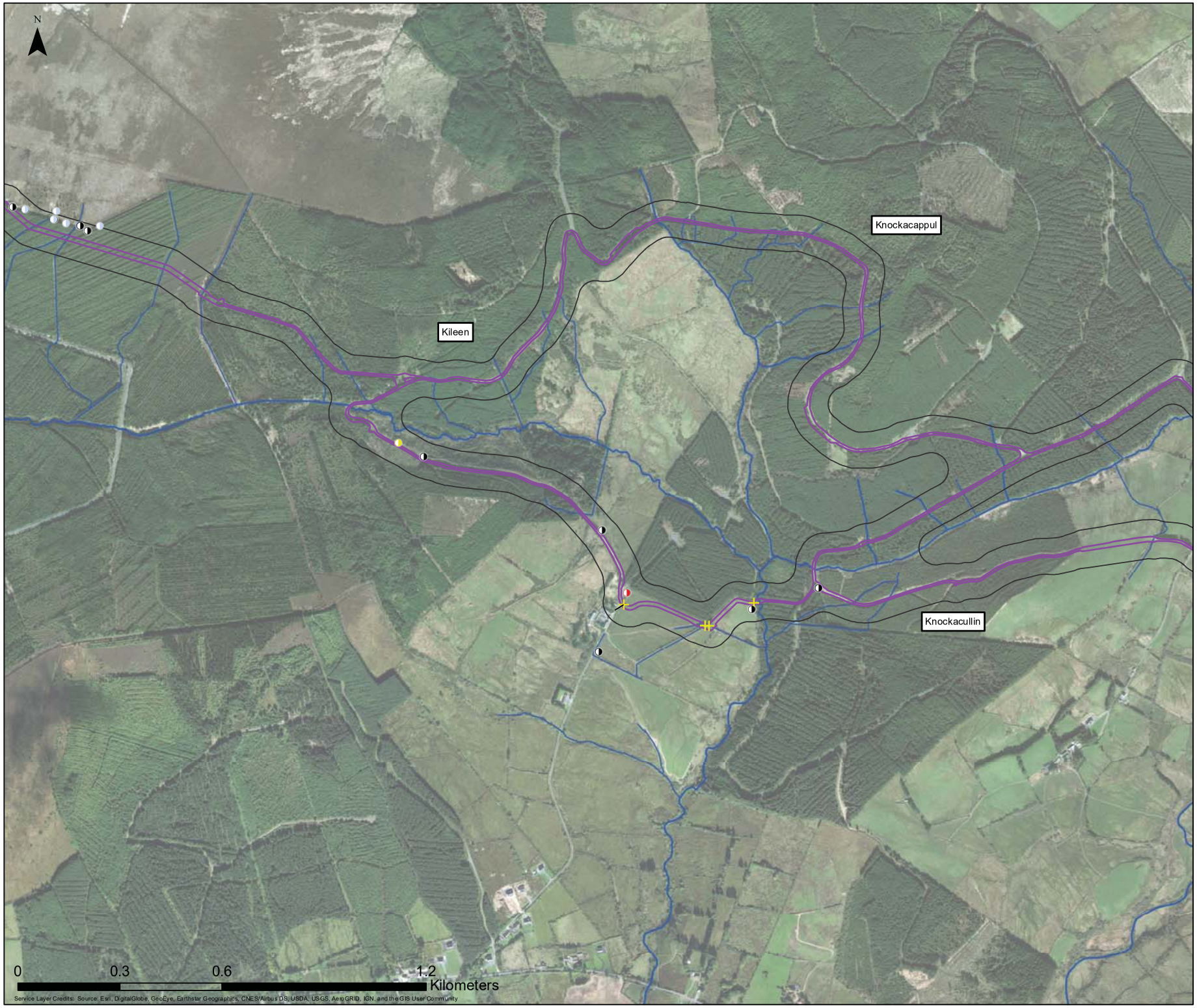

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 3: Non-Volant Mammals within the UWF Grid Connection Study Area.
Map 3 of 7

Legend:

- Badger (Tracks,snuffle hole, latrine, scat)
- Deer sp.
- Fox
- Pine Marten
- Study Area Boundary (50 m)
- Temporary hedge/tree removal and pruning
- UWF Grid Connection Construction Works Area
- Watercourses

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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 3: Non-Volant Mammals within the UWF Grid Connection Study Area.
Map 4 of 7

Legend:

- Badger (Tracks,snuffle hole, latrine, scat)
- Fox
- Irish Hare
- Mink or Otter
- Otter (Tracks, path, slide,spraint)
- Study Area Boundary (50 m)
- Temporary hedge/tree removal and pruning
- Permanent hedge/tree removal
- UWF Grid Connection Construction Works Area
- Watercourses

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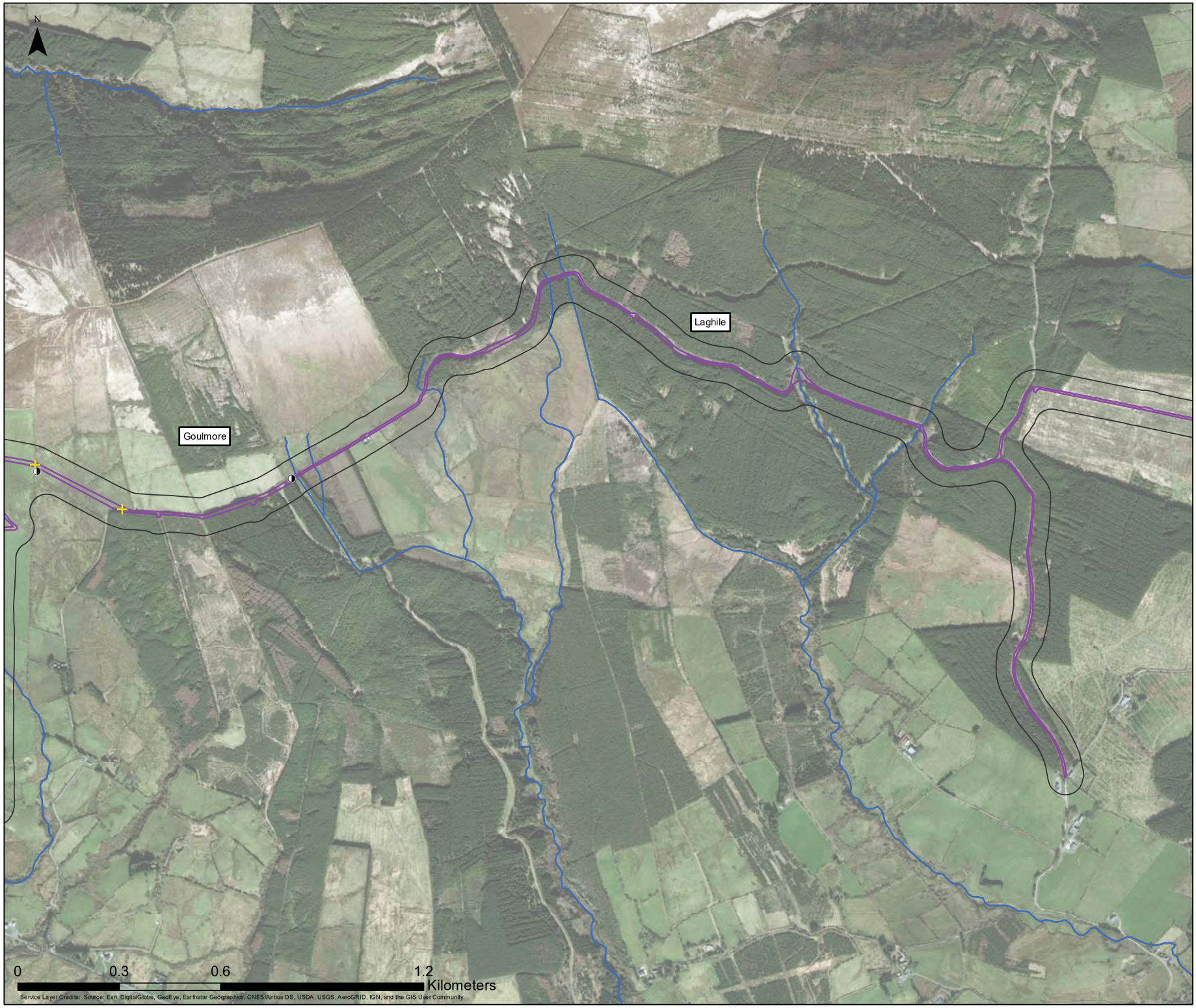

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 3: Non-Volant Mammals within the UWF Grid Connection Study Area.
Map 5 of 7

Legend:

- Badger (Tracks,snuffle hole, latrine, scat)
- Study Area Boundary (50 m)
- UWF Grid Connection Construction Works Area
- Watercourses
- Temporary hedge/tree removal and pruning

For illustrative purposes only. Map not to scale

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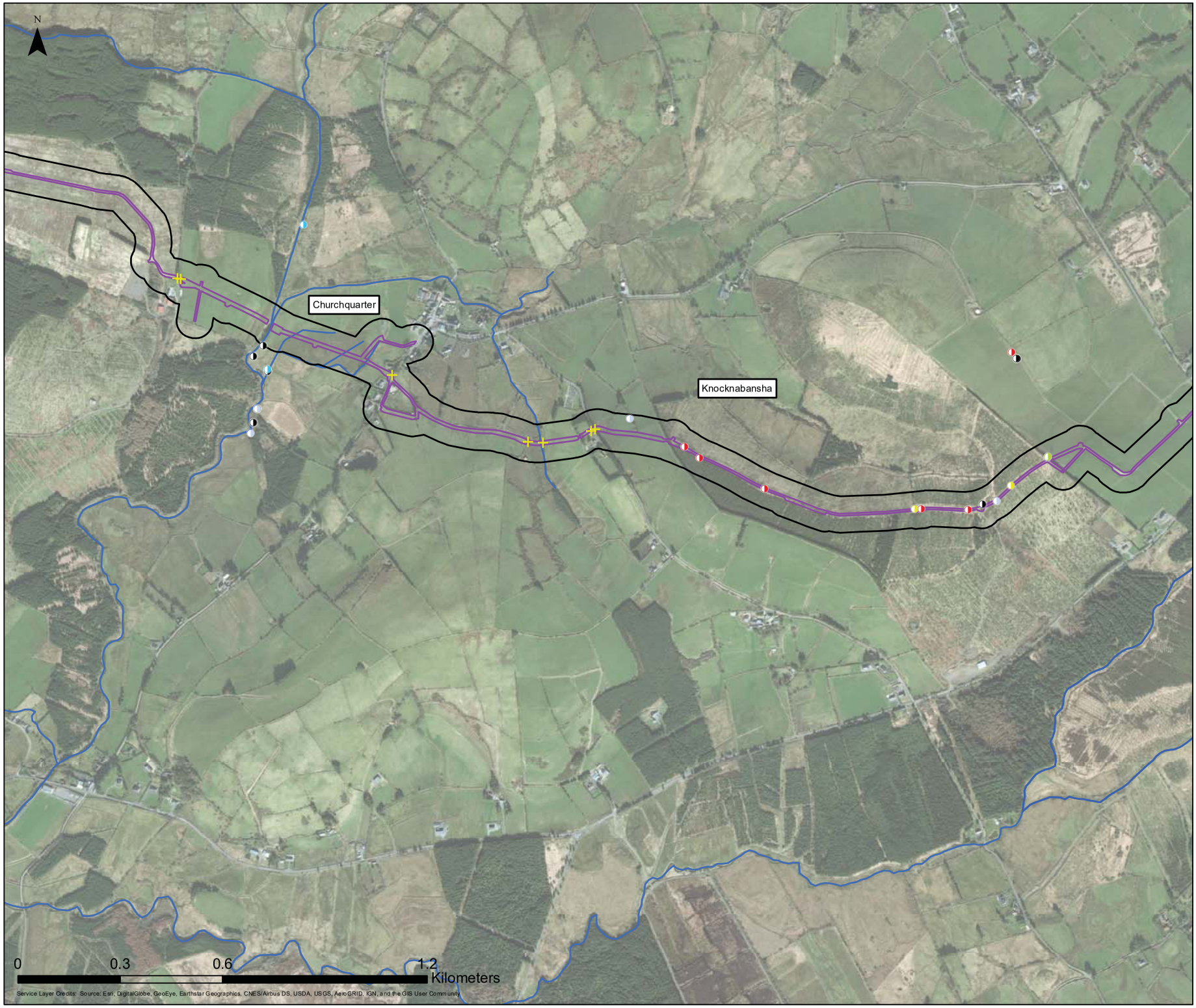

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 3: Non-Volant Mammals within the UWF Grid Connection Study Area.
Map 6 of 7

Legend:

- Badger (Tracks,snuffle hole, latrine, scat)
- Deer sp.
- Fox
- Otter (Tracks, path, slide,spraint)
- Pine Marten
- Squirrel sp.
- Wood Mouse
- Study Area Boundary (50m)
- UWF Grid Connection Construction Works Area
- Watercourses
- Temporary hedge/tree removal and pruning

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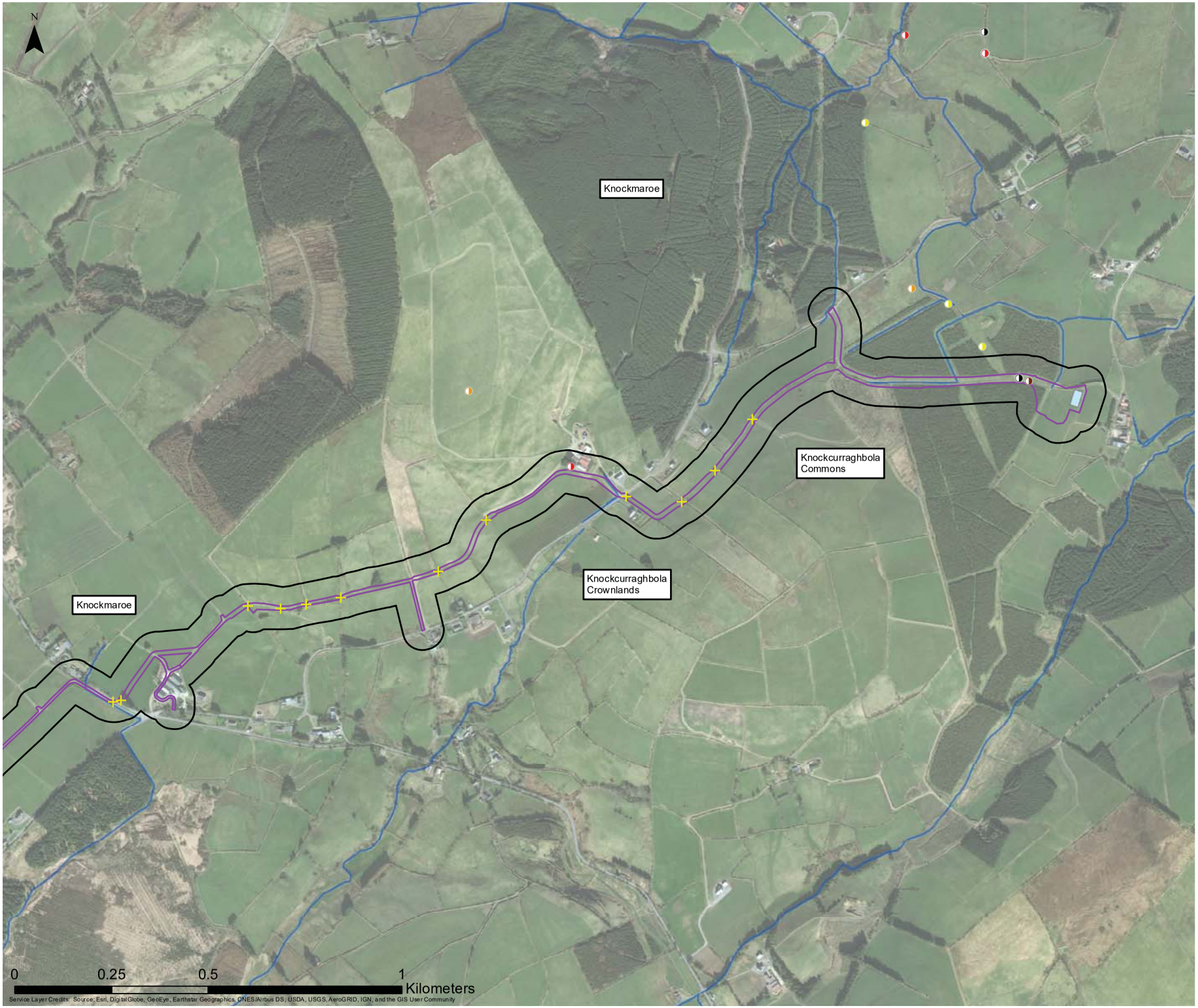

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 3: Non-Volant Mammals within the UWF Grid Connection Study Area.
Map 7 of 7

Legend:

- Badger (Tracks, snuffle hole, latrine, scat)
- Deer sp.
- Fox
- Irish Hare
- Pine Marten
- Temporary hedge/tree removal and pruning
- UWF Grid Connection Construction Works Area
- Study Area Boundary (50m)
- Watercourses
- Temporary Construction Compound

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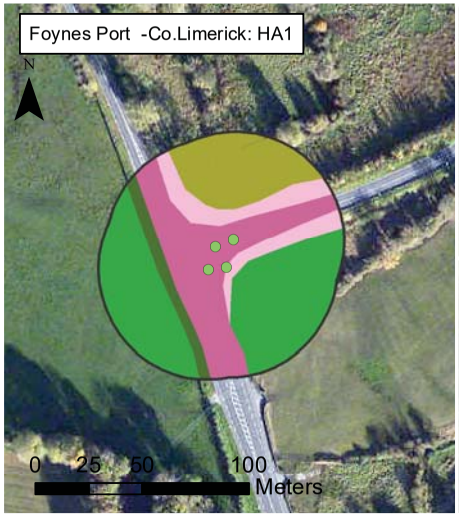

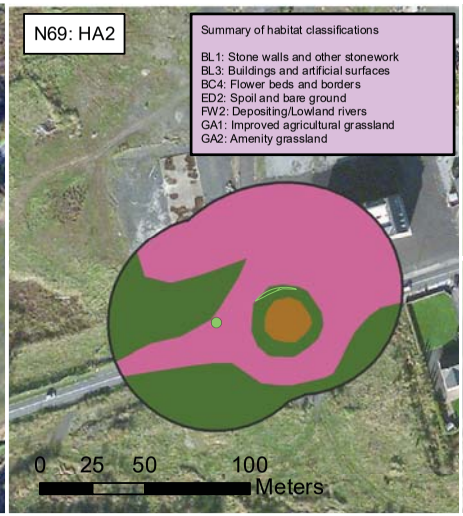

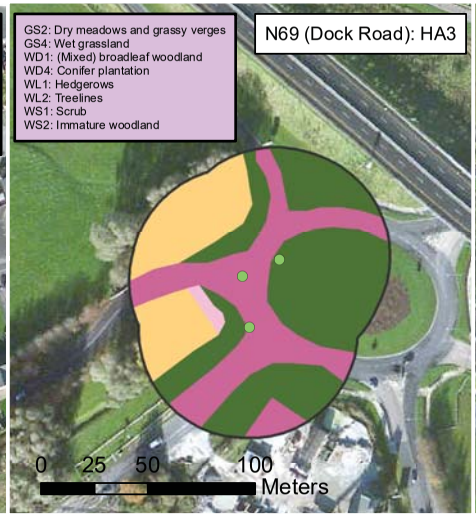

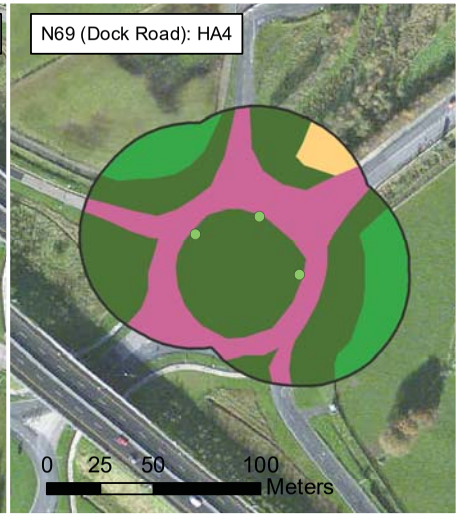

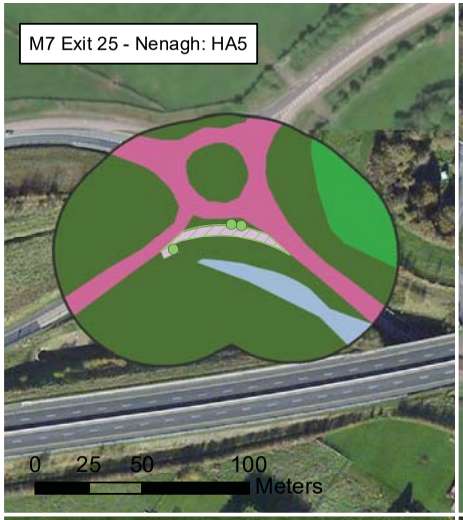

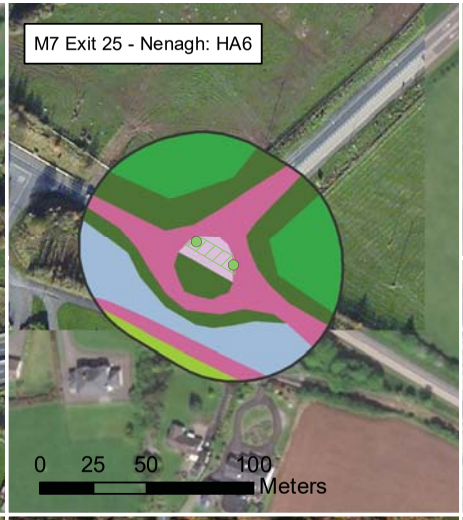

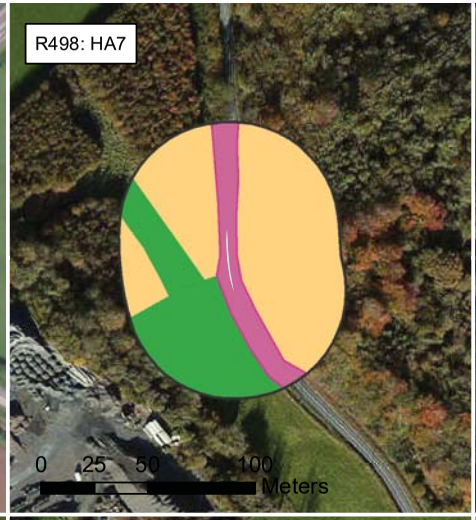

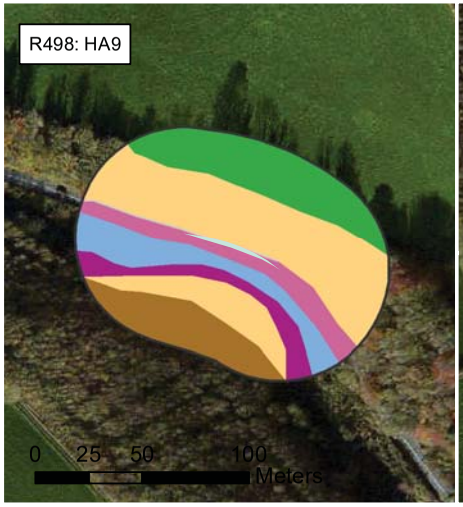

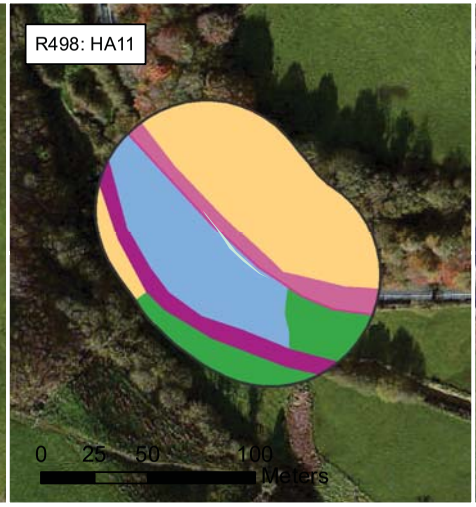

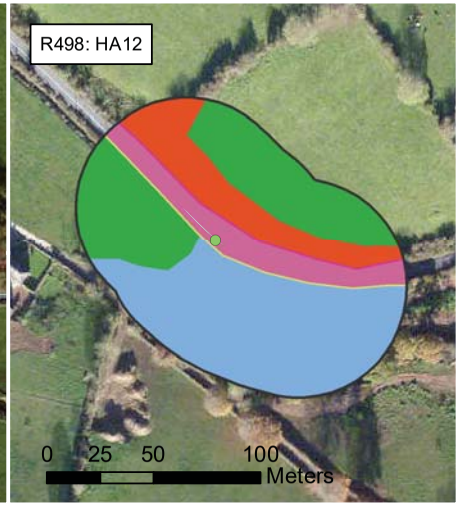

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 4: Other Activities (Habitats, General Birds, Watercourses, Amphibians & Reptiles, Marsh Fritillary) Map 1 of 2

Legend:

- Study Area Boundary (50m)
- BL1
- GS2
- WL1
- BC4
- BL3
- ED2
- FW2
- GA1
- GA2
- GS2
- GS4
- WD1
- WD4
- WL2
- WS1
- WS2
- Street Furniture
- Ancillary Activities Haul Route Street Furniture Not in Sockets
- Ancillary Activities Matting Overlay
- Ancilliary Haul Route Activities: Vegetation Trimming

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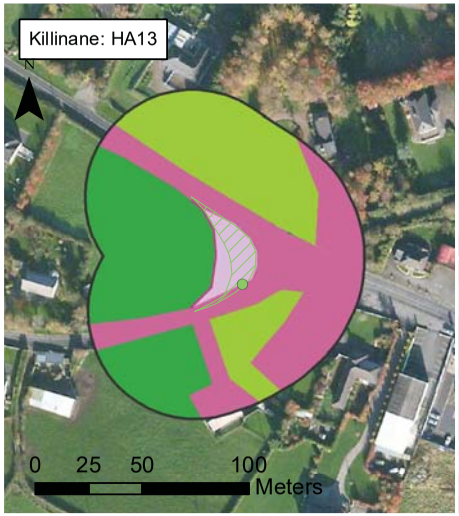

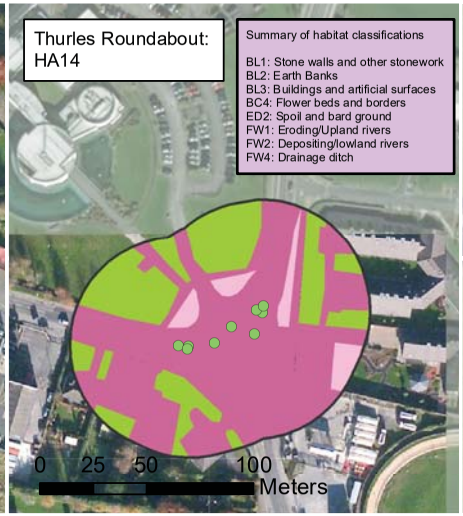

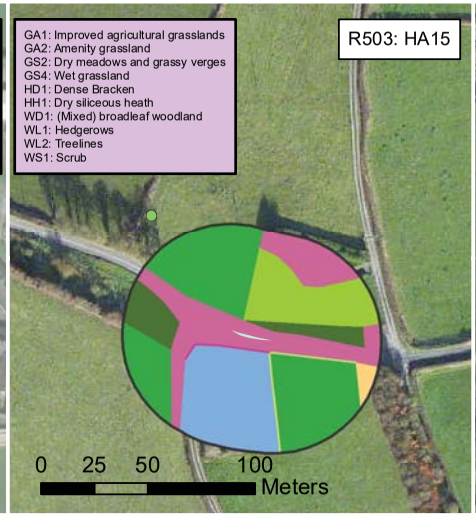

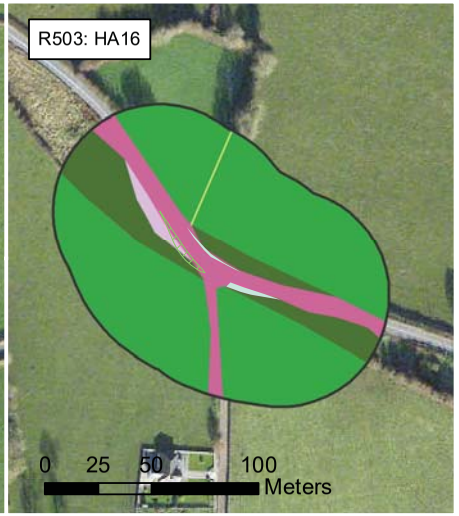

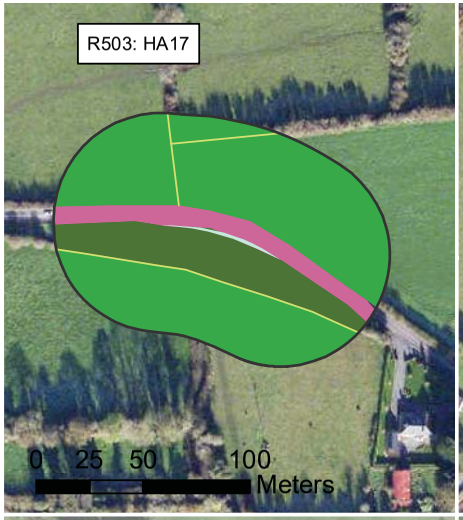

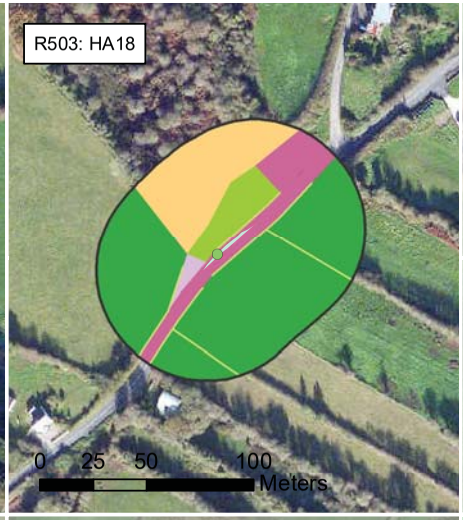

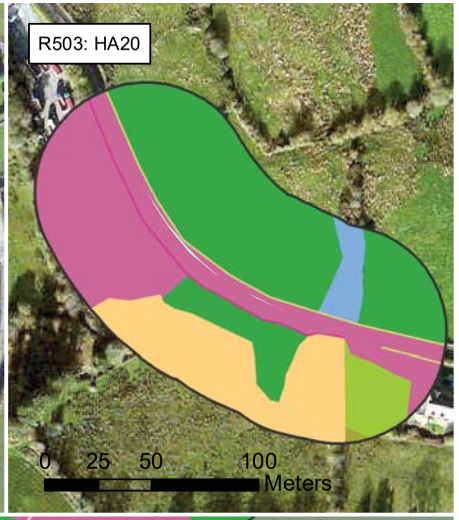

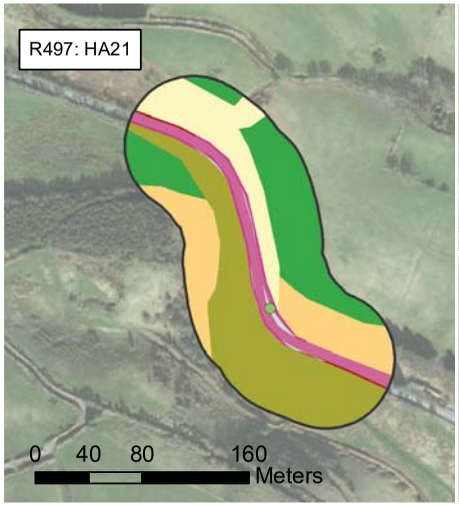

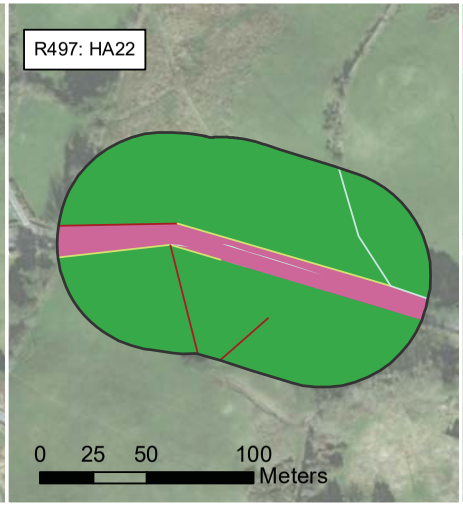

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 4: Other Activities (Habitats, General Birds, Watercourses, Amphibians & Reptiles, Marsh Fritillary) Map 2 of 2

Legend:

- Study Area Boundary (50m)
- BL1
- BL2
- ED2
- FW1
- FW2
- FW4
- GS2
- HD1
- WL1
- WL2
- BC4
- BL3
- ED2
- GA1
- GA2
- GS2
- GS4
- HH1
- WD1
- WS1
- Ancillary Haul Route Activities: Street Furniture
- Ancillary Haul Route Activities: Matting Overlay
- Ancilliary Haul Route Activities: Vegetation Trimming

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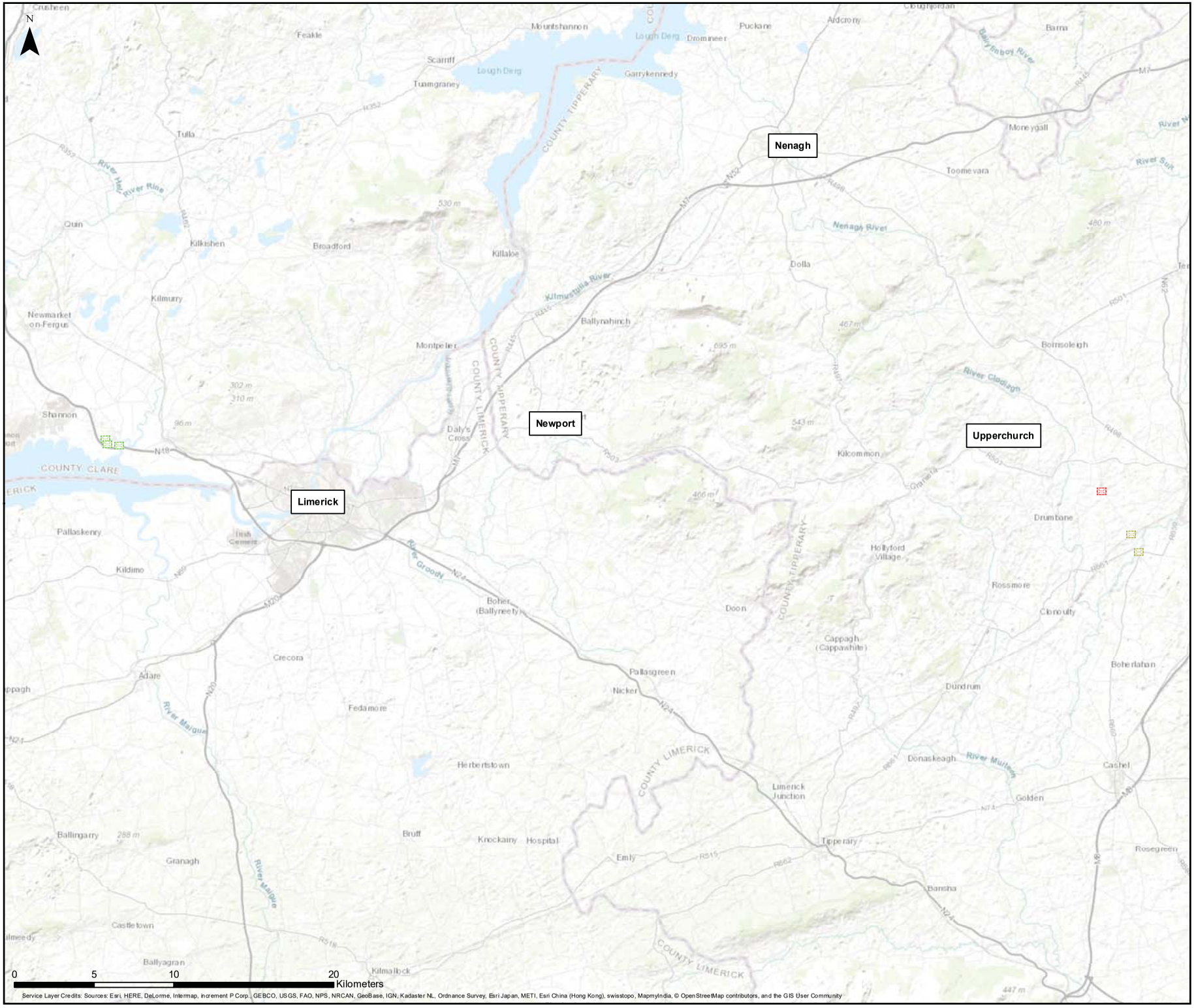

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 5: Other Activities (Bats)

Legend:
Bat Roost Suitability:

Bridges

- High
- Moderate
- Low
- Negligible

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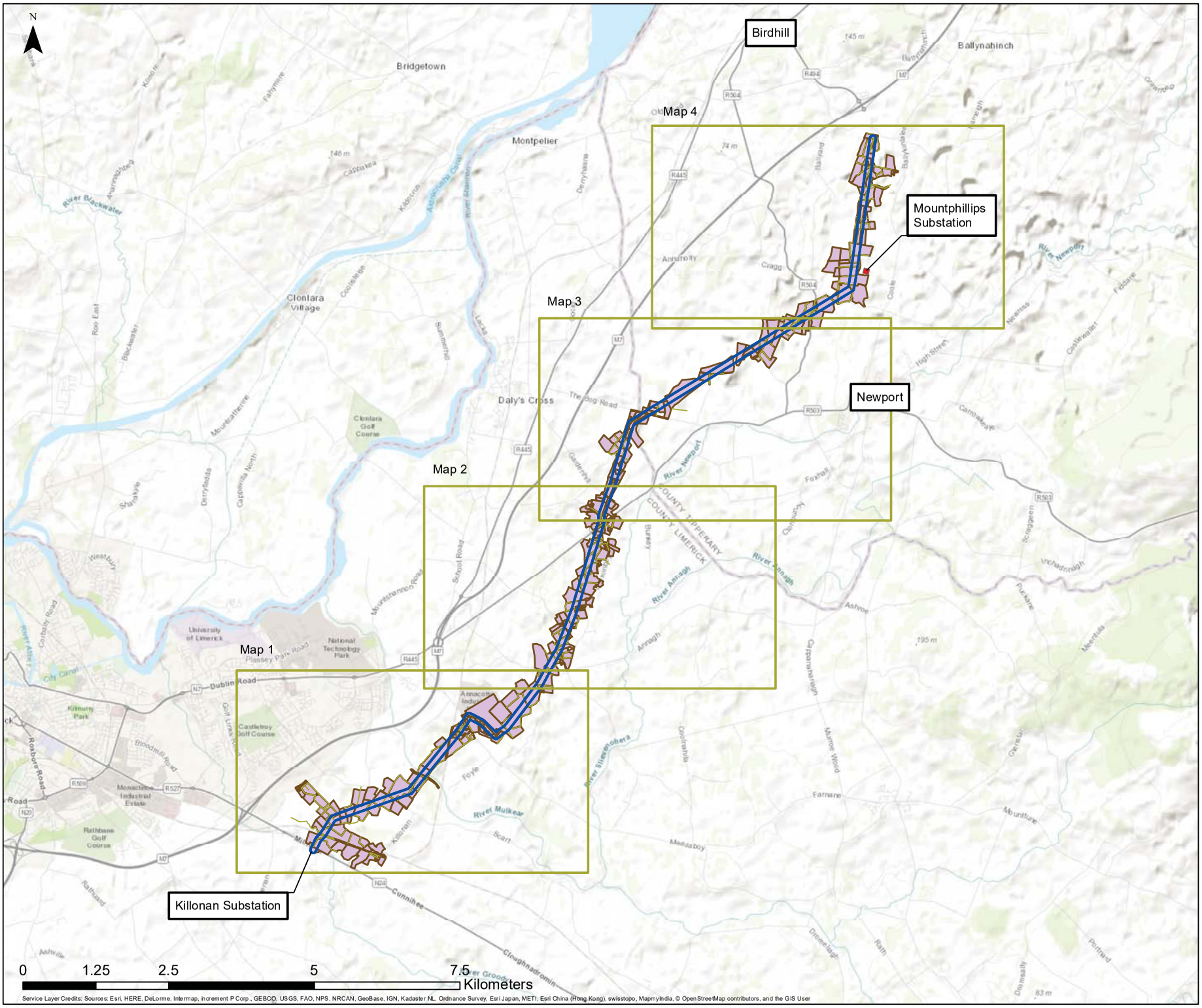

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Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 6: Other Activities: Terrestrial Habitats along the Killonan OHL Overview Map

Legend:
- Mountphillips Substation
- OHL 50m Buffer
- Linear Habitats
- Habitats

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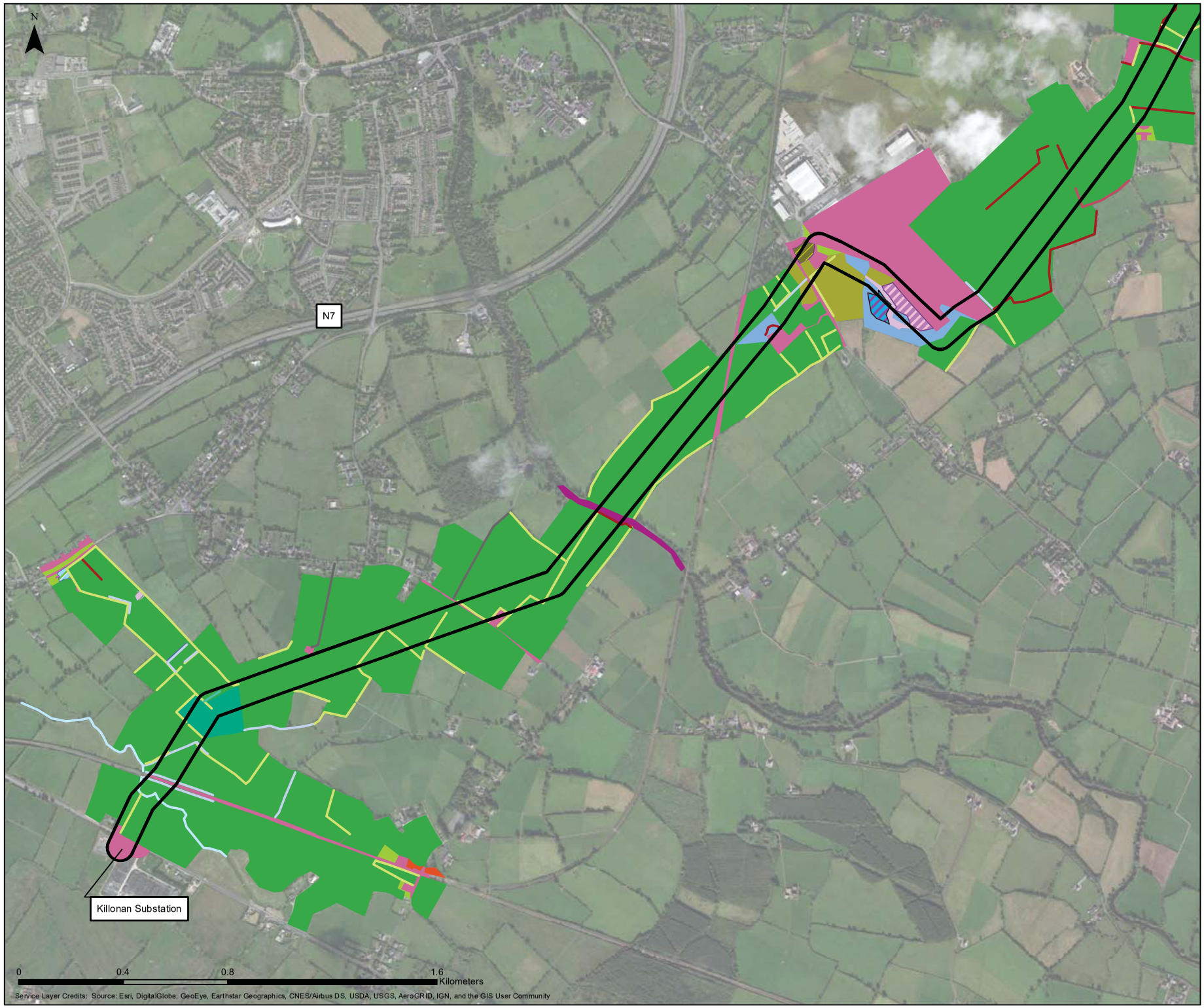

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 6: Other Activities: Terrestrial Habitats along the Killonan OHL
Map 1 of 4

Legend:

- OHL 50m Buffer
- BL3
- FW2
- FW4
- WL1
- WL1/BL1
- WL2
- WL2/BL2
- WL2/FW4
- BL2/ED2
- BL3
- ED2
- ED2/ED3
- FW2
- GA1
- GA1/GS4
- GA2
- GS4
- WD1/GS4
- WL2
- WS1
- WS1/ED2
- WS1/WS2

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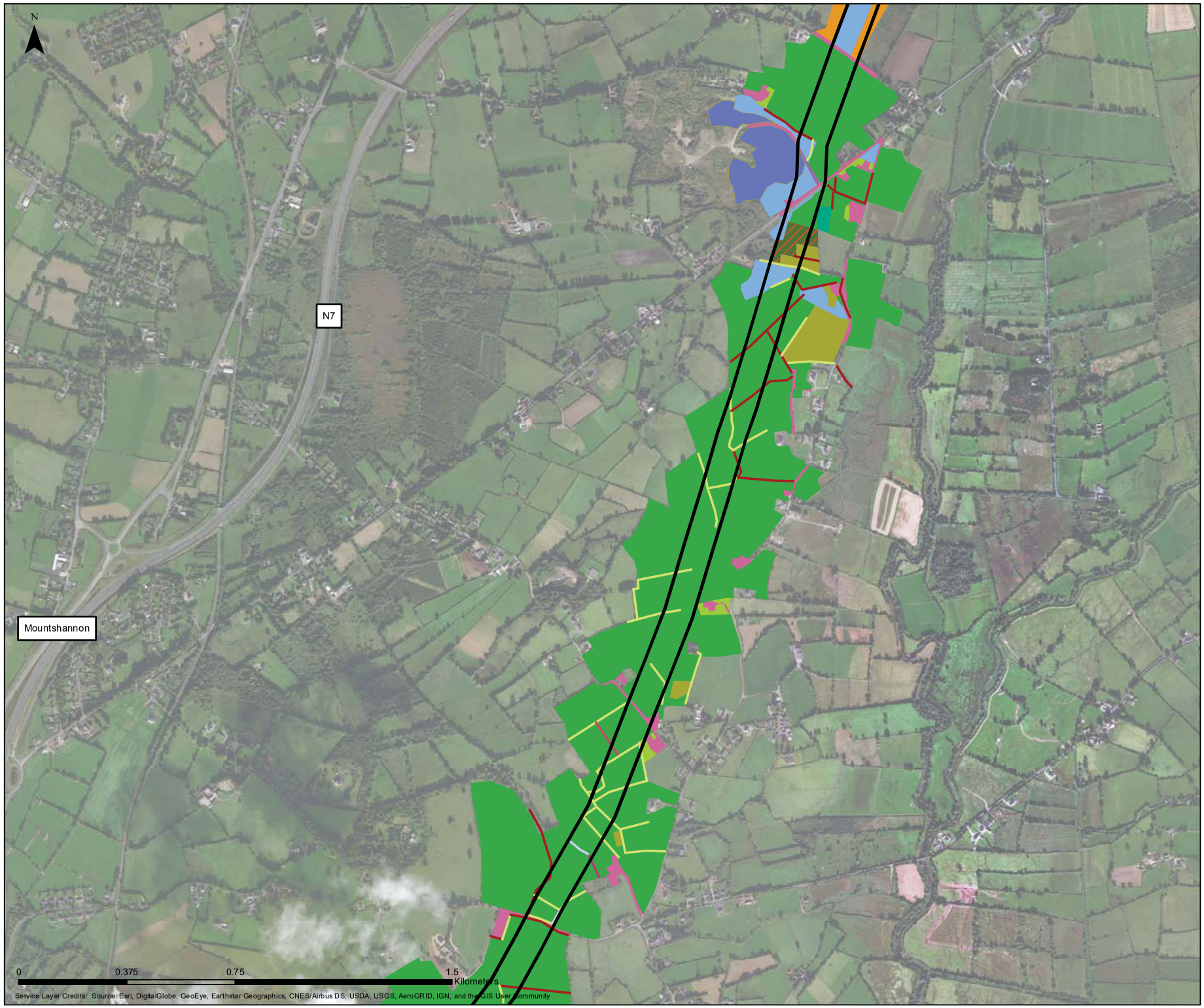

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 6: Other Activities: Terrestrial Habitats along the Killonan OHL
Map 2 of 4

Legend:

- OHL 50m Buffer
- BL2
- FW4
- WL1
- WL1/FW4
- WL2
- WL2/BL2
- BL3
- ED3
- FL8
- GA1
- GA1/GS4
- GA2
- GS4
- WD2
- WN6
- WS1

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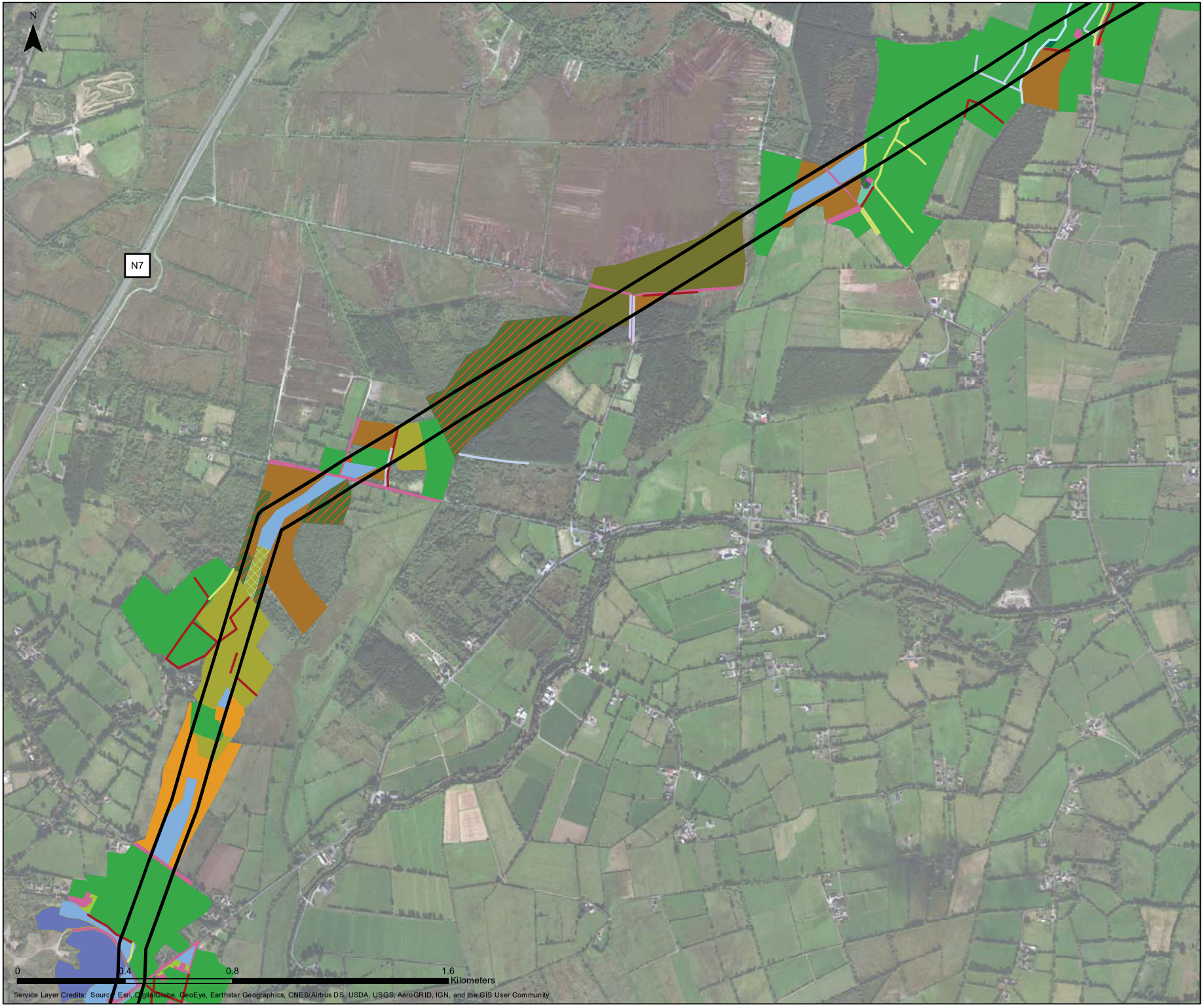

Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 6: Other Activities: Terrestrial Habitats along the Killonan OHL
Map 3 of 4

Legend:

- OHL 50m Buffer
- BL2
- FW2
- FW4
- WL1
- WL2
- BL3
- ED3
- FL8
- GA1
- GA1/ED2
- GA1/WS1
- GA2
- GM1
- GS4
- PB4
- WD2
- WD4
- WL2
- WN2
- WN6
- WS1
- WS1/BL3

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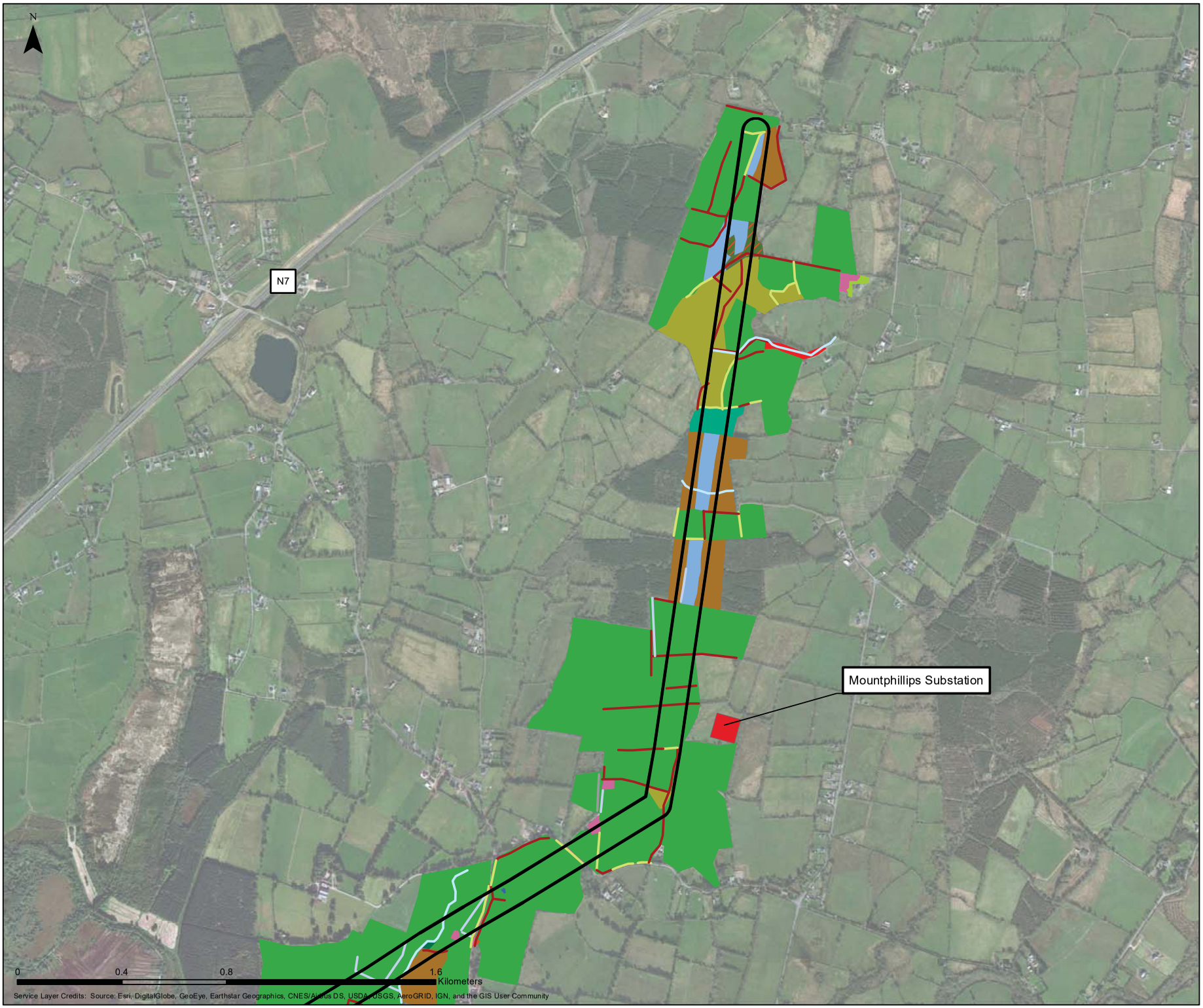
Inis
T: +353 (0) 65 689 2441
E: info@inisenv.ie
W: www.inisecology.com
W: www.inisenv.ie

INIS Ecology
Suite 11, Shannon Commercial Properties,
Information Age Park, Gort Road,
Ennis, Co. Clare



Client: Ecopower Developments Ltd.

Project: Whole Windfarm Project

Title:
Figure A8 - 6: Other Activities: Terrestrial Habitats along the Killonan OHL
Map 4 of 4

Legend:

- Mountphillips Substation
- OHL 50m Buffer
- BL2
- FW2
- FW4
- WL1
- WL2
- BL3
- FL5
- GA1
- GA1/GS4
- GA1/WS1
- GA2
- GS4
- WD4
- WL2
- WN5
- WN6
- WS1

For illustrative purposes only. Map not to scale

Drawn:	Checked:	Authorised:
POC	CC	HW

Date:	Map Reference:
13/02/2018	1.0

Inis
T: +353 (0) 65 689 2441
E: info@inisenv.ie
W: www.inisecology.com
W: www.inisenv.ie

INIS Ecology
Suite 11, Shannon Commercial Properties,
Information Age Park, Gort Road,
Ennis, Co. Clare

Whole Upperchurch Windfarm Project

Natura Impact Statement
for
Whole UWF Project Elements 1 to 5

May 2018

Appendix A15: Biodiversity Information

EIAR Appendix 8.1.7 Confidential Annex

INIS Environmental Consultants Ltd
Planning and Environmental Consultants

Produced by INIS Environmental Consultants Ltd., Suite 11, Shannon Commercial Properties, Information Age Park, Gort Road, Ennis, Co. Clare
T: +353 (0) 65 6892441, M: +353 (0) 87 2831725,

f. www.facebook.com/inis.env

INIS Environmental Consultants Ltd
Planning and Environmental Consultants

Produced by INIS Environmental Consultants Ltd., Suite 11, Shannon Commercial Properties, Information Age Park, Gort Road, Ennis, Co. Clare
T: +353 (0) 65 6892441, M: +353 (0) 87 2831725,

f. www.facebook.com/inis.env

A8-1.7 Confidential Annex

The Confidential Annex contains highly sensitive information on protected species that are vulnerable to persecution. It may be reviewed by the planning officers of the Competent Authorities and by the Statutory Consultees (e.g. the National Parks and Wildlife Service), but should not be published on any online system or made available in any other public format.

The Confidential Annex is not for general public dissemination due to its highly sensitive nature.

It is therefore not included in this public copy of Appendix 8.1.

Members of the public can view this confidential annex, upon appointment, at the premises of the Competent Authority