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

REFERENCE DOCUMENT 15 of 36

This document contains the following:

UWF Related Works (LA ref. 18/600913, ABP ref. ABP-303634-19)

- **2019 Revised Appropriate Assessment Report For UWF Related Works – Volume E3 (3 of 5)**
  - Appendix A10: Biodiversity Information – UWF Related Works EIA Report, EIAR Main Report Ch.8 Biodiversity

VOLUME E
REVISED APPROPRIATE ASSESSMENT REPORTING

UWF Related Works

Revised Appropriate Assessment Report

For UWF Related Works

January 2019

Volume E3 (3 of 5)

Appendix A10: Biodiversity Information - UWF Related Works EIA Report, EIAR Main Report Ch.8 Biodiversity

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Appendix A10: Biodiversity Information

UWF Related Works EIA Report, EIAR Main Report Ch.8 Biodiversity

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UWF Related Works Revised EIA Report

Volume C2: Revised EIAR Main Report

Chapter 8: Biodiversity

Topic Chapter Authors: Inis

EIAR Coordinator: ECOPOWER

January 2019

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Topic: Biodiversity

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

Appendix No.	**Appendix Title**
Appendix 8.1	Detailed Biodiversity Data and Supplementary Information

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

Abbreviation	**Full Term**

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 Related Works are 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 Bilboa River 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 Related Works is illustrated on OSI Mapping on Figure RW 8.1: UWF Related Works 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 Related Works are the subject development, being the subject of a current application to Tipperary County Council. The main parts of the UWF Related Works are identified in Table 8.1 below.

Table 8-1: Subject Development – UWF Related Works

Project ID	The Subject Development	Composition of the Subject Development
Element 2	The Subject Development UWF Related Works (RW)	Internal Windfarm Cabling Realigned Windfarm Roads Haul Route Works Telecom Relay Pole RW Ancillary Works

Note: The UWF Related Works are 'Element 2' 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 Related Works (Volume C2 EIAR Main Report).

This EIA Report is also available on www.upperchurchwindfarm.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>

Type	Source
	• Recommended Bird Survey Methods to Inform Impact Assessment of Onshore Wind Farms. (Scottish Natural Heritage, 2014). • Raptors: A Field Guide for surveys and Monitoring, third Edition (Hardey *et al.,* 2014). <u>Other Birds</u> • 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. <u>Terrestrial Habitats</u> • 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). <u>Bats</u> • 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 <u>Badgers</u> • 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). <u>Otters</u> • 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). <u>Aquatic Habitats & Species</u> • Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (National Roads Authority, 2005).

Type	Source
	• 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). • 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 In co-ordination with and by review of the other EIA Report Chapters as follows: • Chapter 10: Soils • Chapter 11: Water • Chapter 12: Air Consented Upperchurch Windfarm planning documents • Ecopower Developments Ltd. (2013) 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

Type	Source
	Other Projects planning documents • 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 • 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 8-2 above is provided in Appendix 8.1.in Volume C4 EIAR Appendices and includes:

- Desktop Review Datasets
- Survey Results
- Hen Harrier Survey Data

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, nevertheless some minor limitations are discussed below:

Restricted Access to Properties: Where possible within the vicinity of elements 2 -4, detailed bat surveys were carried out for buildings of high or moderate suitability within 150m.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.

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.
County Importance	• Area of Special Amenity. • Area subject to a Tree Preservation Order.

Resource Evaluation	**NRA Criteria**
	• 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	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
			Article 4(2) of the Birds Directive; Species 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 Fieldwork Methodology - 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 UWF Grid Connection 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.

Existing records of Hen Harrier usage of the area, dating back to 2003, were collated to establish suitable nesting or roosting habitat and further consultation undertaken in January 2019 with local Hen Harrier experts and NPWS.

Satellite imagery was additionally reviewed to identify areas of potentially suitable breeding habitat.

Ornithological surveys were performed from March 2015 to April 2017. The 5 No. vantage points are listed below:

- VP1: 594124 E 662083 N
- VP2:595759 E 660170 N
- VP3:596303 E 660414 N
- VP4:595529 E 658478 N
- VP5:598177 E 664307 N

All observations were restricted to hours of daylight (range 06.45-20.35). All 5 vantage points focused on suitable nesting habitat and historical nest locations within 2km of the UWF Related Works/Upperchurch Windfarm site.

8.1.8.4 Fieldwork Methodology - Habitats

Existing habitat information was reviewed to identify potentially sensitive habitats following a data request made to the NPWS. A further walkover of the UWF Related Works in July 2017 also allowed potentially sensitive areas to be identified prior to commencing habitat surveys.

All habitat surveys undertaken for the UWF Related Works 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.

With regard to previous habitat surveys within the Upperchurch Windfarm (EIS 2013), the methodology also followed best practice guidance (Smith *et al.*, 2011) and utilised the habitat classification presented in Fossitt (2000).

8.1.8.5 Fieldwork Methodology for Classifying Ecological Value of Watercourses

Surveys of watercourse crossings pertaining to UWF Related Works were carried out on 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 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 fluviati- lis (L.), Lampetra planeri (Bloch), and Petromyzon marinus (L.): A context for conservation and biodiver- sity considerations in Ireland. Biology and the Environment. 101B(3):165-185.
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- Kennedy, GJA & Strange, CD (1986) The effects of intra- and inter-specific competition on the distribu- tion 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 West- ern 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 follow Best Practice

8.1.8.6 Fieldwork Methodology - Bat Species

8.1.8.6.1 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.

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 project,
- Identify any important bat roosts (particularly maternity and hibernation roosts) in the vicinity of the project.
- Identify any important commuting routes / feeding areas along hedgerows, treelines or other linear features that will be severed or otherwise modified

8.1.8.6.2 Preliminary evaluation of buildings, trees and bridges

A Preliminary Ecological Appraisal was carried out for all buildings within 150m of the UWF Related Works 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 Related Works, 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.

8.1.8.6.3 Surveys of potential roosts

Within the vicinity of the UWF Related Works 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.

Within the vicinity of the UWF Related Works 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).

Five additional buildings in the vicinity of UWF Related Works were surveyed in July/August 2017 to cover the maternity period.

8.1.8.6.4 Evaluation of foraging areas / commuting routes Surveys using automated detectors

Bat activity surveys were carried within the vicinity of the UWF Related Works. 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 the UWF Related Works

Surveys were carried out during suitable weather conditions, i.e. minimum temperatures above 10°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.

8.1.8.6.5 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.).

8.1.8.6.6 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 below. 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.

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

8.1.8.6.7 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.

8.1.8.7 Fieldwork Methodology - Non-Volant Mammals

8.1.8.7.1 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.

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.

8.1.8.7.2 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. In accordance with NRA guidance, all areas were systematically searched for setts and all hedgerows and boundaries were checked comprehensively by Inis ecologists.

8.1.8.7.3 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.

8.1.8.8 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 Revised Appropriate Assessment Report for UWF Related Works (herein referred to as the AA Report and included in Volume E which accompanies the appeal to An Bord Pleanála. In line with EIA Directive Guidance, findings are summarised herein; however, and for the avoidance of doubt, we refer the AA Report 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 Related Works is described in Table 8.14 and illustrated on Figure RW 8.2: European Sites within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 8-14: UWF Related Works Study Area for European Sites

Study Area for European Sites	Justification for the Study Area Extents
15km from the construction works area boundary, extended to 15km from the boundary of all of the Other Elements of the Whole UWF Project.	An evaluation distance of 15km is currently recommended in the case of projects (DoEHLG, 2009). The extension of the area is based on professional judgement and the precautionary principle.

8.2.1.2 Baseline Context and Character of European Sites in the UWF Related Works 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 were identified within the UWF Related Works Study Area. These European Sites and their respective distance to the Whole UWF Project are also outlined in Table 8.15, and identified on Figure RW 8.2.

For the UWF Related Works, a precautionary zone of impact of 15km distance has been applied around UWF Related Works which5 is extended to include a 15km area around all of the other elements of the Whole UWF Project in order to establish whether or not the UWF Related Works either alone or in-combination with the other elements of the Whole UWF Project is likely, or has potential, to have a significant effect on a European Site on the integrity of the site.

There are 23 European Sites within the extended Study Area - nineteen Special Areas of Conservation (SAC) and four Special Protection Area (SPA for birds). These European Sites are identified in **Table 8.15.**

Table 8-15: Proximity of European Sites to UWF Related Works

	European Site	Distance from UWF Related Works
1	Slievefelim to Silvermines Mountain SPA (004165)	0m (see *Note below)
2	Lower River Shannon SAC (002165)	1.5 km
3	Lower River Suir SAC (002137)	3.0 km
4	Anglesey Road SAC (002125)	2.9 km
5	Bolingbrook Hill SAC (002124)	7.2 km
6	Keeper Hill SAC (001197)	10.9 km
7	Silvermine Mountain SAC (000939)	11.5 km
8	Silvermine Mountain West SAC (002258)	12.5 km
9	Philipston Marsh SAC (001847)	13.0 km
10	Kilduff, Devilsbit Mountain SAC (000934)	13.7 km
11	Clare Glen SAC (000930)	17.0 km
12	Glenstal Wood SAC (001432)	17.1 km
13	Slieve Bernagh Bog SAC (002312)	28.4 km
14	Lough Derg, North-East Shore SAC (002241)	28.5 km
15	Glenomra Wood SAC (001013)	31.4 km
16	Tory Hill SAC (000439)	40.4 km
17	Ratty River Cave SAC (002316)	44.5 km
18	Askeaton Fen Complex SAC (002279)	48.2 km
19	Barrigone SAC (000432)	62.0 km
20	Curraghchase Woods SAC (000174)	50.6 km
21	Lough Derg (Shannon) SPA (004058)	24.5 km
22	River Shannon and River Fergus Estuaries SPA (004077)	34.5 km
23	Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161)	67.3 km

**** Note on the Proximity of UWF Related Works to the Slievefelim to Silvermines Mountain SPA:*** *the site boundary of UWF Related Works overlaps the Slievefelim to Silvermines SPA at HW7 where a small section (0.05ha) of SPA is included in the 'tail-swing' space for Upperchurch Windfarm turbine blade deliveries. The Construction Works Boundary does not overlap SPA Boundary. No works or removal of habitat will occur within the SPA, as the turbine blades will simply sweep over the area as the transporting trailer is being turned around in the existing yard.*

A Screening evaluation is included in Volume E: Revised Appropriate Assessment Report for UWF Related Works, the Screening examined the potential for UWF Related Works to cause any effects via source pathway linkages on the designated SACs and SPAs within the extended study area. The results of the Screening are that **is there is no *potential* for UWF Related Works to cause any effects to the following 20 no. European Sites (17 SACs, 3 SPAs):**

- Anglesey Road SAC (002125),
- Bolingbrook Hill SAC (002124),
- Keeper Hill SAC (001197),
- Silvermine Mountain SAC (000939),
- Silvermine Mountain West SAC (002258),
- Philipston Marsh SAC (001847),
- Kilduff, Devilsbit Mountain SAC (000934),
- Clare Glen SAC (000930),
- Glenstal Wood SAC (001432),
- Slieve Bernagh Bog SAC (002312),
- Lough Derg, North-East Shore SAC (002241),
- Glenomra Wood SAC (001013),
- Tory Hill SAC (000439),
- Ratty River Cave SAC (002316),
- Askeaton Fen Complex SAC (002279),
- Barrigone SAC (000432),
- Curraghchase Woods SAC (000174),
- Lough Derg (Shannon) SPA (004058,
- River Shannon and River Fergus Estuaries SPA (004077), and
- Stack's to Mullaghareirk Mountains, West Limerick Hills & Mount Eagle SPA (004161).

The results of the screening are also that UWF Related Works has potential, via impact pathways, to cause effects to the following 3 European Sites (2 SACs, 1 SPA);

- **Lower River Shannon SAC**
- **Lower River Suir SAC, and**
- **Slieve Felim to Silvermines Mountain SPA**

Therefore, the Lower River Shannon SAC, Lower River Suir SAC and Slieve Felim to Silvermines Mountain SPA were 'Screened In' for further evaluation at Stage Two of the Appropriate Assessment process.

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.

European Sites

Sensitive Aspect

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.

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:

Biodiversity

Topic

[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

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

8.2.2.1 Cumulative Evaluation Study Areas

8.2.2.1.1 UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works was evaluated for cumulative effects with other projects and the study area is set out in the table below.

UWF Related Works Cumulative Evaluation Study Area for European Sites	Justification for the Study Area Extents
Slieve Felim to Silvermines Mountains SPA boundary plus 2km Mulkear River catchment in the Lower River Shannon SAC, Clodiagh River and Multeen River catchment in the Lower River Suir SAC	Zone of cumulaitve impacts for the SPA is the entire SPA boundary, plus 2km around the boundary to identifiy other projects. Zone of cumulaitve impacts for SAC relates to the regional subcatchment, as any effects at a wider catchment level will be negligible due to dilution and dispersion.

The study is illustrated on Figure CE 8.2 European Sites within the UWF Related Works Cumulative Evaluation Study Area.

8.2.2.1.2 Whole Project Cumulative Evaluation Study Area

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

The Other Elements must be considered because UWF Related Works 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.

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.

8.2.2.2 Scoping of Other Elements, Other Projects or Activities & for Potential for Impacts

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 Related Works 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, Milestone Windfarm, and the Activities of Forestry, Agriculture, Turf-Cutting have been scoped in for evaluation of cumulative effects to European Sites.

Biodiversity

Topic

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 8.16.

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 WP 8.2. The baseline character of the areas around these Elements is described in Section 8.2.2.3.

Table 8-16: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	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 Milestone Windfarm Forestry Agriculture Turf-Cutting	Yes, included for the evaluation of cumulative effects

8.2.2.3 Cumulative Information: Baseline Characteristics – Context & Character

The location of the Other Elements in relation to the Lower River Shannon SAC, Lower River Suir SAC and the Slieve Felim to Silvermines Mountain SPA is provided below.

8.2.2.3.1 Element 1: UWF Grid Connection – *including preliminary preferred route of 110kV UGC (Jan'19)*

The UWF Grid Connection passes through the boundary of the Lower River Shannon cSAC at six locations, all of which are along the public road route of the 110kV UGC. The vast majority of the footprint of UWF Grid Connection drains into the catchment area of the Lower River Shannon SAC. The remainder of UWF Grid Connection drains into the catchment of the Lower River Suir. The UWF Grid Connection traverses the Slievefelim to Silvermines Mountains SPA where it is routed along the Regional Road R503.

The location of UWF Grid Connection Study Area in the context of these three Sites is illustrated on Figure CE 8.2: European Sites within the UWF Related Works Cumulative Evaluation Study Area, watercourse crossing locations are identified on Figure WP 8.4: Aquatic Habitats & Species within the Whole Project Cumulative Evaluation Study Area.

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in the Bilboa (Inch) local surface water catchment which is part of the River Shannon catchment, and in the Clodiagh local surface water catchment which is part of the River Suir catchment. There is no overlap of UWF Grid Connection works areas with UWF Related Works areas within the boundary of the Slieve Felim to Silvermines Mountain SPA.

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.

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 drains downstream to the Lower River Shannon cSAC. The Upperchurch Windfarm is located in its entirety outside the Slieve Felim to Silvermine Mountains SPA.

Consideration of the Passage of Time: A comparison of EPA monitoring data for 2012 and 2017 demonstrates that water quality in the catchments into which the windfarm site drains, has remained stable. Hen harrier habitat has remained sub-optimal and surveys during 2015 to 2017 recorded low usage of the windfarm site by hen harriers. Therefore it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR.

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 the Lower River Shannon SAC. No works however are proposed in respect of these activities in proximity to European Sites.

8.2.2.3.5 Other Projects or Activities

Milestone Windfarm: an operational 4-turbine windfarm, with an associated hen harrier management plan. The windfarm is located on lands adjoining the UWF Related Works site. This windfarm is located entirely outside of the Slieve Felim to Silvermines Mountain SPA.

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.

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.

8.2.3 PROJECT DESIGN MEASURES for European Sites

At the conception of the UWF Related Works, 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 8.17 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **European Sites**.

Table 8-17: UWF Related Works 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.
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 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 during the hen harrier 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 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.

8.2.4 EVALUATION OF IMPACTS to European Sites

As previously referenced, the likely effects of the UWF Related Works and then the cumulative effects of the UWF Related Works 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 2.7 of the revised Appropriate Assessment report for UWF Related Works.

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 listed below:

8.2.4.1 Evaluation of Effects to the Lower River Shannon SAC & Lower River Suir SAC

The following **indirect habitat degradation effects** to the Lower River Shanonn and Lower River Suir were examined:

1. Riparian Habitat Degradation (Section 3.5.1 and 3.6.1 of the Revised Appropriate Assessment Report)
2. Changes in Flow Regime (Section 3.5.2 and 3.6.2 of the Revised Appropriate Assessment Report)
3. **Decrease in habitat quality via: surface water runoff, sediment entrainment or release; release of fuels oils/ chemicals,** surface/ ground water quality impacts (Section 3.5.3 and 3.6.3 of the Revised Appropriate Assessment Report).

The following **indirect or ex-situ disturbance or displacement effects** to the Lower River Shanonn and Lower River Suir were examined:

1. Disturbance to Fisheries (Section 3.5.4 and 3.6.4 of the Revised Appropriate Assessment Report)
2. Spread of Aquatic Invasive Species (Section 3.5.5 and 3.6.5 of the Revised Appropriate Assessment Report)
3. Disturbance to Otter (Section 3.5.6 and 3.6.6 of the Revised Appropriate Assessment Report)

8.2.4.2 Evaluation of Effects to the Slieve Felim to Silvermines Mountain SPA

The following **indirect habitat reduction or loss effects** was examined:

1. Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat (Section 3.7.1 of the Revised Appropriate Assessment Report)

The following **Indirect or ex-situ disturbance or displacement effects** was examined:

1. Disturbance/Displacement of foraging Hen Harrier (ex-situ during the breeding season) (Section 3.7.2 of the Revised Appropriate Assessment Report)

8.2.4.3 Conclusion of the Assessment of Significance 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; there is no potential for significant effects as a result of UWF Related Works, either alone or in-combination. UWF Related Works 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.

8.2.5 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, significant effects are avoided, and therefore additional mitigation measures were not required.

8.2.6 Evaluation of Residual Impacts to European Sites

Potentially significant effects have been evaluated, and it is concluded that UWF Related Works, 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 Related Works, 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:

RW-BPM-12	Monitoring of nesting and roosting Hen Harrier (*Circus cyaneus*)
RW-BPM-16	Monitoring of non-native invasive plant species
RW-BPM-17	Best practice measures for the removal of vegetation during construction
RW-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 Related Works, 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 Related Works.

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 Related Works, 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 Related Works, 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; that UWF Related Works, alone or in combination, will not result in any effects that will adversely affect the integrity of the Lower River Shannon SAC or Lower River Suir SAC or Slieve Felim to Silvermines Mountain SPA, having regard to their respective conservation objectives, in circumstances where "no reasonable scientific doubt" remains as to the absence of such adverse effects.

No adverse impacts to European Sites are concluded in the Appropriate Assessment Report for UWF Related Works.

Table 8-18: Summary of the impacts to European Sites

Impact to European Sites:	**Lower River Shannon SAC**	**Lower River Suir SAC**	**Slieve Felim to Silvermines Mountains SPA**
Evaluation Impact Table (for Other Elements only)	*Appropriate Assessment Report Section 3.5*	*Appropriate Assessment Report Section 3.5*	*Appropriate Assessment Report Section 3.5*
Project Life-Cycle Stage *(for Other Elements only)*	Construction Stage	Construction Stage	Construction Stage
UWF Related Works	**No Adverse Impacts to the SAC**	**No Adverse Impacts to the SAC**	**No Adverse Impacts to the SAC**
Element 1: UWF Grid Connection	No Adverse Impacts to the SAC	No Adverse Impacts to the SAC	No Adverse Impacts to the SAC
Element 3: UWF Replacement Forestry	No Adverse Impacts to the SAC	No Adverse Impacts to the SAC	No Adverse Impacts to the SAC
Element 4: Upperchurch Windfarm	No Adverse Impacts to the SAC	No Adverse Impacts to the SAC	No Adverse Impacts to the SAC
Element 5: UWF Other Activities	No Adverse Impacts to the SAC	No Adverse Impacts to the SAC	No Adverse Impacts to the SAC
CUMULATIVE IMPACTS:			
UWF Related Works in-combination with Upperchurch Windfarm, UWF Grid Connection, UWF Replacement Forestry, Bunkimalta Windfarm, Castlewaller Windfarm, Milestone Windfarm, and Forestry, Agriculture and Turf-Cutting Activities	No Adverse In-combination Impacts to the SAC	No Adverse In-combination Impacts to the SAC	No Adverse In-combination Impacts to the SPA

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 UWF RELATED WORKS – EVALUATED AS EXCLUDED

8.3.1.1 Baseline Characteristics of National Sites in relation to UWF Related Works Study Area

There are 4 No. NHAs and 17 No. pNHAs within 15km of the UWF Related Works. The location and spatial extent of these NHA's and pNHA's is illustrated on Figure RW 8.3: National Sites within the UWF Related Works Study Area (Volume C3 EIAR Figures).

The location of the NHA's in the UWF Related Works Study Area is described in Table 8.19, the distinguishing aspects of these sites are summarized in Table 8-20.

Table 8-19: List of NHAs within 15km of UWF Related Works

Site name and code	Distance from nearest point of UWF Related Works
Bleanbeg Bog NHA (Site Code: 002450)	12.1km West
Grageen Fen and Bog NHA (Site Code: 002186)	12.4km southwest
Mauherslieve Bog NHA (Site Code: 002385)	4.3km west
Gortacullin Bog NHA (Site Code: 002401)	6.5km north

Table 8-20: Features of Interest of NHAs within the UWF Related Works 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.
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.

National Sites

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8.3.1.2 Evaluation of UWF Related Works

It is evaluated that the UWF Related Works has **no potential to cause impacts to National Sites,** for the following reasons:

- The UWF Related Works will not overlap any NHA or pNHA boundary, the nearest site is over 4km away, as outlined in Table 8.19.
- 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).

8.3.1.3 Cumulative Evaluation for the Other Elements of the Whole UWF Project (grey background)

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

UWF Related Works has no potential to cause impacts to National Sites by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because the UWF Related Works are part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in Section 8.3.2 to Section 8.3.4 and included in the summary table in Section 8.3.8 in order to show the totality of the project.

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8.3.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.3.2.1 Cumulative Evaluation Study Areas

8.3.2.1.1 UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works as been excluded as a source of impacts to National Sites, primarily due to separation distances between UWF Related Works and National Sites.

8.3.2.1.2 Whole Project Cumulative Evaluation Study Area

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

UWF Related Works has no potential to cause impacts to National Sites by itself, and therefore cannot have a cumulative effect. However, the Other Elements must be considered because the UWF Related Works are part of a whole project. Therefore, the cumulative information and evaluations for the Other Elements of the Whole UWF Project are included in Section 8.3.2 to Section 8.3.4 and included in the summary table in Section 8.3.8 in order to show the totality of the 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 Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works Study Area along with the study areas for Other Elements which are described in Table 8-21 and illustrated on Figure WP 8.3: National Sites within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-21: Whole Project Cumulative Evaluation Study Area for National Sites

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	15km from the boundary of construction works, afforestation lands, activity locations.	Professional Judgement
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

8.3.2.2 Scoping of Other Elements, Other Projects or Activities & for Potential for Impacts

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 Related Works 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 A2.3.2.8).

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 Related Works 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.

8.3.2.2.1 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 8-22.

The location of the Other Elements in relation to National Sites is illustrated on Figure WP 8.3. The Features of Interest for these sites are described in Section 8.3.2.4.

Table 8-22: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	Evaluated as excluded: No potential for effects 3 NHA's and 21 No. pNHAs are found within 15km of the UWF Grid Connection. The NHA sites include Bleanbeg Bog NHA, Grageen Fen and Bog NHA and Mauherslieve Bog NHA. Grageen Fen and Bog NHA and Bleanbeg Bog NHA are the closest NHA sites at just over 2km from the route of the 110kV UGC. 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 Grid Connection will not overlap any NHA or pNHA boundary. And it is therefore considered that there is no potential for impacts to the Features of Interest of the National Sites due to seperatoin distance and absence of any ecological connectivity, or source pathway links for hydrological effects (as evaluated in Chapter 11: Water, Section 11.7). • While UWF Grid Connection is located close to the boundary of Grageen Fen and Bog NHA it is downslope of the NHA and located with the carriageway of the public road (regional road R503), therefore it is considered that there is no likelihood of indirect habitat effects to this NHA.
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 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: No potential for effects/Neutral 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.

8.3.3 Mitigation Measures for Impacts to National Sites

Mitigation measures are not relevant as, due to its location, there is **no potential for UWF Related Works to cause impacts** to National Sites.

8.3.4 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. Mitigation measures are not relevant and thus the Residual Impact is the same as the Impact set out in the Evaluation of UWF Related Works (Section 8.3.1), i.e. **no potential for impacts**.

8.3.5 Application of Best Practice and the EMP for National Sites

No UWF Related Works Best Practice Measures have been developed specifically for National Sites.

8.3.6 Summary of Impacts to National Sites

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

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

Table 8-23: Summary of the impacts to National Sites

Impact to National Sites:	**No Impact**
Evaluation Impact Table (for Other Elements only)	*Section 8.3.4.1*
Project Life-Cycle Stage *(for Other Elements only)*	Construction Stage
UWF Related Works	**No Potential for Impacts - See Section 8.3.1**
Element 1: UWF Grid Connection	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

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 Related Works or the Other Elements of the Whole UWF Project (see Section 8.3.2.1).

National Sites

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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 Related Works is described in Table 8-24 and illustrated on Figure RW 8.4: Aquatic Habitats & Species within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 8-24: UWF Related Works 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 Related Works 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.

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.

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.

Table 8-25: 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
7	**Total**		**32**	**25**

8.4.1.3 Importance of Aquatic Habitats & Species

Both the Clodiagh (Tipperary) and Multeen sub-catchments are identified as Freshwater Pearl Mussel sensitive catchments[6], containing other **extant** populations of this Annex II and Annex IV listed species; the Clodiagh River population is designated as a qualifying interest within the Lower River Suir SAC. In both the Clodiagh and Multeen rivers, Freshwater pearl mussel populations are located downstream and at a distance from the subject development (approximately 17 km and 16 km, respectively). The upper reaches of the Clodiagh and Multeen catchments within the study area provide important juvenile habitat for Atlantic salmon, contiguous with the populations within the Lower River Suir SAC downstream; resident Brown trout populations are also supported. Within the study area the tributaries of these sub-catchments are high gradient watercourses, generally of 'Good' status with 'Good' biological water quality. The upper reaches of these watercourses are therefore evaluated as being of National Importance. Additional minor watercourse crossings directly affected by the works are evaluated as being of local importance (higher value) where fisheries potential is identified, and in the absence of fisheries habitat, as 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 Related Works is located in the Clodiagh (Tipperary) catchment and to a lesser degree the Multeen catchment of the River Suir with a small portion of the site within the Mulkear River (Bilboa River) catchment of the River Shannon. Both the Mulkear and Clodiagh river catchments were classified as 'catch and release' by IFI in 2019 (Salmon Angling Regulations: Management of the Wild Salmon Fishery 2019) 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 assigned in the previous River Basin Management Plan (2009-2014) for 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. It is noted that the status and risk

[6] Sourced from online NPWS dataset, available at: https://www.npws.ie/research-projects/animal-species/invertebrates/freshwater-pearl-mussel/freshwater-pearl-mussel-data

characterisations have not been updated in the current RBMP (2018-2012), thus characterisation and water quality status are cited as indicative.

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

8.4.2.1 Cumulative Evaluation Study Areas

UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works was evaluated for cumulative effects with other projects and the study area is set out in the table below.

UWF Related Works Cumulative Evaluation Study Area for Aquatic Habitats & Species	Justification for the Study Area Extents
Watercourse Crossing Locations and Waterbody Sub-catchments	As per Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Scheme, NRA, (2008)

The study is illustrated on Figure CE 8.4 Aquatic Habitats & Species within the UWF Related Works Cumulative Evaluation Study Area.

8.4.2.1.1 Whole Project Cumulative Evaluation Study Area

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

The Other Elements must be considered because UWF Related Works 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.

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 Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works 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 8-26 and illustrated on Figure WP 8.4: Aquatic Habitats & Species within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-26: Whole Project Cumulative Evaluation Study Area for Aquatic Habitats & Species

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	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		

8.4.2.2 Scoping of Other Elements, Other Projects or Activities & for Potential for Impacts

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 Related Works 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 A2.3.2.8).

The results of this scoping exercise are that: no other projects or activities will cause cumulative effects to Aquatic Habitats & Species with UWF Related Works, however in order to present the totality of the project-Bunkimalta Windfarm (consented) have been scoped in for evaluation of cumulative effects relating to the Other Elements.

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 8-27.

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 WP 8.4. The baseline character of the areas around these Elements is described in Section 8.4.2.3

Table 8-27: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	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. • 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	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. Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is no potential for cumulative effects with the UWF Related Works.

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 1: UWF Grid Connection

63 no. watercourse crossings occur within the construction works area boundary associated with the UWF Grid Connection. The majority (58 no.) of the watercourses which occur within the UWF Grid Connection Study Area are located in the River Shannon regional catchment (W1 to W58), with just 5 No. watercourses located in the River Suir regional catchment (W59 to W63). Where the 110kV UGC leaves the Mountphilips Substation site, it is entirely located on the public road along its route to the Consented UWF Substation.

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 (W4 on the Newport Bridge), the Clare River (W31 on the Tooreenbrien Bridge) and the Bilboa River (W48 on the Anglesey Bridge). At these crossing locations all three watercourses are evaluated as containing good salmonid habitat, with good/high biological water quality and good ecological status. All crossing works required for the UWF Grid Connection will be in the bridge structures.

The Newport (Mulkear) River (W4), Clare River (W31) and Bilboa River (W48), which flow through the study area, were generally 4 to 6 metres wide. The smaller Tooreenbrien Lower (25T54) (W28) and Foildarragh (25F33) (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 1m 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 throughout the Mulkear sub-catchment. 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 8-28.

Table 8-28: 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	Fisheries Value: EPA mapped blue line, major river or stream	W4, W9, W13, W28, W31, W33, W34, W40, W44, W48	10	2
Class 2	Fisheries Value: Headwater Stream Equivalent to EPA blue line but not mapped	W1, W3, W60	3	3
Class 3	Low Fisheries Value: Sub-optimal, heavily vegetated, low or no flow during dry periods	W2, W5, W6, W10, W12, W16, W17, W18, W19, W20, W21, W22, W23, W24, W26, W27, W32, W36, W37, W38, W39, W45, W46, W47, W51	25	8
Class 4	No Fisheries Value: Drain, no flow	W7, W8, W11, W14, W15, W25, W29, W30, W35, W41 W42, W43, W49, W50, W52, W53, W54, W55, W56, W57, W58, W59, W61, W62, W63	25	18
	Total		**63**	**31**

Watercourse crossing locations, watercourse classifications and the boundary of various sub-catchments are identified on Figure WP 8.4: Aquatic Habitats & Species within the Whole Project Cumulative Evaluation Study Area.

Further details on the site visits and the fisheries appraisals for each watercourse are included in Appendix 8.1: Detailed Biodiversity Information and Supplementary Data (Section A8.1.3.1) in Volume C4 EIAR Appendices.

Geographical Overlap with UWF Related Works:

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area due to surface water crossings in the Bilboa (Inch) local surface water catchment which is part of the River Shannon catchment, and in the Clodiagh local surface water catchment which is part of the River Suir catchment. The potential for cumulative effects extends to the zone of influence of the works at the UWF Related Works watercourse crossing locations and also includes the intervening reach within the same waterbody in instances where potential culvert replacement works are also required for the UWF Grid Connection.

8.4.2.3.2 Element 3: UWF Replacement Forestry

Not applicable – This Element has been 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 8-25 as WW2 (Class 2).

Consideration of the Passage of Time: A comparison of EPA monitoring data for 2012 and 2017 demonstrates that water quality in the catchment into which the windfarm site drains, has remained stable. Therefore, it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR.

8.4.2.3.4 Element 5: UWF Other Activities

Not applicable – This Element has been evaluated as excluded, see Section 8.4.2.2.1.

8.4.2.3.5 Other Projects or Activities

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.

Please Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is no potential for cumulative effects with the UWF Related Works.

8.4.3 PROJECT DESIGN MEASURES for Aquatic Habitats & Species

At the conception of the UWF Related Works, 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 8-29 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Aquatic Habitats & Species**.

Table 8-29: UWF Related Works 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 (Realigned Windfarm 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
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 (Consented

	Upperchurch Windfarm Site Compound No.1). 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.

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 Grid Connection, 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 Related Works are identified and evaluated. Then the likely cumulative effects of the UWF Related Works 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 8-30: 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; culvert replacement 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[7], 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 of the Subject Development Impact – Decrease in instream aquatic habitat quality

Element 2: UWF Related Works – direct/indirect impact

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 32 no. crossings, 5 No. watercourse crossings (all in the Clodiagh River catchment) were 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

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

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 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude:

The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2) within the Clodiagh River catchments, and where UWF Related Works will include 5 No. watercourse crossings evaluated as having fisheries value and UWF Grid Connection may potentially require culvert replacement works on 1 no. Class 1 watercourses. Neither Upperchurch Windfarm nor UWF Replacement Forestry will require any instream works, it is therefore evaluated that any cumulative impacts to instream aquatic habitat quality will be negligible.

The spatial extent of such effects will occur within the footprint of the instream works or culvert replacement works, and also downstream within the zone of sediment transport. Where minor watercourse tributaries are crossed by the proposed works their contribution to downstream waterbodies is assessed collectively. Therefore, the zone of cumulative effects extends from the watercourse crossing points to the lower end of any waterbody

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

Rationale for Impact Evaluation:

- In-stream works or culvert replacement 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. for UWF Related Works in the Clodiagh River) and culvert replacement works (1 no. for UWF Grid Connection in the Clodiagh River catchment and None in the Bilboa River catchment) 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.

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

Element 1: UWF Grid Connection

Topic: Biodiversity

Sensitive Aspect: Aquatic Habitats & Species

General Impact Magnitude: Of the 63 No. watercourse crossings along the Grid Connection, 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. will be subject to *potential* culvert replacement works instream. The remaining crossings, including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream 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 at potential culvert replacement locations 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 Newport River (see cumulative impacts with other Projects below): Approximately 4.3km 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 at the terminal end of the route, as well as at watercourse crossings within the existing road corridor. There are 4 No. watercourse crossings (including haulage routes) within the Newport (and Small River) River catchment (W1-W4).

Specifically, in relation to the Clare River (see cumulative impacts with other Projects below): Approximately 11km of the 110kV UGC exists within the Clare River catchment. Effects on surface water are likely to arise mainly from trench excavation works within the road and at watercourse crossings at existing road bridge and culvert locations. There are 30 no. watercourse crossings (including haulage routes) within the Clare River catchment (W5-W34).

Specifically, in relation to the Bilboa River (see cumulative impacts with other Projects below): Approximately 11.7km of the 110kV UGC exists within the Bilboa River catchment. Effects on surface water are likely to arise mainly from trench excavation works within the road and at watercourse crossings at existing road bridge and culvert locations. There are 24 No. watercourse crossings within the Bilboa River catchment (W35-W58).

Specifically, in relation to the Clodiagh River (see cumulative impacts with other Projects below): Approximately 1.5km of the 110kV UGC exists within an upper headwater tributary of the Clodiagh River catchment. Effects on surface water are likely to arise mainly from trench excavation works within the road and at watercourse crossings of one minor watercourse and small drains at existing road bridge and culvert locations. There are 5 No. watercourse crossings within the Clodiagh River catchment (W59-63).

Significance of the Impact: Slight to moderate in the local context, Slight in the Newport River, Clare River, Bilboa River and Clodiagh River catchments.

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 5.3 : Compiled UWF Grid Connection). This will be completed by over pumping, flume (pipe);
- 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 5.3 : Compiled UWF Grid Connection);
- The spatial extent of effects to the watercourse channel will occur within the footprint of any works at potential culvert replacement locations;
- The frequency of such an event is once of for any culvert replacement works, 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. 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.

Newport River catchment

- The watercourse crossings within the Newport River catchment requiring culvert replacement works (3 No.) are streams and therefore works will only be completed between the IFI permitted season of May and September (Project Design Measure), no instream works are required for the crossing of the Newport River (W4);

- 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);
- All effects will be brief to temporary in nature and reversible.

Clare River catchment:

- The majority of the watercourse crossings (24 of 30 No.) within the catchment have low / no fisheries value (Class 3 and Class 4 watercourses) and therefore the potential for downstream water quality effects is limited due to small size and low or absent flows;
- Watercourse crossings at potential culvert replacement locations which may require instream works at Class 1 watercourses (W9 and W33) will only be completed between the IFI permitted season of July to September (Project Design Measure), no instream works are required at the crossing of the Clare (Annagh) River (W31), as works will be within the existing bridge structure;
- 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.

Bilboa River catchment:

- The majority of the watercourse crossings (21 of 24 No.) within the catchment have low / no fisheries value (Class 3 and Class 4 watercourses) and therefore the potential for downstream water quality effects is limited due to small size and low or absent flows;
- There are no instream works or culvert replacement works required at watercourse crossings at Class 1 watercourses (W40, W44 and W48), all works will be within the existing bridge structures;
- It's likely only between 100 – 200m of the trench will be excavated in any day with only 1 – 2 watercourse crossings (no crossing works) 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.

Clodiagh River catchment:

- All watercourse crossings (5 No.) are within a single headwater tributary of the upper Clodiagh sub-catchment. The majority of these crossings (4 of 5 No.) have no fisheries value (Class 4 watercourses). Only 1 No. crossing of a Class 2 first order stream is required; therefore, the potential for downstream water quality effects is limited due to small size and low or absent flows;
- Watercourse crossings comprising potential culvert replacement works instream at the Class 2 watercourse (W60) 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 (4 out of 5 with no culvert replacement works) 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.

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.*

Aquatic Habitats & Species

Sensitive Aspect

Cumulative Information: Individual Evaluations of Other Projects or Activities
(Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is no potential for cumulative effects with the UWF Related Works)

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.

Evaluation of Other Cumulative Impacts – Decrease in instream aquatic habitat quality

Whole UWF Project Effect

Cumulative Impact Magnitude: For the Whole UWF Project, a potential decrease in aquatic habitat quality is identified at a total of **10 No**. watercourse crossings where instream works are required within watercourses evaluated as having fisheries value – 5 no. for UWF Grid Connection, and 5 no. for UWF Related Works. 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 of the lowest point in the waterbody where Whole UWF Project works are required, with reference to 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 UWF Grid Connection (110kV UGC) (63 No. total) are largely located within the River Shannon catchment (58 No.) while the watercourse crossings required for the Upper-church 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,
- 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 and 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 11km 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 4.3km 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.

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;

Biodiversity

Topic

- The short-term temporary nature of the 110kV UGC works within the Clare River catchment, limited to 2 No. crossings of watercourses with fisheries value (Class 1 / Class 2).

Newport River

- The relatively small scale of the 110kV UGC works within the Newport River catchment (4.3km of temporary access roads);
- The large surface water catchment area of the Newport 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, limited to 2 No. crossings of watercourses with fisheries value (Class 1 / Class 2);
- Sediment Control Plans will be in place at the Bunkimalta Windfarm

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; new crossing structures

Cumulative Impact Source: Sediment; Instream works; culvert replacement works; Machinery movement, new crossing structures

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 of the Subject Development Impact – Changes to Flow Regime

Element 2: UWF Related Works – direct/indirect impact

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 32 no. crossings, 5 no. were evaluated as having fisheries potential (all in the Clodiagh River catchment, none in the Bilboa catchment).
Instream works in watercourses with fisheries value (5 No.) relate to 3 temporary crossings for Internal Windfarm Cabling trenching works and/or the installation of a temporary crossing structure, while the remaining 2 No. relate to 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 2: UWF Related Works – cumulative impact

The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2) within the Clodiagh River catchments, and where UWF Related Works will include 5 No. watercourse crossings evaluated as having fisheries value and UWF Grid Connection may potentially require culvert replacement works on 1 no. Class 1 watercourses. Neither Upperchurch Windfarm nor UWF Replacement Forestry will require any instream works, it is therefore evaluated that any cumulative impacts to instream aquatic habitat quality will be negligible.

Neither Upperchurch Windfarm nor UWF Replacement Forestry will require any instream works, it is therefore evaluated that any cumulative impacts to flow regime will be negligible.

The spatial extent of such effects will occur within the footprint of the instream works or culvert replacement works, and also downstream within the zone of sediment transport. Where minor watercourse tributaries are crossed by the proposed works their contribution to downstream waterbodies is assessed collectively. Therefore, the zone of cumulative effects extends from watercourse crossing points lower end of any waterbody

Significance of the Impact: Imperceptible to Slight 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 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.

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

Element 1: UWF Grid Connection

Impact Magnitude:

At Mountphilips Substation, instream works will be required at 1 no. watercourses with fisheries value (associated with the installation of permanent crossing structures). 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.

Topic	Sensitive Aspect
Biodiversity	Aquatic Habitats & Species

Of the 63 No. watercourse crossings along the UWF Grid Connection 110kV UGC, 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. will be subject to *potential* culvert replacement works. The remaining crossings, including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream works and cables will be installed either under or over the structure.

At the 5 no. potential culvert replacement works locations s, changes to the flow regime will be brief to temporary and for the duration of the immediate works, restricted to the location of the works area within the footprint of, or directly adjacent to the existing crossing point in the public road. Following the completion of construction works, 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.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- In-stream works or culvert replacement 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 agri-culture);
- 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.

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.*

Evaluation of Other Cumulative Impacts – Changes to Flow Regime

Whole UWF Project Effect

Cumulative Impact Magnitude:

A potential decrease in aquatic habitat (via changes to flow regime) is identified at **10 No**. watercourse crossings where instream works or culvert replacement works are required within watercourses evaluated as having fisheries value – 5 no. for UWF Grid Connection and 5 no. for UWF Related Works. 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 watercourse 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 of the Subject Development Impact – Disturbance or Displacement

Element 2: UWF Related Works – direct/indirect impact

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 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 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude:
The potential for cumulative effects relates to watercourses with fisheries value (i.e. Class 1 or Class 2) within the Clodiagh River and to a lesser extent, Bilboa River catchments. UWF Related Works will require works in close proximity to 6 no. watercourses with fisheries value, and instream works at 5 no. of these watercourses (all in the Clodiagh). Upperchurch Windfarm will require works in close proximity to 1 no. watercourse in the Clodiagh River catchment (construction of a clear span bridge (no instream works) at this location). UWF Grid Connection (110kV UGC) will require works in close proximity to 4 no. watercourses within the Bilboa River catchment and in close proximity to 1 no. watercourse crossing (with potential for culvert replacement works at this crossing) in the Clodiagh River catchment.

UWF Replacement Forestry will involve works in proximity to a Class 1 watercourse in the Clodiagh River catchment, with planting carried out by hand at the site, it is therefore evaluated that any cumulative impacts will be negligible.

The spatial extent of cumulative disturbance or displacement effects is localised at each crossing location–

Significance of the Impact: Imperceptible to 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 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.
-

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

Element 1: UWF Grid Connection

Impact Magnitude:
At Mountphilips Substation, works will take place in close proximity to 1 no. watercourses with fisheries value (Blue Line Equivalent). This watercourse crossing will be subject to instream works

Along the 110kV UGC, there are 63. No. watercourse crossings, of which 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. may be subject to culvert replacement works. The remaining crossings identified as having fisheries value (8 No.), including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream works and cables will be installed either under or over the structure. Proposed works including trench excavation, bridge works, culvert replacement, and resurfacing may give rise to disturbance to fish and aquatic biodiversity receptors present within Class 1 and Class 2 watercourses over a period of 1 – 2 days at each crossing location. The frequency of these disturbance effects is once for cables trenches with or without new permanent culverts. 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 these locations are therefore evaluated as Imperceptible.

Significance of the Impact: Slight

Topic	Sensitive Aspect	
Biodiversity	Aquatic Habitats & Species	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 5.3 : Compiled UWF Grid Connection); • The extent of disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the direct footprint of any potential culvert replacement works within watercourses which support anadromous Atlantic salmon and resident Brown trout populations. • The frequency of disturbance effects will be once for all cables trenches where instream works are required, installed at crossing locations with or without new permanent culverts • 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.
		Element 5: UWF Other Activities – *N/A, evaluated as excluded, see Section 8.4.2.2.1*
		Evaluation of Other Cumulative Impacts – Disturbance or Displacement
		Whole UWF Project Effect
		Cumulative Impact Magnitude: Direct disturbance or displacement of aquatic ecological receptors, including fish, will be limited to the footprint of any instream works or culvert replacement 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 **10 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 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 frequency of disturbance effects will be once for all cables trenches at crossing locations with or without potential culvert replacement; 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)

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; culvert replacement 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 of the Subject Development Impact – Riparian habitat degradation

Element 2: UWF Related Works – direct/indirect impact

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 watercourse crossing locations; alternatives to riparian clearance are not available.
- Impacts to the riparian habitat are temporary to short-term and reversible with reinstatement.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: UWF Related Works will include 6 No. watercourse crossings evaluated as having fisheries value. Upperchurch Windfarm will also involve some access road construction work at 1 no. watercourse with fisheries value, this watercourse is one of the watercourses associated with UWF Related Works – and the trenching and ducting for UWF Related Works will take place during Upperchurch Windfarm access road construction and clear span bridge construction works at this location, thereby minimising cumulative impacts.

In relation to cumulative impacts with UWF Grid Connection, 1 no. watercourse of fisheries value may require culvert replacement works which would involve works in the riparian zone.

The spatial extent of such effects will occur within the footprint of the works within the riparian margins. Therefore, the zone of cumulative effects is limited to the footprint of the works areas identified at each crossing location, in-combination with other Project Elements affecting riparian habitat within the same waterbody.

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 watercourse crossing locations; alternatives to riparian clearance are not available.
- 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 1: UWF Grid Connection

Impact Magnitude:
At Mountphilips Substation, construction works will take place within the riparian habitat zone of 2 no. watercourses, evaluated as having fisheries value. These works relate to 1 No. new permanent crossing and 1 No. temporary crossings

Of the 63 No. watercourse crossings along the 110kV UGC, 13 No. have been evaluated to have fisheries value. Of these 13 No. watercourses, 5 No. will be subject to instream works at potential culvert location works sites. The effect on the riparian and bankside habitat will be greatest at these culvert replacement locations (31 No.), while the significance of such effects is greatest at watercourses supporting fisheries value (5 No.). The remaining crossings, including all required crossings of major rivers (Newport, Clare (Annagh) and Bilboa), are over existing crossing structures which do not require any instream works and cables will be installed either under or over the structure.

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

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Sensitive Aspect

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 be 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 watercourse crossing locations; alternatives to riparian clearance are not available. • 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.
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*
Evaluation of Other Cumulative Impacts – Riparian habitat degradation
Whole UWF Project Effect
Cumulative Impact Magnitude: Riparian habitat will be affected at **11 No**. watercourse crossings (1 no. watercourse is crossed by UWF Related Works and Upperchurch Windfarm at the same crossing point) 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:

Biodiversity

Topic

- 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 watercourse 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; culvert replacement 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 of the Subject Development Impact – Spread of Aquatic Invasive Species

Element 2: UWF Related Works – direct/indirect impact

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.

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

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: There is the potential for introduction of non-native, invasive aquatic species at all **32 No**. watercourse crossings in the Clodiagh and Bilboa river catchments associated with the UWF Related Works, the affected watercourses may be further exposed to cumulative risk of spread or introduction from Upperchurch Windfarm construction traffic and works in proximity to some of the watercourse crossings, and works in proximity to an additional 29 no. watercourse crossing locations associated with UWF Grid Connection with the Clodiagh and Bilboa river catchments.

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 1: UWF Grid Connection
Impact Magnitude: There is the potential for introduction of non-native, invasive aquatic species at all **63 No**. watercourse crossings associated with the Mountphilips Substation and 110kV UGC 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.
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 Other Cumulative Impacts – Spread of Aquatic Invasive Species
Whole UWF Project Effect
Cumulative Impact Magnitude: There is the potential for introduction of non-native, invasive aquatic species at the **96 No**. watercourse crossing associated with the Whole UWF Project (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 Connection).
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 8-31 below.

Table 8-31: 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	2,4,5	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. No felling for UWF Grid Connection, or UWF Replacement Forestry
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 UWF Related Works 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 Related Works.

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 Related Works, 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:

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

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 Related Works, 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 Related Works, 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 8-32.

Table 8-32: 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 Related Works	**Imperceptible to Moderate**	**Slight**	**Slight**	**Slight to Moderate**	**Slight to Moderate**
UWF Related Works Cumulative Impact	**Imperceptible to Moderate**	**Imperceptible to Slight**	**Imperceptible to Slight**	**Slight to Moderate**	**Slight to Moderate**
Element 1: UWF Grid Connection	Slight to Slight-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	Slight to Slight-Moderate	N/A - Evaluated as excluded from these impacts, 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.

Please Note: Other Projects or Activities only relate to the cumulative evaluation of Other Elements of the Whole UWF Project. There is no potential for cumulative effects with the UWF Related Works.

Sensitive Aspect | **Aquatic Habitats & Species**

Topic | **Biodiversity**

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 Related Works is described in Table 8-33 and illustrated on Figure RW 8.5: Terrestrial Habitats within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 8-33: UWF Related Works 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 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 is GA1: Improved agricultural grassland (113.38ha or 59.5%), followed by WD4: Conifer plantation (45.45ha or 22%). The remaining habitats are mainly made up of: Wet Grassland (GS4), Scrub (WS1), built land and artificial surfaces (BL3), Wet Heath (HH3) and Upland Blanket Bog (PB2). Linear habitats are primarily composed of Buildings and Artificial Surfaces (BL3), earth banks (BL2), and Eroding/Upland Rivers (FW1).

Habitats (evaluated as of Local Importance (Higher Value) or above) which occur within the UWF Related Works Study Area comprise:

- 693 meters of Upland/Eroding Rivers (FW1),
- 2.03ha of Upland Blanket Bog (PB2),
- 11.95ha of Wet Grassland (GS4),
- 1.77ha of Scrub and Immature Woodland (WS1/2),
- 2.32ha of Wet Heath (HH3),
- 1.58ha of Dry-humid Acid Grassland (GS3),
- 0.11ha of Dry Siliceous Heath (HH1),
- 0.1ha of Cutover Bog (PB4),
- 1611 meters of Linear hedgerow (WL1) / treelines (WL2).

Respective areas of each habitat type (evaluated as of Local Importance (Higher Value) or above) are illustrated in Figure RW 8.5: Terrestrial Habitats within the UWF Related Works Study Area and presented in full in Appendix 8.1: Detailed Biodiversity Information and Supplementary Data (Section A8.1.3.4) in Volume C4 EIAR Appendices

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.

A Japanese knotweed or Himalayan knotweed infestation was 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 haul route realignment construction works area boundary.

8.5.1.3 Importance of Terrestrial Habitats

National Importance: Upland/Eroding Streams habitats present are evaluated as of National Importance based on connectivity to the Clodiagh (Tipperary) and Multeen River sub-catchments, in total 7 No. of the watercourses are classified as Upland/Eroding Streams within UWF Related Works study area.

County Importance: 2.03ha of Upland Blanket Bog (PB2), which is of County Importance, is present within the study area.

188.47ha of habitats of Local Importance (Higher Value) are within the UWF Related Works Study Area. These habitats are evaluated as being of Local Importance (Higher value) based on their semi-natural status, and thus their potential to support a range of native species of plants and animals of high value in a local context. These habitats are comprised of:

- BL3: Buildings and artificial surfaces (based on importance to bats),
- GS4: Wet Grassland
- HH3: Wet Heath
- WS1/WS2 Scrub and Immature Woodland
- GS3: Dry-humid Acid Grassland),
- HH1 Dry Siliceous Heath (HH1),
- PB4: Cutover Bog (PB4),
- WL1: hedgerows (based on level of maturity and value to birds and mammals),
- WL2: tree lines (local importance to birds and mammals),

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.

8.5.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.5.2.1 Cumulative Evaluation Study Areas

8.5.2.1.1 UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works was evaluated for cumulative effects with other projects and the study area is set out in the table below.

UWF Related Works Cumulative Evaluation Study Area for Terrestrial Habitats	Justification for the Study Area Extents
UWF Related Works Construction works area boundary plus 50m in all directions	The study area is sufficient to identify those Other Elements (or Other Projects or Activities) which may cause cumulative effects to Terrestrial Habitats with UWF Related Works.

The study is illustrated on Figure CE 8.5 Terrestrial Habitats within the UWF Related Works Cumulative Evaluation Study Area.

8.5.2.1.2 Whole Project Cumulative Evaluation Study Area

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

The Other Elements must be considered because UWF Related Works 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.

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 Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works Study Area along with the study areas for Other Elements which are described in Table 8-34 and illustrated on Figure WP 8.5: Terrestrial Habitat within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-34: Whole Project Cumulative Evaluation Study Area for Terrestrial Habitats

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	construction works area boundary/afforestation lands plus 50m in all directions	Professional judgement and as per Best Practice (CIEEM, 2016)
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

8.5.2.2 Scoping of Other Elements, Other Projects or Activities & for Potential for Impacts

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 Related Works 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 A2.3.2.8).

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 Related Works 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.

8.5.2.2.1 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 8-35.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 8.5. The baseline character of the areas around these Elements is described in Section 8.5.2.3.

Table 8-35: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	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 1: UWF Grid Connection

Terrestrial Habitats within the UWF Grid Connection Study Area comprise a mosaic of agricultural grassland, commercial forestry plantations, broadleaved woodland, peatlands, hedgerows, wet grassland, private roads and public roads. Due to the location of UWF Grid Connection mainly along existing public roads within a agricultural setting, for the most part the landscape is dominated by agricultural grassland and other habitats reflective of this e.g roadside hedgerows, treelines and earth banks, with numerous dwellings , farm buildings and associated gardens, amenity grassland, hedges and lawns.

Forty-two habitat types (including twenty types of habitat mosaic) comprising 295.5Ha were recorded along the survey corridor (i.e. within 50m). The dominant habitats present are improved agricultural grassland (GA1), built land (BL3), wet grassland (GS4), and a mosaic of built land and amenity grassland (BL3/GA2), which together make up 75% of all habitats present. Conifer plantation (WD4) and Scrub (WS1) make up the majority of the remaining habitats by area.

Five Linear habitat feature types including Drainage ditches (FW4), Hedgerows (FW2), Earthen Banks (BL2), and Tree lines (WL2) were also recorded.

The total length of linear hedgerow and treelines (or mosaics of both) present within the study area comprises 40.6km.

No Flora Protection Order (FPO) species are present within the construction area boundary.

Terrestrial Habitats within 50m of UWF Grid Connection are illustrated on Figure WP 8.5..

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. Rhododendron (*Rhododendron ponticum*) is present at 39 locations. Japanese knotweed or Himalayan knotweed infestations were recorded at 15 locations during habitat assessments on the UWF Grid Connection.

Cherry laurel *(Prunus laurocerasus)* was recorded at 12 locations, this species, while not 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) is listed as a 'High impact' invasive species by O' Flynn et al. (2014). 'Medium impact' non-native invasive plant species (Kelly *et al.,* 2013, O' Flynn *et al.*, 2014) recorded included Sycamore (*Acer pseudoplanatus*), Pheasant berry (*Leycesteria Formosa*), and Cotoneaster *(Cotoneaster spp.)*. Other non-native plant species of lesser significance were also recorded, these included Box honeysuckle *(Lonicera nitida),* Snowberry *(Symphoricarpus albus),* and Motbretia *(Crocosmia x crocosmiflora).* Respective locations of non-native invasive plant species are illustrated in Figure WP 8.5.

Geographical Overlap with UWF Related Works:

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area on the eastern end of the 110kV UGC in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons townlands where 110kV UGC trenching works on the regional and local road networks are located within 100m of UWF Related Works Haul Route Works, and to a lesser extent Internal Windfarm Cabling works.

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 (public roadside) record of Japanese Knotweed was recorded within the study area for the Upperchurch Windfarm.

Consideration of the Passage of Time: the 2013 planning documents were reviewed and habitats on the Consented Upperchurch Windfarm site were observed during surveys for UWF Related Works. With the exception of some maturation of trees, there have been no material changes in the makeup of terrestrial habitats on the windfarm site, and it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR. Furthermore, the maturity of trees on the windfarm site has been taken into account in the relevant cumulative evaluations in this EIAR.

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.

8.5.2.4 Cumulative Information Baseline Characteristics - Importance of Terrestrial Habitats

UWF Grid Connection:

International importance: Habitats of international conservation importance are located at four 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.

Habitats of National Importance include: Clare River, Newport River, Bilboa River, and Upland/Eroding Streams habitats which are hydrologically connected to the Lower River Shannon SAC.

Habitats of Local Importance (Higher Value) include mixed broadleaf woodland (WD1), mixed broadleaf/conifer woodland (WD2), hedgerows (WL1), tree lines (WL2), and scrub (WS1). A small area of Oak-birch-holly woodland at Scraggeen was found to correspond to the EU Habitats Directive 92/43/EEC habitat, 'Old sessile oak woods with *Ilex* and *Blechnum,* in the British Isles (91A0)'. A small area of Wet heath/Wet grassland habitat mosaic was found at Loughbrack Townland; wet heath corresponds to EU Habitats Directive 92/43/EEC Annex I habitat 'Northern Atlantic wet heaths with *Erica tetralix* (4010)', however the area of habitat in question was very limited in extent and degraded through grazing and drainage. An area of Lowland blanket bog (PB3) was found at Reardnogy Beg, this habitat corresponds to EU Habitats Directive 92/43/EEC Annex I habitat to 'Blanket bogs (priority if active)'; however, this area of bog was found to be in poor condition due to evidence of peat harvesting and substantial colonization by invasive Rhododendron.

Due to the location of sections of the UWF Grid Connection 110kV UGC within an SPA designated for Hen Harrier, a number of habitats along the route of the 110kV UGC support the structure and function of the SPA. This primarily includes foraging habitats in the open landscape (grassland, heath and bog) habitats. See Sensitive Aspect Hen Harrier Section 8.6 for further information.

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.

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 – Receiving 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. 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 Related Works, 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 8-36 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Terrestrial Habitats**.

Table 8-36: UWF Related Works 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.

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 Grid Connection 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.

8.5.4 EVALUATION OF IMPACTS to Terrestrial Habitats

In this Section, the likely direct and indirect effects of the UWF Related Works are identified and evaluated. Then the likely cumulative effects of the UWF Related Works 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) - Terrestrial Habitats.

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

Table 8-37: 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.

Terrestrial Habitats

Sensitive Aspect

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.

Project Design Measures such as the use of flagmen at entrances reduces land cover change. Permanent storage berms, located along realigned windfarm roads, will be re-instated immediately with native grasses. 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 the Subject Development Impact – Reduction in Terrestrial Habitats

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:

No habitats evaluated as of County, National or International Importance will be lost.

Permanent habitat loss relates to 1 no. habitat types evaluated as of Local Importance (higher value):(Wet Grassland (0.07Ha) The magnitude of change represents 0.04% of the total habitat within the study area and 0.6% of the Wet Grassland habitat.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The local importance (higher value) of the habitats lost;
- 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 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for the 1 no. habitats (Wet Grassland) identified above to be cumulatively affected by another Element of the Whole UWF Project, is limited to Upperchurch Windfarm, as UWF Grid Connection (which also occurs within 100m of UWF Related Works) is entirely located along bitumen surfaced public road and forestry road within the UWF Related Works Cumulative Evaluation Study Area.
The area of Wet Grassland to be removed is at RWR2. There is no potential for additional habitat loss in combination with the Upperchurch Windfarm as the RWR2 road way will be replacing the Consented UWF Road at this location.

Significance of the Impact: Not Significant

Biodiversity

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Rationale for Impact Evaluation:

- The local importance (higher value) of the habitats lost;
- 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 1: UWF Grid Connection

Impact Magnitude:

Permanent habitat loss will comprise 1.39 ha, limited to 3 no. habitat types, (Improved agricultural grassland (1.35 ha), Wet grassland (0.05 ha) and Mixed broadleaved woodland (<0.01 ha)), all of which will occur at Mountphilips/Coole. These habitats are evaluated as having Local Importance (Higher value), in the case of Wet grassland and Mixed broadleaved woodland, and Local Importance (Lower Value) for Improved agricultural grassland. The wet grassland present is not considered optimal for Hen Harrier foraging. Seeing as the remaining section of the 110kV UGC will be confined to the road corridor there will be no other loss of habitat associated with the UWF Grid Connection; all other hedgerows and treelines will be retained along the grid route road corridor.

The magnitude of change represents 0.47% of the total habitat within the study area, and 1.29%, 0.12%, and <0.01% respectively of the habitats described.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The local importance (higher value) of habitats lost;
- The low sensitivity of the habitats for which change will occur
- In the context of the extent of habitat in the wider surrounding area (context), and;
- The extremely limited extent of semi-natural habitat lost, with the majority of lost habitat consisting of lower value Improved agricultural grassland.
- Only a minor shift away from baseline conditions, notwithstanding;
- The permanent 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 Effect
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 Other Cumulative Impacts – Reduction in Terrestrial Habitats
Whole UWF Project Effect
Cumulative Impact Magnitude: Habitat loss in respect of the UWF Grid Connection, the UWF Related Works, UWF Replacement Forestry Upperchurch Windfarm and UWF Other Activities will be limited to small distinct areas of 3 no. habitat types totalling 0.12ha in area, with an importance evaluation of Local Importance (Higher Value). Three will be no loss of habitat of Local Importance (Higher Value) resulting from the UWF Replacement Forestry; this area will undergo landuse change from agricultural grassland to deciduous forestry.
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.

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 Related Works 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 the Subject Development Impact – Hedgerow Severance

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Hedgerows and earthen banks occur at most field boundaries within the Internal Windfarm Cabling, Realigned Windfarm Roads and Haul Route Works locations. In total, 170m of hedgerow will be permanently removed to facilitate Haul Route Works (HR6 and HR13) and Realigned Windfarm Roads (RWR2). These hedgerows comprise primarily earthen banks (only 1 mature tree and 3 immature trees are to be removed). These hedgerows and trees will be replaced with an equivalent length of new native hedgerow along with an equivalent number of native trees immediately adjacent to the area. In addition new hedgerow will be planted on the berms surrounding the Telecom Relay Pole (c.17m).
In total, 145m of hedgerow and 4 No. trees will be temporarily removed at Internal Windfarm Cabling and some Haul Route Works locations, these hedgerows and trees will be immediately reinstated after completion of construction works.

Significance of the Impact: Not Significant

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

Terrestrial Habitats

Sensitive Aspect

Element 2: UWF Related Works – cumulative impact
Cumulative Impact Magnitude: The potential for cumulative hedgerow severance is limited to Upperchurch Windfarm which will require a total of 980m of hedgerow to be removed on the windfarm site. 70m of this hedgerow removal will be located within the UWF Related Works Study Area boundary, where permanent hedgerow removal will occur at 14 locations.
Significance of the Impact: Not significant
Rationale for Impact Evaluation: • The extent of cumulative severance, with most field boundaries comprising earthen banks; • 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 • Provision of replacement hedgerow in close proximity to original alignment for UWF Related Works and Provision of replacement hedgerow on the Consented Upperchurch Windfarm site.
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 1: UWF Grid Connection
Impact Magnitude: Permanent Habitat loss is limited to Coole and Mountphilips where 45m of permanent hedgerow removal from 9 no. locations each of 5m in length. In addition, 700m of new hedgerow will be planted along the new access road to Mountphilips Substation
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 noticeable adverse contrast with baseline conditions is not expected, when considered with proposed new planting; • The permanent 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:

Biodiversity

Topic

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 Other Cumulative Impacts – Hedgerow Severance
Whole UWF Project Effect
Cumulative Impact Magnitude: Permanent hedgerow loss will occur both at the western side of the Slievefelim to Silvermines Mountain uplands area at the Mountphilips Substation site (UWF Grid Connection), and on the eastern side of the upland area at the UWF Related Works and Upperchurch Windfarm sites. Total permanent hedgerow loss will be 1195m across the Whole UWF Project, the majority of which relates to Upperchurch Windfarm (980m). Temporary hedgerow/field boundary removal only relates to 145m within the UWF Related Works Study Area, much of which comprises earthen banks. The total length of hedgerow removal within the UWF Grid Connection route will be 45m. In total 4.4km of new hedgerow will be planted within the Whole UWF Project study area, including 700m along new access road to Mountphilips Substation (UWF Grid Connection), c.560m for UWF Related Works, 360m for Upperchurch Windfarm, and 2800m for UWF Other Activities).
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; • Significant positive effects from Hedgerow enhancement and planting of 2.8km of new hedgerows in the Upperchurch area 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 Related Works or the Other Elements of the Whole UWF Project (see Section 8.5.2.1).

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.

Impact Quality: Negative and positive

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

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Tree loss is limited to 1 no. mature tree and 3 no. 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

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative impacts is limited to additional trees which will be removed for Upperchurch Windfarm works, as UWF Grid Connection is located within public road pavements/forestry road pavement and will not require the removal of any trees within the cumulative evaluation area.
The cumulative tree loss within the UWF Related Works Cumulative Evaluation Study Area is 24 no. mature trees removed for the consented Upperchurch Windfarm and the UWF Related Works tree loss detailed above (1 no. mature tree and 3 no. immature trees).

Significance of the Impact: Not significant

Rationale for Impact Evaluation:

- The extent of replanting of trees, in the context of numerous high nature value trees in the surrounding wider area and;
- The duration which is long term and over the lifetime of the project, and;
- A minor change to baseline conditions is predicted, with;
- Limited reversibility

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 1: UWF Grid Connection
Impact Magnitude: Tree loss is limited to 1 no. mature trees and 4 immature trees along the access road to Mountphilips Substation location.
Significance of the Impact: Not Significant
Rationale for Impact Evaluation: • The low magnitude of Loss 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.
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 Other Cumulative Impacts – Loss of High Nature Value Trees
Whole UWF Project Effect
Cumulative Impact Magnitude:

Terrestrial Habitats

Sensitive Aspect

Tree loss is limited to 26 no. mature and 7 no. immature trees. The majority of tree loss relates to Upperchurch Windfarm, where 24 mature trees will be lost. The remaining tree loss will be 1 no. mature tree and 4 no. immature trees on UWF Grid Connection, and 1 no. mature tree and 3 no. immature trees within the UWF Related 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.

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 Related Works or the Other Elements of the Whole UWF Project (see Section 8.5.2.1).

Biodiversity

Topic

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 8-38 below.

Table 8-38: 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 entrance to Mountphilips Substation will be re-instated; hedgerow crossings for UWF Related Works are narrowed to 5m to avoid/reduce fragmentation effects, Minimal trees are to be removed for UWF Related Works which generally correlates with Consented UWF Roads. 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: A number of infestations of Japanese knotweed and Rhododendron were recorded along the road corridor within which the UWF Grid Connection is located. The impact can be excluded however, as a comprehensive Invasive Species Management Plan for UWF Grid Connection which will include detailed biosecurity measures will be developed which will fully meet the requirements of Best Practice, and in accorded with BAT currently utilised for roadworks by TCC/TII. In addition a suitably qualified Environmental Clerk of Works will be

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				present at all for works adjacent to infestations, within the correct zone of effect, and for the total duration of works, to ensure the Invasive Species Management Plan (ISMP) is fully adhered with. The implementation of the final ISMP will be a contractual obligation on any appointed contractors. In relation to UWF Related Works, an Invasive Species Management Plan has been developed and can be found in Volume D: Environmental Management Plan.
Operational Stage				
Movement of soils and machinery	1,2,4,5	Soils	Introduction or spread of invasive species	Rationale for Excluding: Operational maintenance is minimal and unlikely to result in the spread of invasive species. Notwithstanding this a comprehensive Invasive Species Management Plan has been developed, and will be implemented during operational maintenance to ensure that none of the identified Invasive Species infestations poses a risk to the environment.
Decommissioning Stage				
Movement of soils and machinery	1,2,4,5	Soils	Introduction or spread of invasive species	Rationale for Excluding: UWF Grid Connection will not be decommissioned so no pathways exist for effect where the source magnitude is potentially highest. All pertinent locations of Invasive Species with respect to elements 2,4,5 are currently >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 Related Works 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 Related Works.

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) - **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 Related Works, 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:

RW-BPM-16	Monitoring of non-native invasive plant species
RW-BPM-17	Best practice measures for the removal of vegetation during construction
RW-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 Related Works, 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 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 Related Works, 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 8-39.

Table 8-39: 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 Related Works *Direct, indirect effects*	**Not Significant**	**Not Significant**	**Not Significant**
UWF Related Works *Cumulative effects*	**Not Significant**	**Not Significant**	**Not Significant**
Element 1: UWF Grid Connection	Not Significant	Not Significant	Not Significant
Element 3: UWF Replacement Forestry	Neutral	No Impact	No Impact
Element 4: Upperchurch Windfarm	Not Significant	Not Significant	Not Significant
Element 5: UWF Other Activities	Neutral	**Significant (positive)**	Moderate (positive)
Other Cumulative Impact:			
Whole UWF Project effect	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 Related Works or the Other Elements of the Whole UWF Project (see Section 8.5.2.1).

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 Related Works is described in Table 8-40 and illustrated on Figure RW 8.6: Hen Harrier within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 8-40: UWF Related Works Study Area for Hen Harrier

Study Area for Hen Harrier	Justification for the Study Area Extents
1. Within 2km from the UWF Related Works construction works area boundary in all directions, for breeding sites and for communal roost sites –in relation to disturbance/displacement effects to nesting or roosting hen harrier, or secondary foraging habitat loss (permanent or temporary) affecting nest success. 2. Suitable habitat within 50m from the UWF Related Works construction works area boundary in all directions in relation to habitat/landcover change related effects such as decreases in prey item abundance and direct loss of foraging habitats.	1. The extent of the study area are defined in accordance with SNH Guidelines (2017[8]) guidance. Foraging habitat loss within 2km of a Hen harrier nest may potentially have negative effects on breeding success (Arroyo *et al.,*2014). 2. Professional Judgement, based on the proposed width of the construction works boundary (10m).

8.6.1.2 Baseline Context and Character of Hen Harrier in the UWF Related Works Study Area

8.6.1.2.1 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] Scottish Natural Heritage (2017). *Recommended bird survey methods to inform impact assessment of onshore wind Farms. Version 2*. SNH, Battleby.

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8.6.1.2.2 Nesting (breeding) Habitat in the UWF Related Works Study Area

Nesting Hen harriers in the Slieve Felim to Silvermines Mountain SPA have shown a preference to nest in the early stages of new and second-rotation conifer plantations, though some pairs may still nest in tall heather of unplanted bogs and heath[9].

Within the overlap area of the UWF Related Works Study Area with the SPA, habitats such as upland blanket bog, conifer plantations of varying age classes, improved agricultural grassland, but also various mosaics of grassland and rough grazing are present. Habitat in general within 2km of the UWF Related Works are of limited use for breeding Hen Harrier as agriculture predominates land use. The results of the last 2 National Surveys of Hen Harriers are evidence of this.

8.6.1.2.3 Roosting Habitat in the UWF Related Works Study area

In the winter months harriers often roost communally, typically in habitats such as reedbeds and heather less than 100m above sea level (ASL), however, small numbers of communal roosts exist at higher altitudes. Windfarms and associated infrastructure have not been explicitly defined as a threat or pressure on roosts within the Irish context.

In relation to roost sites, suitable roosting habitats (reed beds, heather/bog and rank/rough grassland but also fen, bracken, gorse) are not widely available, with very small fragmented patches of habitat located within 2km of UWF Related Works.

8.6.1.2.4 Nearest Nesting and Roost Sites

For the current appraisal a further review of desktop information and consultation with local experts, and NPWS has been undertaken. No Hen Harrier nest locations/breeding sites are recorded within 1km of the proposed UWF Related Works, or the consented Upperchurch Windfarm boundary. None are present within a further radius of 2km.

The nearest known *historical* nest location to the UWF Related Works is that within the townland of Knockalough, located ca. 2.5 km to the south– no confirmed nest has occurred here in recent years (i.e. 2015-2018) and the last confirmed nesting attempt was in 2014.

Previously a nest has been located at Curreeny, to the northwest of UWF Related Works, and at Glenough Windfarm, to the south of UWF Related Works. The Curreeny nesting territory has not been confirmed active since 2014 (G.Penn, *pers. Comm*.), the Glenough nesting territory (adjacent to the operating Glenough Windfarm) has been active in recent years up to and including 2018 and is known to Inis surveyors.

For the avoidance of doubt Table 8-41 below outlines the distance in kilometers from the nearest identified nests to UWF Related Works (construction works boundary). For completeness distances are also provided to the Upperchurch Windfarm (UWF) 2013 Study area and the nearest Consented UWF Turbine.

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[9] https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004165.pdf

Table 8-41. Historical and Recently Active Hen Harrier Nests within 8km of the proposed Related Works*

Nest	Townland	Last Confirmed as active	Distance to UWF Related Works (CWB) (km)	Distance to UWF 2013 Study Area (km)	Distance to nearest Consented UWF Turbine Location (km)	Within SPA
A	Coumnagillagh	2016	4.8	5.3	5.6	Yes
B	Baurnadomeeny	2016	6.2	7.1	7.4	Yes
C	Baurnadomeeny	2017	6.6	7.5	7.7	Yes
D	Knockalough	2014	2.6	2.4	2.6	No
E	Glenough	2018	4.5	4	4.6	No
F	Curreeny	2014	2.8	2.7	2.8	Yes

*Distances to the UWF 2013 study area and nearest Consented UWF Turbine location are provided for completeness.

No Hen Harrier nests are present within 2km of the UWF Related Works boundary, either inside the SPA or outside the SPA.

For the period covered by the current evaluation (2016-2018 inclusive) the closest nest within the SPA to UWF Related Works is 4.8km to the west of the nearest point of the construction works boundary. The closest nest outside the SPA is 4.5km to the south of the nearest point of the construction works boundary.

8.6.1.2.5 Winter Roosts in the UWF Related Works Study Area

No communal roosts within 2km of UWF Related Works were identified during 2012 – 2017, or 2017/2018 surveys, or are known to exist in the area based on desktop review, and the results of scoping and consultation with local NPWS/Hen Harrier surveyors.

8.6.1.2.6 Availability of foraging habitat within 2km

Habitat in general within 2km of the UWF Related Works Study area are of limited use for foraging Hen Harrier as agriculture predominates land use. The results of the last 2 National Surveys of Hen Harriers are evidence of this.

8.6.1.2.7 Connectivity to Designated Sites – Separation distance of UWF Related Works to the SPA

The location of the 5 No. different parts of UWF Related Works are outside of the SPA, except for one overlap to the south of Haul Route Works HW7 (however HW7 does not require works or vegetation clearance within the SPA boundary). Otherwise, the nearest boundary of the SPA is:

- 580m to the west of Internal Windfarm Cabling;
- 173m to the west of Realigned Windfarm roads;
- 157m west of Haul Route Works;
- and 805m west of Telecom Relay Pole.

8.6.1.2.8 Connectivity to Designated Sites – Scottish Natural Heritage Guidance

Guidance is available from Scottish Natural Heritage (SNH) to assist in establishing levels of connectivity to designated SPA's. Connectivity distances per species included are set out from a literature review that examined ranging behaviour. SNH specifically recommends that "in most cases the core range should be used when determining whether there is connectivity between the proposal and the qualifying interests". A core foraging range of 2km from nests sites during breeding is presented for Hen Harrier, with a maximum range of 10km.

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Further investigation of the recommended core foraging range of 2km, shows that this is based on publications/studies specifically on habitat use and range management on priority areas (notably SPA's) for Hen Harriers (Arroyo et al., 2005). In this source study the authors investigated the ranging behaviour and habitat use of breeding Hen Harriers on SPA's (3 study areas) with the objective of developing a model to predict range use in breeding Hen Harriers. The methods involved capturing and fixing radio transmitters to adult Hen Harriers (male and female) and following the movement of birds to establish range size and usage. The size of home ranges was estimated statistically using kernel analysis.

The study found no marked difference in home range sizes between study areas. Following analyses of the various methods to establish a home range estimate, the authors found that across all methods considered, the home range of male Hen Harriers were double the size of females. The average home range of females was 3.6km^2 and those of males 7.3km^2. The study supports an assertion that female ranges are centred on nest locations and the immediate environs whereas males will not use the areas around the nest equally. Whilst males may spend some time outside 2km from the nest the core range across the sexes is more accurately represented within a 2km radius of same.

In the Irish context the study undertaken by UCC in respect of the PlanforBIO Hen Harrier project , which utilized GPS tracking to investigate hunting behaviour (n=3 birds) found the following (based on 293 identified hunting tracks):

"*Despite the large distances travelled by hunting Hen Harriers, the majority of foraging was concentrated relatively close to the nest, as one would expect with central-place foragers like breeding Hen Harriers. Over 50% of all GPS registrations consistent with hunting behaviour were within 2 km of the focal nest. Moreover, because the area within a certain radius of the nest increases as the square of this distance, the concentration of hunting behaviour was more than 10 times higher within 1 km of the nest than it was between 2 and 5 km from the nest."*

Considering the SNH recommendation that it is the core range (2km) which should be used when determining connectivity, and the reasoned analysis presented above, it is considered that "*one or more"* nesting pairs within the SPA do <u>not</u> currently rely on hunting habitat "*for which mitigation is required"*, within the consented windfarm or the within the construction works area boundaries of the proposed UWF Related Works[10].

8.6.1.2.9 Availability of Suitable Foraging Habitat within the UWF Related Works

Foraging Hen harriers generally prefer open habitats in particular heath & bog, low intensity farmed grassland and semi-natural open habitats with well-established hedgerows, pre-thicket forest and areas of scrub. Ruddock et al. 2016, reported that Hen Harrier were more frequently recorded foraging over heather moorland (30%), second rotation forest (18.7%), rough grassland (12.4%) and thicket stage forest (12.4%).

The lands within 2km of UWF Related Works for the most part comprised actively farmed agricultural lands, with cattle rearing, dairy farming and sheep rearing on managed grassland. This is reflected in the most dominant habitat in the area being Improved Agricultural Grassland. There are also some areas of wet grassland and conifer plantation.

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The 2km study area partially overlaps the Slievefelim to Silvermines Mountains SPA (hereafter referred to as SPA) which is designated for breeding Hen Harrier. Within the overlap area of the UWF Related Works Study Area with the SPA, habitats such as upland blanket bog, conifer plantations of varying age classes, improved agricultural grassland, but also various mosaics of grassland and rough grazing are present.

[10] See also the NPWS submission to Tipperary County Council on Related Works.

The lands within 2km of UWF Related Works, also includes the previous study area for the consented Upperchurch Windfarm (overlapping the UWF Related Works to a large degree). The Upperchurch Windfarm area has already been evaluated as unsuitable for breeding Hen Harrier (2013 EIS).

It is considered that foraging habitat that is present within the footprint of UWF Related Works or within 50m of the construction works boundary **is sub-optimal** because:

1. The majority of the surrounding farmed area is permanent grassland, with livestock farming, dairying and beef cattle rearing ongoing. It is noted in this EIAR that there has been notable production up-scaling, enlargement of field layouts and technological improvement in farming present over time (See Chapter 9: Land).
2. The fragmentation of suitable habitat, with suitable foraging habitats within the study area mainly comprising small patches of heterogenous habitat in a wider landscape. The habitat in the SPA offers greater suitability for foraging Hen Harrier (this was the basis for the designation of these habitats).
3. Bird density or availability of food resources has also been used as a proxy for habitat suitability. The identified prey for nesting Hen Harriers in Ireland is considered to be largely based on small mammals, birds, amphibians and reptiles (Wilson et al., 2015). For central-place foragers such as Hen harriers (Arroyo et al., 2009), the use of a resource patch within a heterogeneous environment will be a function of both quality and availability of food resource, and distance to the central place (Matthiopoulos, 2003). Perhaps most critically, the load-size effect of carrying prey substantial distances from foraging grounds to a nesting site must also be considered (Sonerund, 1992); predators will only use foraging habitats substantially distant from the nest site if the prey has sufficiently increased energetic return for the extra foraging distance. Distance to nest is therefore a limiting factor.
4. In the context of Hen Harriers being central place foragers, with much of foraging occurring within 2km of the nest and only 2% of foraging occurring outside 4km from the nest (Arroyo et al. 2012). Surveys, consultation and desktop review of nest records has found that no nests (historical or known) have been located where the UWF Related Works occur.

8.6.1.2.10	Hen harrier usage of lands on the western side of UWF Related Works

In relation to the reference in the NPWS submission to Tipperary County Council in respect of UWF Related Works, as to whether Hen Harrier forage on the western side of the Consented Upperchurch Windfarm areas, we note that in accordance with SNH Guidelines, the evaluation of effects on foraging hen harriers is based on the distance from the nest rather than the presence of suitable foraging habitat in a given spot. As already described Hen Harriers are central place foragers, with much of foraging occurring within 2km of the nest and only 2% of foraging occurring outside 4km from the nest (Arroyo et al. 2012).

The degree of foraging by Hen Harrier within the western portion of the Consented Upperchurch Windfarm/UWF Related Works sites, and by inference closer to the SPA is not the recommended determinant in establishing connectivity to the SPA. Any birds recorded outside the SPA, may not even be individuals connected to the SPA, but simply failed breeders, birds on passage, or sub-adults which is typical of Hen Harrier ecology in the uplands of Ireland. It is the distance of any proposed development to nests, such as recommended by SNH that is key.

The distance of UWF Related Works to the nearest confirmed nest within the SPA is 4.8km (Coumnagillagh, within the SPA), the next nearest nest is 4.5km at Glenough Windfarm (outside the SPA). Due to this separation distance, it is considered that there is limited dependence/connectivity if any with foraging habitats on the western part of UWF Related Works, or indeed on the Consented Upperchurch Windfarm.

Also, because of the availability of large areas of suitable habitat inside the SPA boundary, including at nesting locations, it is evaluated that hunting or foraging Hen Harrier from the SPA population do not to rely on habitats outside of the SPA at the UWF Related Works/Upperchurch Windfarm sites.

8.6.1.2.11 Records from Upperchurch Windfarm and Milestone Windfarm

The UWF Related Works is generally located in the same area as Upperchurch Windfarm (with c.62% of Internal Windfarm Cabling within Consented UWF Roads), therefore Hen harrier surveys undertaken in 2012 for Upperchurch Windfarm EIS are a useful source of baseline information.

Further, additionally commissioned Hen Harrier surveys carried out from March 2015 to April 2017 (same vantage points as originally utilised in the Upperchurch Windfarm 2013 EIS) also inform the current appraisal and are herein referenced (Ecopower Developments 2015, 2016 and 2017). The purpose of the review of this representative subset of data is to confirm the assumption that by reason of distance from likely centres of activity for Hen Harrier (nearest confirmed nests), usage of the site has continued to remain low, in line with the original evaluation in 2013, and address whether the site does not present an unexpectedly higher attraction for bird activity (by holding especially rich or increased food supplies for instance), making it more attractive than would be expected from distance to nest alone, as a result of the passage of time since the original evaluation in 2013.

The results of the Upperchurch Windfarm surveys (Ecopower Developments, 2015, 2016) is that Hen Harrier observations have continued to remain low during the breeding season (April-July as cited in SNH Guidance) with only 5 observations, in total comprising 580 seconds, recorded during this period. Of this, only one bird was within the Consented Upperchurch Windfarm boundary – in March 2015 where a bird was recorded for 15 seconds. No observed flight paths intersected the locations of UWF Related Works.

Pre-construction surveys aimed at establishing any breeding activity at the nearby Milestone Windfarm (BES, 2015 and 2017) provide further insight into hen harrier usage of the area. Within 2015, these surveys took place in April, May and June of 2015; and in 2017, within the months of April and May. The methods followed were based on the methodology used in the Irish Hen Harrier Survey 2015 (Ruddock *et al.*, 2016) to detect breeding territories (see '*Survey and recording guidelines for contributors*' within the cited document).

Results of pre-construction surveys at Milestone Windfarm are 3 no. observations of birds across two yearly periods of the breeding season when expected activity would be high were Hen Harriers breeding onsite (at Milestone) or locally.

The results of these Upperchurch and Milestone surveys support the assumption that by reason of distance from likely centres of activity for Hen Harrier (nearest confirmed nests), usage of the UWF Related Works / Upperchurch Windfarm site has continued to remain low and does not demonstrated any dependency by birds breeding within the SPA upon lands where the UWF Related Works (or consented Upperchurch Windfarm) are to be located.

In our professional opinion, the passage of time has not resulted in any significant new dependence by Hen Harrier, particularly for nesting but also foraging, on the baseline environment for UWF Related Works or the Consented Upperchurch Windfarm in the passage of time between 2013 and the current date.

To conclude, on the basis of the information presented herein, it is evaluated that **dependent connectivity from the proposed UWF Related Works to the SPA does not exist**. We refer also in this regard the NIS which accompanies this EIAR.

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. Research in the Irish context (Wilson *et al*. 2015) has found a pattern of reduced nest success and productivity in instances where a turbine was located within 1km of a Hen Harrier nest, however this was not statistically significant and other influencing variables may be important determinants in establishing the likelihood of significant effects due to wind turbine proximity. Importantly it is distance to from turbine to nest which is the casual mechanism to any observed effect, not distance to protected site or suitable foraging habitat.

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). Multiple studies exist where Hen Harriers have continued to nest and forage in close proximity to operational wind energy developments where inclusive habitat 'enhancement' was provided (see SPR, 2009; Robson, 2011 as cited in NPWS, (draft) 2017[11]).

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

[11] NPWS. 2017. *Hen Harrier Conservation and the Renewable Energy Sector in Ireland (Draft).*

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:

"*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*[12]"(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.

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

8.6.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.6.2.1 Cumulative Evaluation Study Areas

8.6.2.1.1 UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works was evaluated for cumulative effects with other projects and the study area is set out in the table below.

UWF Related Works Cumulative Evaluation Study Area for Hen Harrier	Justification for the Study Area Extents
2km from the UWF Related Works construction works area boundary in all directions	Cumulative impacts should be assessed at the relevant biogeographical scale, so that the assessment of the impact of the development can be made alone and in combination with other developments- SNH 2018[13] Little information is available on the effects of wind farm construction activities on breeding Hen Harriers, although disruption at distances of up to 1km has been reported (Ruddock & Whitfield, 2007). An area of twice this has been selected in line with Best Practice, (SNH, 2017).

The study is illustrated on Figure CE 8.6 Hen Harrier within the UWF Related Works Cumulative Evaluation Study Area.

8.6.2.1.2 Whole Project Cumulative Evaluation Study Area

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

The Other Elements must be considered because UWF Related Works 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.

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 Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 8-42 and illustrated on Figure WP 8.6: Hen Harrier within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

[13] Scottish Natural Heritage. (2018). *Assessing Significance of Impacts from Onshore Wind Farms Outwith Designated Areas*. SNH, Battleby.

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Table 8-42: Whole Project Cumulative Evaluation Study Area for Hen Harrier

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	2km from the construction works/afforestation area boundaries in all directions for whole project effect; 4km from construction works areas to identify other projects which could contribute to cumulative effects.	As per SNH (2017) guidance 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).
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

8.6.2.2 Scoping of Other Elements, Other Projects or Activities & for Potential for Impacts

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 to Hen Harrier with either the UWF Related Works 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 A2.3.2.8).

The results of this scoping exercise are that: Milestone Windfarm (now operational), Castlewaller Windfarm (consented)Bunkimalta Windfarm (consented, outside 4km study area, but included on a precautionary basis) and the activities: Forestry, Agriculture and Turf-Cutting have been scoped in for evaluation of cumulative effects to Hen Harrier

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 8-43.

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 WP 8.6. The baseline character of the areas around these Elements is described in Section 8.6.2.3

Table 8-43: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	Included for the evaluation of cumulative effects as it occurs in proximity to established natural zones of usage by Hen Harrier
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 occur in proximity to established Hen Harrier usage areas, nor do they have potential to act as a source for impacts on

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	Hen Harriers due again to their location on public roads and have been scoped out accordingly).
Other Projects or Activities	
Milestone Windfarm Castlewaller Windfarm Bunkimalta 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 1: UWF Grid Connection – *including the preliminary preferred route of the 110kV UGC*

Mountphilips Substation is located 1.7km to the west of the Slieve Felim to Silvermine Mountains SPA boundary, a new route for the 110kV UGC is being investigated from Mountphilips Substation to the Consented UWF Substation mainly along local and regional (R503) roads. The 110kV UGC route traverses the SPA. In general, the SPA habitats include forestry at differing age classes, open moorland and bog, in addition to rough grazing, which is suitable for foraging and breeding.

Breeding and Foraging Context

Where the 110kV UGC route traverses the SPA, it is located within the public road and generally adjacent to improved farmland along with substantial numbers of dwellings, and associated amenity lands (gardens), especially in proximity to Newport town, Rear Cross village and Kilcommon village. The result of this is that approximately 60% of the habitats within 50m of either side of the corridor comprise habitats such as Built Surfaces, Improved Agricultural Grassland and Amenity Grassland all of which are generally unsuitable for foraging or nesting Hen Harrier. This is reflective of the nature of the route selection design with the majority of the UWF Grid Connection 110kV UGC route located within the public road, and adjacent to substantial numbers of dwellings, improved farmland and associated amenity lands, especially in proximity to smaller towns and villages. The immediate vicinity of the 110kV route therefore is largely of little use to Hen Harriers.

The route does traverse the Slieve Felim to Silvermine Mountains SPA and where it occurs in close proximity, habitats within the SPA are generally suitable for Hen Harrier foraging or breeding (but these may be mutually exclusive). SPA habitats present include forestry at differing age classes, open moorland and bog, in addition to rough grazing and improved agricultural lands. Additional lands not in the SPA, but within 2km of the route corridor may also be suitable for Hen Harrier, this primarily includes grassland habitats and mosaics (rough grassland), not within the SPA boundary but which may offer some foraging potential to harriers. Similarly, lands are present within 2km of the route which are outside the SPA in isolated patches and which are considered unsuitable. Due to its presence within the roadway for most of the route, and due to fact that lands at Mountphilips are unsuitable for breeding, no breeding habitats for hen harrier are within the footprint of works. Where the 110kV UGC goes off-road into the Mountphilips Substation, no foraging habitat is present as fields are largely improved.

Breeding territories or nests within 2km of the route of the 110kV UGC are now described, as informed from baseline studies conducted in 2016 and 2017 but also desktop review, and consultation with local Hen Harrier experts. A number of historical and recently confirmed nests occur within 2km of the 110kV UGC route. Many of these territories are traditional and continue to be occupied from year to year, however others are more marginal and breeding is only confirmed at irregular intervals. Within the study period (2016-2017) three no. breeding attempts were confirmed within 2km of the 110kV UGC route; the closest confirmed nest was 600m

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from the R503 at Kilnacappagh, the other 2 nests were located in consecutive years at Baurnadomeeny at ca. 1.8km and 1.9km respectively from the R503.

Other, historically used nesting territories occur in the townlands of Forkeala (1.2km south of the 110kV UGC); Gleno (1.5km south of the 110kV UGC) and Glenstall (1.9km south of the 110kV UGC), however these have not been confirmed as successfully breeding within 2016/2017.

Confirmed breeding attempts on the margin of 2km from the 110kV UGC route included at Culley Rocks in 2016 (2.4km from the 110kV UGC), Bleanbeg in 2017 (2.6km from the 110kV UGC) and Coomnagillagh (3.1km from the 110kV UGC). A historical territory within 3km of the R503 occurs at Cullaun, however this has been unproved in recent years (2016-2018). Further historical territories or recent nesting attempts totalling 8 no. have been documented at distances out to 7.5km from the route of the UWF Grid Connection 110kV UGC.

Suitable habitats for communal winter roosting were also studied and a total of 3 no. are present within the broader hinterland of the UWF Grid Connection. No winter roosts are within 2km of the UWF Grid Connection. Distances from the UWF Grid Connection to communal winter roosts are 2.07km (Goulmore), 3.3km (Fiddane) and 3.6km (Mauherslieve). All the identified roosts are at notably higher altitude and in habitats comprising heath and bog. Based on studies conducted during 2016 and 2017 the wintering 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 dependent 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 Supplementary Data (Section A8.1.4 & Section A8.1.5) and maps illustrating UWF Grid Connection sections with high sensitivity in respect of breeding Hen Harrier are provided in Figure WP 8.6: Hen Harrier within the Whole Project Cumulative Evaluation 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).

Geographical Overlap with UWF Related Works:

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in the Knocknabansha, Knocknamaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons where the 110kV UGC is located along regional and local public roads and a short section of paved forestry road (0.6km) on its approach to the Consented UWF Substation (Knockcurraghbola Commons).

8.6.2.3.2 Element 3: UWF Replacement Forestry

The UWF 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.

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8.6.2.3.3 Element 4: Upperchurch Windfarm

The consented 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.

The nearest known historical nest location to the consented windfarm is that within the townland of Knockalough, located ca. 2.4 km to the south– no confirmed nest has occurred here in recent years (i.e. 2015-2018) however and the last confirmed nesting attempt was in 2014.

Previously a nest has been located at Curreeny, ca. 2.7km to the northwest of the consented Windfarm, and at Glenough Windfarm, ca.4km to the south of the windfarm. The Curreeny nesting territory has not been confirmed active since 2014 (G.Penn, pers. Comm.), the Glenough nesting territory (adjacent to the operating Glenough Windfarm) has been active in recent years up to and including 2018 and is known to Inis surveyors.

For the avoidance of doubt a table is presented below, outlining the distance in km from the nearest identified nests to UWF Study Area Boundary (2013) and the nearest consented wind turbine.

Table 8-44: Historical & Recently Active Hen Harrier Nests within 8km of Upperchurch Windfarm

Nest	Townland	Last Confirmed as active	Distance to UWF 2013 Study Area (km)	Distance to nearest Consented UWF Turbine Location (km)	Within SPA
A	Coumnagillagh	2016	5.3	5.6	Yes
B	Baurnadomeeny	2016	7.1	7.4	Yes
C	Baurnadomeeny	2017	7.5	7.7	Yes
D	Knockalough	2014	2.4	2.6	No
E	Glenough	2018	4	4.6	No
F	Curreeny	2014	2.7	2.8	Yes

Consideration of the Passage of Time: The makeup of suitable habitat for hen harrier species on the Upperchurch Windfarm site has not materially changed since 2012/2013, and the frequency of use by hen harrier, recorded during the 2012/2013 surveys, is supported by the results of the Upperchurch and Milestone surveys described in respect of recent years. By reason of distance from likely centres of activity for Hen Harrier (nearest confirmed nests), usage of the Upperchurch Windfarm site has continued to remain low and does not demonstrate any dependency by birds breeding within the SPA upon lands where the consented Upperchurch Windfarm is to be located. Therefore, it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR.

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 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. These Haul Route Activities locations in closest proximity to the already consented Upperchurch Windfarm (HA21-23) whilst in unsuitable locations themselves, do occur adjacent to lands where foraging at

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low frequency has been recorded (lands on the consented windfarm). 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

Milestone Windfarm is located almost immediately south west of Related Works construction works and comprises 4 no. built and operational turbines and associated infrastructure.

The consented Castlewaller Windfarm is located within the Slievefelim to Silvermines SPA, c.1.2km to the north of the UWF Grid Connection where the 110kV UGC is routed along the R503. This windfarm is located within areas containing suitable foraging and nesting Hen Harrier habitat and in close proximity to known historical and more recent nesting attempts. Castlewaller Windfarm will be subject to significant management plans in respect of Hen Harrier.

The consented Bunkimalta Windfarm is also located within the Slievefelim to Silvermines SPA, c.4.6km to the north of the UWF Grid Connection 110kV UGC route. This windfarms is located within areas containing suitable foraging and nesting Hen Harrier habitat and in close proximity to known historical and more recent nesting attempts. The Bunkimalta Windfarm will be subject to significant management plans in respect of Hen Harrier.

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). Forestry occurs within the CE Study area both outside the SPA and within.

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. Within the SPA where it overlaps the CE Study area, certain land use activities are notifiable actions. In addition, a European Innovation Partnership (EIP) AGRI scheme supporting the maintenance of habitats for Hen Harrier with subsidies is in place.

An SPA level payment rewards participating farmers whose SPA continues to support a stable or increasing Hen Harrier population. The SPA level goal for the SPA in 2018 was set at 4 confirmed nesting pairs of Hen Harrier.

Turf-Cutting or Peat Extraction, both mechanically and by hand is also a medium ranked negative pressure on the SPA. Cutover bog does exist within the 2km CE study area, but this may not be actively cut at the moment.

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8.6.3 PROJECT DESIGN MEASURES for Hen Harrier

At the conception of the UWF Related Works, 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 8-45 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Hen Harrier**.

Table 8-45: UWF Related Works Project Design Measures relevant to Hen Harrier

PD ID	Project Design Environmental Protection Measure (PD)
PD26	Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive.
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. This includes hedgerow and scrub removal in addition to hedgerow trimming.

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 Grid Connection and 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.

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8.6.4 EVALUATION OF IMPACTS to Hen Harrier

In this Section, the likely direct and indirect effects of the UWF Related Works are identified and evaluated. Then the likely cumulative effects of the UWF Related Works 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 8-46: 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)*
Permanent or Temporary Reduction or Loss of Suitable Foraging Habitat (construction/operational stages)	*Disturbance/Displacement of nesting Hen Harrier, (construction stage)*
Disturbance/Displacement of foraging Hen Harrier, (construction stage) (ex-situ during the breeding season)	*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)
	Reduction in Prey Item Species (construction/operational stage)
	Disturbance/Displacement of foraging Hen Harrier, (construction stage) (ex-situ during the winter season)
	Disturbance/Displacement of foraging Hen Harrier, (operational stage)(ex-situ)
	Additive mortality/disturbance, (operational stage)
	Disturbance/displacement, (operational stage)
	Disturbance/displacement, (decommissioning stage)

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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.

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

Impact Description	
Project Life Cycle Stage:	Construction/Operational stage

Impact Source: Permanent structures such as the telecom relay pole, forestry felling to facilitate access roads (permanent or temporary), the re-alignment of previously consented roads in addition to temporary sources such as short-term trenching for underground cabling, the temporary removal of hedgerows, temporary widening of entrances, and temporary access roads for the transport of materials.

Cumulative Impact Source: provision of windfarm access roads , turbine hardstanding areas and substation compounds for consented windfarm; 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. Permanent Land take or land use/cover change of optimal foraging habitats (i.e. suitable and within the established core range for connectivity to a nest) during the construction stage may cause secondary effects for this Annex I species and SPA special conservation interest, however the magnitude of effects is distance (to nearest nest) dependant. Land cover change may result in foraging habitat (if available) being temporarily unavailable to any birds which may be dependant on this during key periods of the breeding cycle such as provisioning young. Effects may affect breeding success/productivity for one whole cycle, or until vegetation is re-instated. Loss of high dependency foraging habitat in close proximity to nesting locations at key periods of the breeding cycle may result in reduced productivity and/or nest success, in particular where it occurs within 2km of a nest location, and limited alternative habitat is available.

No nests occur within 2km of UWF Related Works and foraging usage in the vicinity is evaluated as low and in line with the trends established in the 2013 EIS for the consented Upperchurch Windfarm (see section on passage of time – Section 8.6.1.2.11). **Available foraging habitat within 50m of UWF Related Works, is sub optimal because of the distance to nearest active nest, the managed nature (intensive agricultural/grazing) of much of the surrounding landscape, and the fragmented nature of available foraging patches**.

The spatial extent of permanent habitat loss associated with UWF Related Works will be limited to the footprint of forestry felling, and the re-alignment of windfarm road RWR1. No permanent loss of suitable habitat is associated with Haul Route Works or the proposed Telecom Relay Pole or other ancillary activities. Temporary land use change will occur during various stages of UWF Related Works such as short-term trenching for underground cabling, and temporary access roads for the transport of materials where these locations overlap suitable foraging habitat.

In relation to cumulative effects, no permanent loss of suitable foraging habitat is associated with the UWF Grid Connection 110kV UGC; nor UWF Replacement Forestry, while the Upperchurch Hen Harrier Scheme (UWF Other Activities) and UWF Replacement Forestry will result in increased availability of foraging habitat once operational.

Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive.

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

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

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude: Total permanent land take of suitable 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.

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In addition, during construction, suitable foraging habitat will be temporarily unavailable, this habitat includes up to 4.6km of internal cabling located in agricultural lands and 2.1km located in forestry lands, in addition to c.1500m of temporary access roads at 4 no. differing locations. All these lands will be available for foraging within one growing season once vegetation has re-established.

Permanent habitat loss represents 0.28% of the suitable foraging habitat within 50m of the UWF Related Works and is considered negligible.

Note: Within the UWF Related Works site, HW7 is the only location where the site boundary overlaps the Hen Harrier SPA. No construction works and no land use change will take place within the SPA boundary, in line with the precautionary principle, to avoid effects on habitats possibly suitable for Hen Harrier. All other UWF Related Works locations and lands are located outside the SPA.

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, however;
- The reversibility of temporary habitat loss is expected within the temporary-short term period, also;
- The nearest active hen harrier nest is >4km to the west or south, and it is considered that hen harrier nesting at this distance will not rely on the foraging habitat at UWF Related Works thus significantly reducing likelihood of effect;
- Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;
- The reversibility of the impact with the reinstatement of lands at temporary works locations.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative impacts on foraging habitat relates to Upperchurch Windfarm, UWF Replacement Forestry and UWF Other Activities. There is no potential for cumulative impacts with UWF Grid Connection because the route of 110kV UGC is entirely on paved roads (with no foraging habitat) within the UWF Related Works Cumulative Evaluation Study Area.

The magnitude of cumulative impacts relates to a total of 0.48ha of suitable foraging habitat permanently lost within 50m of UWF Related Works, additional ca. 98.11ha permanent loss at Upperchurch Windfarm, and ca. 4ha short term loss at UWF Replacement Forestry.

Once growth at UWF Replacement Forestry (4ha) and Upperchurch Hen Harrier Scheme (UWF Other Activities) establishes (128ha), the gain of permanent suitable foraging habitat will be ca. 132ha. The UWF Replacement Forestry (1.5km east) and Upperchurch Hen Harrier Scheme habitats (adjacent to and within 2km of the SPA) - will have a positive effect to foraging hen harriers of High magnitude.

Significance of the Impact: Neutral

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, however;
- This is limited to loss only associated with the UWF Related Works;
- The reversibility of temporary habitat loss is expected within the temporary-short term period, also;
- The nearest active hen harrier nest is >4km, and it is considered that hen harrier nesting at this distance will not rely on the foraging habitat at UWF Related Works thus significantly reducing likelihood of effect;
- Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;
- The reversibility of the impact with the reinstatement of works areas, and;

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- the planting and management of lands for the use of Hen Harrier (UWF Other Activities and UWF Replacement Forestry) considered positive in quality and of High magnitude;

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

Element 1: UWF Grid Connection

Impact Magnitude:
No foraging habitat for Hen harrier will be lost on a temporary or permanent basis. Magnitude is negligible.

Significance of the Impact: Slight (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 'Negligible' (0-1% of habitat lost), equivalent to a non-distinguishable change away from baseline conditions;

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 conditioned Upperchurch Hen Harrier Scheme (evaluated other 'UWF Other Activities').

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

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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 consented 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 habitat will be managed to increase the area of hen harrier foraging habitat, measures set down to achieve this include:

- Rush management to control coverage and increase suitability for foraging habitat, promoting prey item species;
- 2,085m increase in hedgerow, resulting in increased edge habitat for foraging and prey items;
- 3ha enclosures of native scrub and trees, increased cover for prey item species;
- Lines of electric fence with plastic fliers so that they are more visible to the hen harrier, to avoid mortality;
- Enhancement of the riparian corridor (to maintain corridor value for foraging Hen Harrier):
    1. 1220m of woody scrub species
    2. Erect fencing to make stockproof and exclude access to river by livestock.

The following restrictions will apply to landowners within the Upperchurch hen harrier habitat scheme (to maintain habitat suitability):

- Limited spreading of fertiliser (every 4-5 years).
- Limited spreading of lime (every 4-5 years).
- No burning.
- No excavation of drains or reclaiming heath or bog.

In addition to the management described, workshops are proposed with landowners to advise landowners on the importance and implementation of the above measures.

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 Upperchurch Windfarm EMP. The net gain to Hen Harrier is 128Ha-98.11Ha which is 30Ha. The magnitude of this gain (an increase of 30% on the effective lands loss plus management of 128Ha to maintain suitability for Hen Harrier foraging) 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 Milestone Windfarm

Biodiversity

Topic

Impact Magnitude: Effective Habitat Loss of Hen Harrier habitat within 250m of each turbine location, where harriers use suitable forestry and or/other habitats. However, an area of lands at Knockcurraghbola Commons will be managed as part of a Hen Harrier Management Area for the lifetime of the windfarm for the benefit of Hen Harrier- comprising 10.8ha. This includes rush management, nutrient management, weed control, and the maintenance of edge habitat.

Significance of the Impact: Neutral residual effect

Rationale for Impact Evaluation:
The impact is evaluated as neutral given the effective habitat loss is mitigated by lands proposed to be managed for the benefit of Hen Harrier, over the lifetime of the wind farm.

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.[14] 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 Bunkimalta 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 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[15]"(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.

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

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

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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 and ergo where the SPA overlaps the CE 2km study area for Related Works. Peat extraction by hand or through mechanical means is ranked as a medium level pressure in respect of Hen Harrier within the SPA[16].

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. Within the Whole Project Cumulative Evaluation Study Area, turf extraction appears to form part of the current baseline environment at various locations such as Bleanbeg Bog, Cummermore, Gortmahonoge and at Cummer (Mulloghney). Some of these habitats where they overlap the SPA are further protected through the provision of NHA's such as at Bleanbeg Bog, wherein further turf cutting of intact areas is unlawful, or SAC's wherein Conservation Objectives to protect Qualifying Interest bog are set out. Outside the SPA but within 2km of the UWF Related Works, some turf cutting may take place at Dooree Commons.

Significance of the Impact: Neutral

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%), with little of this occurring within the CE Study Area;
- 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 Other Cumulative Impacts – Reduction in or Loss of Suitable Foraging Habitat

Whole UWF Project Effect

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 of 2019 (as per the Upperchurch Windfarm RFI 2013); is effectively mitigated by the activities consented under the Upperchurch Hen Harrier Scheme (UWF Other Activities), which as intended results in a net gain through design to Hen Harrier both in area and quality of habitat. No negative effects stem from the UWF Grid Connection; and effects overall are limited to permanent negative quality effects from the Related Works themselves of negligible magnitude (0.48ha).

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 an additional 30Ha 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 absence of any likely significant effects from the UWF Grid Connection 110kV route, also;
- The construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;

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[16] https://www.npws.ie/sites/default/files/protected-sites/natura2000/NF004165.pdf

- The reversibility of negative effects with reinstatement of lands, and the application of the Upper-church 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, Bunkimalta Windfarm, Milestone Windfarm, Agriculture/ Forestry and Turbary. Effects from other activities or projects in the vicinity are evaluated as largely neutral however forestry is generally a negative trend in the background environment currently and evaluated as significant in that regard. Effects from Hen Harrier management plans in respect of Castlewaller, Bunkimalta and Milestone Windfarms are neutral. The magnitude of effect is in the order of any net gain from the Whole UWF Project which is at minimum 30Ha, this is offset by any negative trend in the environment with respect to forestry declines in the short-medium term (next 10 years & expected to increase subsequently).

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 Impact Evaluation Table: Disturbance/Displacement of foraging Hen Harrier (ex-Situ during the breeding season)

Impact Description	
Project Life Cycle Stage:	Construction/Operational stage

Impact Source: Noise and Visual Intrusion from anthropogenic activities during construction and/or operation

Cumulative Impact Source: Multiple source of noise and visual intrusion occurring within the same spatial or temporal timeframe

Impact Pathway: Air

Impact Description: Hen Harriers are known to be sensitive to disturbance at nests (Masden 2010, Pearce-Higgins et al., 2012). Disturbance to foraging birds ex-situ from the immediate vicinity of nests and/or designated sites may impair foraging success during critical periods of the breeding season such as when provisioning young, or result in increased energy expenditure and subsequent reductions in fitness. This may be dependent on whether or not sequential effects occur, levels of habituation to background disturbance or whether sufficient displacement habitat is available once a bird experiences a disturbance event. The degree or frequency of baseline foraging is an influencing factor, as is distance to nests as this is a likely determinant of dependency. A minimum approach distance (MAD) as a function of flight initiation distance is used to determine the likelihood of any effect on an individual.

There have been no specific studies examining the flight initiation distance (FID) of non-breeding Hen Harriers to human disturbance. However, a study on FIDs on Northern Harrier *Circus cyaneus* from aircraft suggested a mean FID of 70m (Booms *et al.,* 2010) implying that birds may react to disturbance of similar magnitude (90db) at a distance of 105m. In a wider review of FIDs, Livesey et al. (2016) indicated a mean FIDs for Falconiformes of 89.7m (MAD 134.5m) (for pedestrian-based disturbance) and 79.7m (MAD 119.5m) (for motorised vehicles). Collectively, these data would suggest that foraging Hen Harriers are unlikely to be impacted by disturbance events over 150m away and within this distance only events of similar magnitude to the sources described (e.g. at 90dB) may have any effect. However birds will be habituated to certain background activities and react less to artificial noise versus the presence of humans.

Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;

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.

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. This includes hedgerow and scrub removal in addition to hedgerow trimming.

In relation to cumulative effects, the Upperchurch Hen Harrier Scheme (UWF Other Activities) activities are similar to background farming. If UWF Grid Connection 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 UWF Grid Connection works will be carried out within 2km of an active hen harrier nest.

Impact Quality: Negative

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

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude: Disturbance and visual intrusion during the excavation and subsequent cabling and reinstatement of 17.9km of trenching, disturbance and visual intrusion during the realignment of windfarm

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roads, and during haul route works, the use of flag men and any other activities associated with the construction stage – primarily where the activity occurs adjacent to suitable habitat but it is assumed that birds may transit through non-optimal habitat on a precautionary basis.

The use of machinery and equipment will include 1 no. 12ton excavator, 1 no. 6 ton excavator, 2 no. dump trucks, 1 no. vibrating roller, 1 no. cable pulling winch, a pole planter and auger drill, 1 no. diesel generator and various other small tools and equipment. Works will include the importation of construction materials such as aggregate via local and regional road networks. A traffic management plan will be in place.

Main construction activities will last for 6-8 months and will take place at the same time as the construction of the consented Upperchurch Windfarm and UWF Grid Connection. Works will be phased to varying degrees such as for water quality protection requirements.

During the construction stage, heavy machinery and vehicles which will be used at works areas during the construction stage will emit noise during their operation, noise will also be emitted from certain construction activities such as excavation or rock breaking or by mobile generators which may be used at work areas. Noise emissions will not be at levels to cause significant adverse effects on humans. Construction works, including excavations and the use of heavy machinery will cause low levels of ground vibration. No blasting or piling will occur at the UWF Related Works construction works areas. Vibration emissions will not be at levels to cause significant adverse effects (on humans).

Magnitude of effect is evaluated as negligible based on likely noise levels.

Significance of the Impact: Slight Negative

Rationale for Impact Evaluation:

- Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;
- The distance to the nearest confirmed nest locations (4.8km, 4.5km respectively), and;
- Fact that most foraging takes place within 2km of the nest site, with only 2% occurring at distances >4km- no nests are within 4km;
- Absence of dependency on the habitats within 50m of the UWF Related Works for foraging, with;
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude:

The potential for cumulative impacts via disturbance relates to Upperchurch Windfarm, UWF Related Works and works on Upperchurch Grid Connection within the UWF Related works Cumulative Evaluation Study Area. There is no potential for cumulative impacts with UWF Replacement forestry (planted by hand) and the UWF Other Activities Upperchurch Hen Harrier Scheme (similar to farming activities and outside temporal overlap).

The magnitude of cumulative impacts relates to the potential for concurrent activity encountered sequentially by foraging birds as they move through the area, which is reduced by the carrying out of construction works for UWF Related Works outside of the breeding season. Magnitude of effect is evaluated as negligible based on predicted noise levels.

Significance of the Impact: **Slight Negative**

Rationale for Impact Evaluation:

- Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive;

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- The distance to the nearest confirmed nest locations (4.8km ,4.5km respectively for UWF Related Works and 3.15km for the closest point of the UWF Grid Connection within the UWF Related Works Cumulative Evaluation Study area of 2km), and;
- Fact that most foraging takes place within 2km of the nest site, with only 2% occurring at distances >4kmno nests are within 4km;
- Absence of dependency on the habitats within the UWF Related Works Cumulative Evaluation Study Area for foraging, with;
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.

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

Element 1: UWF Grid Connection

Impact Magnitude:
UWF Grid Connection works will take place primarily within the public roads where habitats within 50m are generally unsuitable. Off-road works at Mountphilips are not proximal to any nesting and therefore regularly foraging birds during the breeding season. Within the study period (2016-2017) three no. breeding attempts were confirmed within 2km of the 110kV UGC route; the closest confirmed nest was 600m from the R503 at Kilnacappagh, the other 2 nests were located in consecutive years at Baurnadomeeny at ca. 1.8km and 1.9km respectively from the R503 therefore foraging birds from these 3 no. nests may encounter sources of disturbance within or ex-situ to the SPA. Likely noise levels from construction are evaluated as negligible in the context of existing background trends.

Significance of the Impact: Slight (negative)

Rationale for Impact Evaluation:

- Birds will already be habituated to road-based noise and visual intrusion;
- Works will take place outside the breeding season (March-August) for works locations within 2km of an identified nest.
- Effects will be momentary-Brief in duration, and;
- unlikely to affect any individual >150m from source, and;
- Highly reversible once any individual moves beyond 150m.

Element 3: UWF Replacement Forestry

Impact Magnitude:
All planting will be done by hand. Magnitude is negligible.

Significance of the Impact: Neutral to Slight (negative

Rationale for Impact Evaluation:

- No contrast in activities from background levels, and;
- Momentary – brief duration, with;
- High reversibility once any individual moves beyond 150m.

Element 4: Upperchurch Windfarm

Impact Magnitude: The nearest known historical nest location to the consented windfarm is that within the townland of Knockalough, located ca. 2.4 km to the south– no confirmed nest has occurred here in recent years (i.e. 2015-2018) however and the last confirmed nesting attempt was in 2014. Previously a nest has been located at Curreeny, ca. 2.7km to the northwest of the consented Windfarm. A slight percentage of foraging activity from 2 no. nests may overlap sources of noise. Temporary Disturbance has already been evaluated as not significant (2013 NIS)

Significance of the Impact: Not Significant

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Rationale for Impact Evaluation:
- The randomness and low number of hen harrier observations during the 2010 and 2011 vantage point surveys for the 2013 EIS suggests that the consented Upperchurch Windfarm is used infrequently by hen harriers.

Element 5: UWF Other Activities

Impact Magnitude: Negligible. The Upperchurch Hen Harrier Scheme will involve activities with similar sources of noise/intrusion as farming practices; Haul Route Activities trimming will be similar to existing noise/intrusion from regular maintenance of roadside hedgerows, and works on the Killonan Line will compare with existing maintenance in terms of the scale and magnitude of any noise/intrusion.

Significance of the Impact: Slight (negative)

Rationale for Impact Evaluation:
- No contrast from background levels of noise of intrusion is expected, and;
- Birds will already be habituated to road-based noise and visual intrusion;
- Effect duration will be brief to momentary for most activities, and;
- Highly reversible once any individual moves beyond 150m

Cumulative Information: Individual Evaluations of Other Projects or Activities

Other Project: Milestone Windfarm

Impact Magnitude: Milestone windfarm has already been constructed. Magnitude of effects is limited to operational disturbance only. It is assumed that Hen Harrier management measures to mitigate for disturbance will be in place at the time of construction of the Whole UWF Project.

Significance of the Impact: Neutral (Negative)

Rationale for Impact Evaluation:
The development of a HHMP to mitigate for any disturbance effects such as displacement from foraging areas;

Other Project: Consented Castlewaller Windfarm

Impact Magnitude: Noise and visual intrusion during the construction period may interact with foraging individuals from 2-3 no. nests within 2km. Magnitude of Effects on Hen Harrier have already been evaluated as Negligible.

Significance of the Impact: Low (Slight)

Rationale for Impact Evaluation:
- Primarily on the design of the windfarm allowing for the maintenance of foraging corridors and separation distance to nearest nests, and;
- The extent of displacement habitat available for any disturbed birds.

Other Project: Bunkimalta Windfarm

Impact Magnitude: Noise and visual intrusion during the construction period may interact with foraging individuals from 1 no. nests within 2km.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:
"During construction, the various activities may discourage birds from foraging in the immediate vicinity of the works. Whilst this is an adverse impact, it is temporary in duration. Further, the issue can be mitigated by avoiding works (partially or totally) during the main hen harrier nesting season."

Activity: Forestry/Agriculture

Sensitive Aspect: Hen Harrier

Impact Magnitude:
Evaluated as negligible, effectively same as background. Disturbance from forestry operations is part of background trends, limited information is available on magnitude of this however forestry extraction is subject to Forest Service procedure for felling within the Hen Harrier breeding season, this includes full Appropriate Assessment to protect Hen Harriers within SPA's. It is assumed this process will be undertaken for all commercial forestry resulting in no likelihood of significant effects or adverse effects on site integrity.

Significance of the Impact: Slight (neutral)

Rationale for Impact Evaluation:

- No contrast in activities from background levels, and;
- Brief-Temporary duration, with;
- High reversibility once any individual moves beyond 150m.
- Forestry activities are subject to Appropriate Assessment of their effects on Hen Harrier.

Other Project: Turf-cutting

Impact Magnitude: Evaluated as negligible, effectively same as background.

Significance of the Impact: Slight (neutral)

Rationale for Impact Evaluation:

- No contrast in activities from background levels, and;
- Momentary – brief duration, with;
- High reversibility once any individual moves beyond 150m.

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

Whole UWF Project Effect

Cumulative Impact Magnitude:
Magnitude of the cumulative effects will be in the order of the Related Works, consented wind farm and Grid Connection where they overlap, i.e. the same as Related Works. This is evaluated as negligible.

Significance of the Cumulative Impact: Neutral to Slight (negative)

Rationale for Cumulative Impact Evaluation:

- Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive, avoiding any potential for sequential effects;
- The distance to the nearest confirmed nest locations (4.8km ,4.5km respectively for UWF Related Works and 3.15km for the closest point of the UWF Grid Connection within the UWF Related Works Cumulative Evaluation Study area of 2km), and;
- Fact that most foraging takes place within 2km of the nest site, with only 2% occurring at distances >4km
- No nests are within 4km of UWF Related Works;
- Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the bird moves beyond 150m.

Topic: Biodiversity

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

Cumulative Impact Magnitude:
The magnitude of foraging disturbance ex-situ from nests/designated sites resulting from the Whole UWF Project, Castlewaller Wind Farm, Bunkimalta Windfarm, Milestone Windfarm, Agriculture/ Forestry and Turbary. Effects from other activities or projects in the vicinity are evaluated as neutral – apart from Castlewaller Windfarm which is evaluated as Negligible and Bunkimalta (evaluated as Not Significant). Magnitude

of effects from the Whole UWF Project is negligible and solely in the order of the UWF Related Works, UWF Grid Connection and Consented Upperchurch Windfarm where they overlap.

Significance of the Cumulative Impact: Slight (negative)

Rationale for Cumulative Impact Evaluation:

- Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive, avoiding any potential for sequential effects;
- Construction works for the Grid Connection will not take place during the period March-August at any locations within 2km of a confirmed Hen Harrier nest, and;
- The distance to the nearest confirmed nest locations in respect of the UWF Related Works, UWF Grid Connection and consented Upperchurch Windfarm, where they overlap;
- Fact that most foraging takes place within 2km of the nest site, with only 2% occurring at distances >4km Noise/Vibration/Intrusion unlikely to affect any individual >150m from source;
- Birds likely to be habituated to various background activities such as farming practices, road maintenance, forestry practices and;
- The duration of effects, (momentary-brief) and;
- High reversibility once the individual bird moves beyond 150m.
- The separation distance from the zone of overlap between UWF Related Works, UWF Grid Connection, and Consented Upperchurch Windfarm from Castlewaller Windfarm (>10km) or Bunkimalta Windfarm (>8km) precludes foraging overlap and ergo sequential effects.

8.6.4.3 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 8-47 below.

Table 8-47: 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.
Forestry Felling	2,4	Contact	Mortality of Hen Harrier in or at Nest Sites	Evaluated as Excluded: No potential for effects from 2, No construction works (which includes forestry felling) for UWF Related Works during the breeding season. In relation to Upperchurch Windfarm, no likely impact as no works will take place within 500m of a nest March - August as part of Planning Conditions. No forestry felling for UWF Grid Connection.
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.
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	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, as part of Project Design. Construction works for the UWF Related Works will be not be carried out during the hen harrier breeding season March to August inclusive. Works for the UGC will take place outside the breeding season (March-August) for works locations within 2km of an identified nest.

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Noise and human activity	1,2,3,4 5	Visibility	Disturbance/Displacement of foraging Hen Harrier (ex-situ during the winter season)	Distance to established winter roosts and low frequency of occurrence during the winter months reduces likelihood of effect. Brief-momentary duration and high reversibility once any foraging bird moves beyond 150m from source of disturbance avoids significant effects.
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. 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 to foraging Hen Harrier (ex-situ) or nesting /roosting Hen Harrier	Evaluated as Excluded: No potential for impacts/Neutral effect; UWF Grid Connection: - Avoidance of annual inspections and Planned Maintenance works or activities within the SPA during the breeding season is built into design. Any unscheduled repair work, which may need to take place during the breeding season, will occur very infrequently, if at all. Due to the infrequent, reversible, and temporary duration, and location of any works within primarily permanent existing public roads, it is considered that disturbance/displacement effects to hen harriers will be Neutral during unplanned repairs, should they occur at all. UWF Related Works – no potential for impacts due to no works at HW7 within SPA, all other works which may occur during operation, relate to Haul Route Works, which are located along the public road network and outside of the SPA. No dependency of hen harrier on the land within the site, based on low usage of UWF Related Works area by hen harrier, and separation (greater than 2km) to nearest known and historical nest sites.

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Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				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. 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. Upperchurch Windfarm: As per the 2014 ABP Inspectors Report no significant residual impact to Hen Harrier is expected to occur. Distance to established winter roosts and low frequency of occurrence during the winter months reduces likelihood of effect to winter foraging birds. Brief -momentary duration, combined with low frequency of operational maintenance and high reversibility once any foraging bird moves beyond 150m from source of disturbance avoids significant effects.
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. Upperchurch Windfarm and UWF Related Works- decommissioning 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 works 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 Related Works project design including the Project Design Measures.

No additional mitigation measures are required as **slight negative impacts** are concluded by the topic authors as likely to occur to Hen Harrier with respect to permanent or temporary foraging habitat loss as a consequence of the UWF Related Works on its own; when considered cumulatively with the Other Elements of the Whole UWF Project – **significant positive cumulative impacts** are expected, and when Other Projects or Activities are considered the overall cumulative effect is Neutral.

No additional mitigation measures are required as **slight negative impacts** are concluded by the topic authors as likely to occur to Hen Harrier with respect to Disturbance/Displacement as a consequence of the UWF Related Works on its own; when considered cumulatively with the Other Elements of the Whole UWF Project – **Slight (neutral - negative)** effects are expected, and when Other Projects or Activities are considered the overall cumulative effect is **Slight (negative).**

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 Tables 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 Related Works, 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:

RW-BPM-12	Monitoring of nesting and roosting Hen Harrier (*Circus cyaneus*)
RW-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 Related Works, which is included as Volume D with the planning application.

8.6.8 Summary of Impacts to Hen Harrier

A summary of the Impact to Hen Harrier is presented in Table 8-48.

Table 8-48: Summary of the impacts to Hen Harrier

Impact to Hen Harrier:	**Permanent or Temporary Reduction in or Loss of Suitable Foraging Habitat**	**Disturbance/ displacement of foraging Hen Harrier (ex-situ)**
Evaluation Impact Table	*Section 8.6.4.1*	*Section 8.6.4.2*
Project Life-Cycle Stage	Construction/Operation	Construction/Operation
UWF Related Works *Direct and indirect effects*	**Slight (negative)**	**Slight (negative)**
UWF Related Works *Cumulative effects*	**Neutral**	**Slight (negative)**
Element 1: UWF Grid Connection	Slight (negative)	Slight (negative)
Element 3: UWF Replacement Forestry	**Very Significant (positive)**	Neutral to Slight (negative)
Element 4: Upperchurch Windfarm	Neutral residual effect	Not Significant
Element 5: UWF Other Activities	**Very Significant (positive)**	**Slight (Negative)**
Cumulative Impact:		
All Elements of the Whole UWF Project	**Significant (positive)**	**Neutral to Slight (Negative)**
All Elements of the Whole UWF Project *cumulatively with* Other Projects or Activities: Bunkimalta Windfarm Castlewaller Windfarm Milestone Windfarm Forestry, Agriculture, Turf-Cutting	**Neutral**	**Slight (negative)**

The greyed out boxes in the 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.

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 Related Works is described in Table 8-49 and illustrated on Figure RW 8.7: General Bird Species within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 8-49: UWF Related Works Study Area for General Bird Species

Study Area for General Bird Species	Justification for the Study Area Extents
50m area around and incorporating the construction works areas	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 Related Works Study Area

All the species recorded during the UWF Related Works EIA Report 2017 surveys are typical of the habitats present. 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, but is also reflective of the conservation status (locally/nationally/internationally) of the species within the study area overall.

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 (Annex I), Stonechat and Crossbill. Additional species recorded on Upperchurch Windfarm included Raven, 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 in the area (e.g. hill farming) in respect of the quality of habitat present. Studies as part of the current evaluation of Related Works, such as habitat surveys for Forestry replant lands (conducted in April 2017), also recorded species such as Blackbird, Goldcrest, Great Tit, Wren and Robin, in addition to Meadow Pipit, Reed Bunting and Skylark. In general, the distribution of general bird species is considered unchanged with respect to the passage of time since the 2013 EIS.

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), seven Amber-listed (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.

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 nests on the ground in open countryside in heaths, moors, bogs and coastal marshes. This species is generally site-faithful, although there is some post-breeding dispersal in winter months, particularly from upland areas to lowland habitats. There is c.123Ha of suitable habitat, comprising grassland, grassland mosaics, dry heath, upland blanket bog and cutaway bog, for Meadow Pipit within the UWF Related Works Study Area. It is considered that the habitat at UWF Related Works is sub-optimal/optimal, and it is noted that suitable habitat occurs throughout the wider area. Meadow Pipit were recorded on the UWF Related Works sites during bird surveys for Upperchurch Windfarm and during site surveys for UWF Related Works.

Golden Plover

Golden Plover breed in heather moors, blanket bogs & acidic grasslands. Golden Plover form flocks in winter, foraging and roosting in large open pasture and tilled fields. 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. There is c.120ha of available suitable Golden Plover habitat within the study area which mainly comprises improved agricultural grassland and grassland mosaics, and small areas of upland blanket bog and cutaway bog. The habitat is only suitable for wintering birds.

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 but sparely-occurring breeding bird. It is 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. 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.

Merlin, Peregrine Falcon

Merlin was not observed during studies to inform Upperchurch Windfarm 2013 EIS. None were recorded during site visits to inform the current evaluation..

Peregrine Falcon was recorded on a single occasion (June 2011) during studies to inform Upperchurch Windfarm 2013 EIS.

Hen Harrier is specifically evaluated in Section 8.6 of this report.

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. Areas of wet grassland and open moorland are present in the wider area, but may be sub-optimal for Curlew due to land use management, and fragmentation.

Kingfisher

Kingfishers breed in tunnels dug in vertical banks along watercourses. They are a largely sedentary species and rarely move from established territories. However, some may move to lakes and coasts during extended

spells of cold weather outside of the breeding season. They are widespread in Ireland and found on streams, rivers and canals. Kingfisher was not recorded during studies to inform Upperchurch Windfarm EIS. None were recorded in surveys to inform the current appraisal, including watercourse evaluations. The watercourses (habitats) which are present on the UWF Related Works site predominately comprise drains which are not suitable for breeding Kingfisher.

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, Peregrine Falcon 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'

Notwithstanding the protection afforded to some bird species at EU level, the importance of each species in relation to the UWF Related Works area takes account of international classifications and the occurrence of the species at the site within the context of resident or regularly occurring local populations, county populations or those at a national or international level – see Table 8-4 for criteria.

Although not listed on either Annex I or II of the EU Birds Directive, due to its importance as a prey item for Hen Harrier in the context of the nearby Slievefelim to Silvermines Mountain SPA, Meadow Pipit have been evaluated as of County Importance and assigned a sensitivity rating of Medium for evaluation.

Although listed on Annex I of the EU Birds Directive, due to an unfavourable conservation status in the EU, Golden Plover is provisionally listed as secure at pan-European level. Nevertheless, wintering Golden Plover in Ireland are evaluated as Nationally Important and assigned a sensitivity rating of High.

Although listed on Annex II of the EU Birds Directive, due to a decline in population across Europe including Ireland. Red Grouse are evaluated as of County Importance and assigned a sensitivity rating of medium.

Although listed on Annex I of the EU Birds Directive, due to population declines across Europe (including Ireland) Merlin in the density recorded are evaluated as of Local Importance (low value) and assigned a sensitivity rating of Negligible.

Although listed on Annex I of the EU Birds Directive, due to historical population declines Peregrine Falcon populations are on the increase in Ireland. Given the density recorded here they are evaluated as of Local Importance (low value) and assigned a sensitivity rating of Negligible.

Listed on the red list of conservation concern Curlew is evaluated as of National Importance and assigned a sensitivity rating of High.

Kingfishers are Amber listed in Ireland, due to having an unfavourable conservation status in Europe from historical declines. However, Kingfisher populations are not of global concern, thus a sensitivity rating of low is applied.

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 habitats 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)

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.

8.7.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.7.2.1 Cumulative Evaluation Study Areas

8.7.2.1.1 UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works was evaluated for cumulative effects with other projects and the study area is set out in the table below.

UWF Related Works Cumulative Evaluation Study Area for General Bird Species	Justification for the Study Area Extents
1km from UWF Related Works construction works areas	General birds, due to their naturally smaller home ranges are unlikely to be cumulatively affected by Other Elements or Other Projects or Activities outside this distance

The study is illustrated on Figure CE 8.7 General Bird Species within the UWF Related Works Cumulative Evaluation Study Area.

8.7.2.1.2 Whole Project Cumulative Evaluation Study Area

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

The Other Elements must be considered because UWF Related Works 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.

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 Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works 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 8-50 and illustrated on Figure WP 8.7: General Birds Species within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-50: Whole Project 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 1km from construction works areas and activity locations in relation to cumulative effects with Other Projects or Activities	Professional judgement and as per Best Practice (CIEEM, 2016, NRA, 2008, Lusby et al.,2010, SNH 2014). General birds, due to their naturally smaller home ranges are unlikely to be cumulatively affected outside this distance
Element 1: UWF Grid Connection		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

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8.7.2.2 Scoping of Other Elements, Other Projects or Activities & for Potential for Impacts

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 Related Works 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 A2.3.2.8).

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 8-51.

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 WP 8.7. The baseline character of the areas around these Elements is described in Section 8.7.2.3.

Table 8-51: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	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

8.7.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.7.2.3.1 Element 1: UWF Grid Connection

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 species 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.

General Breeding Birds

Based on the range of terrestrial habitats mapped, and on observations made during ecological surveys of the 110kV UGC route in January 2019, general breeding birds are assumed to include bird species which commonly nest in hedgerows and tree lines such as passerines and bird species associated with farmland such as Meadow Pipit and Skylark.

There are suitable habitats for breeding Dipper and Grey Wagtail at water crossing locations. During ecological surveys undertaken of the 110kV UGC route in January 2019, observations of evidence of Dipper and Grey Wagtail at water crossings were recorded. During these surveys a pair of Dippers were observed at

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the Mulkear River (W4), although no nests were recorded at this water crossing. Additionally, Dipper nests were recorded at three water crossing locations; one nest at water crossing W13, two nests at water crossing W23 and one nest at water crossing W36. A number of water crossings were identified as suitable for Dipper however no evidence of Dipper was recorded at these locations. A probable Grey Wagtail nest was recorded at water crossing W36. Evidence of bird presence (white wash on a rock) was recorded at water crossing W38, the source species is unknown.

Additionally, four Swallow nests were recorded within a derelict shed adjacent to water crossing W48.

General Wintering Birds

Based on the range of terrestrial habitats mapped, and based on observations made during habitat surveys of the 110kV UGC route in January 2019, general wintering birds are assumed to include passerines and farmland birds.

A total of 17 species were recorded comprising one Red-listed (Grey Wagtail), six Amber-listed and ten Green-listed birds of conservation concern. The Red-listed Grey Wagtail was observed at water crossing W4, on the Mulkear River.

Meadow Pipit

It is assumed that populations of the Red-listed Meadow Pipit are present in suitable habitat (pasture, scrub and bog) in the survey area. Meadow Pipit have been evaluated as of County Importance and assigned a sensitivity rating of Medium for evaluation.

Terrestrial habitat surveys indicate that Meadow Pipit habitat is widespread along the 110kV UGC route. This species is generally site-faithful, although there is some post-breeding dispersal in winter months, particularly from upland areas to lowland habitats.

Golden Plover, Red Grouse, Curlew, Merlin

Based on the range of terrestrial habitats mapped during ecological surveys of the 110kV UGC route in January 2019 there is suitable habitat for the following species; wintering Golden Plover and Merlin.

Golden Plover breed in heather moors, blanket bogs and acidic grasslands and disperse widely over the winter months. Wintering Golden Plover use wide open expanses of pasture and tilled land. During the survey undertaken in January 2019, suitable winter habitat for Golden Plover, consisting of pasture in large open fields was recorded. No suitable breeding habitat for Golden Plover was recorded within the survey area. This species was not observed during ecological surveys in January 2019.

No suitable breeding habitat for Red Grouse was recorded during the ecological surveys of the 110kV UGC route in January 2019. In the winter if snow is on the ground the species has a widespread distribution occupying wind swept ridges and lower ground, however no suitable habitat with sufficient habitat cover was recorded within the survey areas of the 110kV UGC route.

Curlew nest on the ground in a range of habitats in Ireland, from rough pasture, meadows and heather. Huge changes in the upland areas, such as the destruction of peat bogs, afforestation, intensive management of farmland and the abandonment of some lands, leading to encroachment by scrub, gorse and dense rushes, have all affected Curlew breeding habitats. In Ireland, the Curlew is not a common breeder, however it is found in most parts of the country.

No suitable habitat for wintering Curlew were recorded during the ecological survey of the 110kV UGC route in January 2019. These habitats consist of wet grassland. No Curlew were observed during the ecological surveys. No suitable breeding habitat for Curlew was recorded within the study area during these surveys. In

general, grazing regimes and other land management practices within 50m of the road corridor preclude breeding by this species.

No suitable breeding habitat for Merlin were recorded within the study area during the ecological surveys undertaken in January 2019 (the proximity to the road qualifies the habitats as unsuitable for breeding). During the winter Merlin have a widespread distribution, and may occasionally perch in roadside trees during the winter months. However, the locations of activities do not comprise foraging habitat for this species.

Kingfisher

With regard to the UWF Grid Connection suitable watercourses were surveyed 150m upstream and downstream were possible of watercourse crossing locations. These surveyed watercourses include the Mulkear, Clare and Bilboa River. Habitats at watercourse crossings are generally unsuitable for this species, which requires sandy or earth banks alongside the watercourse to establish their tunnel/burrow nests.

Barn Owl

All buildings within the survey area were evaluated for suitability for Barn Owl during the ecological surveys of the 110kV UGC route undertaken in January 2019. The assessment followed criteria according to Lusby et al. (2012). Only the exterior of buildings was assessed for Barn Owl, thus presence or absence of Barn Owl within the buildings could not be confirmed.

Four buildings where assessed as having high suitability for Barn Owl.

Geographical Overlap with UWF Related Works:

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in the Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons where 110kV UGC works will occur within 1km of Haul Route Works, Internal Windfarm Cabling and the works for the Telecom Relay Pole.

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.

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 at the UWF Replacement Forestry site.

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.

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.

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 nesting 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, 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), seven Amber-listed (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.

Meadow Pipit

Meadow Pipit is present in suitable habitat.

Golden Plover

Golden Plover were not observed during studies on Upperchurch Windfarm or during any surveys carried out at UWF Replacement Forestry.

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.

Consideration of the Passage of Time: The makeup of suitable habitat for general bird species on the Upperchurch Windfarm site has not materially changed since 2012/2013, and the species recorded during the 2012/2013 surveys were generally also recorded during site surveys for UWF Related Works. Therefore, it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR.

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. 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 A8.1.3.6. Twenty three species were recorded, including six Amber-listed species (Goldcrest, Stonechat, Starling, Common Snipe, Robin and House Sparrow).

8.7.2.3.5 Other Projects or Activities

Not applicable –No Other Projects or Activities were scoped in for evaluation of cumulative effects, see Section 8.7.2.1

8.7.3 PROJECT DESIGN MEASURES for General Bird Species

At the conception of the UWF Related Works, 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 8-52 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **General Bird Species**.

Table 8-52: UWF Related Works 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.

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 Grid Connection, 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 Related Works are identified and evaluated. Then the likely cumulative effects of the UWF Related Works 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 8-53: 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, Peregrine Falcon (construction stage)*
Golden Plover: Disturbance/Displacement (construction stage)	*Disturbance / Displacement: General Birds, Kingfisher, Red Grouse, Merlin, Meadow Pipit, Eurasian Curlew, Peregrine Falcon (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 for the Elements of the Whole UWF Project 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 2: UWF Related Works – direct/indirect impact

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. 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.

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 120Ha) in the greater area, notwithstanding;
- The long term duration, and;
- Low reversibility with permanent land use change likely.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative impacts relates to additional habitat loss as a result of Upperchurch Windfarm (7.81ha) and UWF Replacement Forestry (3.98ha), both of which occur within 1km of UWF Related Works and will involve landcover change in suitable Golden Plover habitat. However, the cumulative impact is not expected to be greater than UWF Related Works due to the absence of Golden Plover recorded on any of the three project study areas, and the extent of available habitat in the wider surrounding area.

Significance of the Impact: **Not Significant**

Rationale for Impact Evaluation:

- The extent of suitable habitat to be affected;
- The availability of habitat in the wider surrounding area, notwithstanding;

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- The permanent duration, and;
- Low reversibility with land use change likely.

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

Element 1: UWF Grid Connection

Impact Magnitude:
Permanent land use change will occur at the location of the Mountphilips Substation (including access road), however the habitats present at this location are not suitable for Golden Plover due to the enclose nature of the improved grassland fields. No habitat loss will occur along the 110kV UGC route where is occurs outside of the Mountphilips Substation site.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The high sensitivity rating of the species, based on conservation status, and;
- No suitable habitat loss, notwithstanding;
- The permanent duration, and;
- Low reversibility

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). 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.

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: Construction Works will include land use change of 7.81Ha of suitable breeding habitat for Golden Plover in the form of grassland, grassland mosaic, and bog habitat. The scale of land use change is 1.4% of available habitat within the Study area boundary (536Ha).

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: Negligible

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;

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• Monitoring does not include land take or land use changes
Evaluation of Other Cumulative Impacts – Golden Plover: Habitat Loss
Whole UWF Project Effect
Cumulative Impact Magnitude: Instances of land use change in respect of suitable foraging or roosting habitat will occur from works on either side of the Slievefelim to Silvermines Mountain upland area, with habitat loss associated with UWF Related Works (0.2Ha), Upperchurch Windfarm (7.81Ha) and UWF Replacement Forestry (3.99Ha).
Significance of the Cumulative Impact: Slight
Rationale for Cumulative Impact Evaluation: • The high sensitivity rating of the species, counterbalanced with; • No birds recorded • The extent of habitat loss overall in the context of the availability of habitat within the study area (Overall habitat loss is 12ha, consisting of 0.2Ha from related works, 7.81Ha from Upperchurch Windfarm and 3.99Ha from replacement forestry), • The availability of habitat in the surrounding area, and not withstanding; • The permanent duration, and; • Low 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 Bats with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 8.7.2.1).

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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 or anthropogenic sources may occur during the period October to March when the highest proportion of birds (wintering) could be potentially 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 2: UWF Related Works – direct/indirect impact

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, or observed during site surveys for UWF Related Works therefore;
- The probability of disturbance is significantly reduced (to an evaluation as low), notwithstanding suitable habitat is present.
- Activities such as cable trenching will not contrast significantly from baseline activities such as road works or farming related works, and;
- The duration of any individual disturbance events (if any) 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 2012) and therefore unlikely to alter long term wintering trends;

Element 2: UWF Related Works – cumulative impact

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Cumulative Impact Magnitude: The potential for cumulative impacts relates to the potential for combined or increased disturbance as a result of multiple crews of people and machinery carrying out various works and activities for Upperchurch Windfarm and UWF Replacement Forestry, both of which occur within 1km of UWF Related Works and both of which also contain suitable Golden Plover habitat. However, the cumulative magnitude of impact is considered to be low due to the absence of Golden Plover recorded on any of the three project study areas, and the extent of available habitat in the wider surrounding area and the carrying out of works during daylight hours.

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, or observed during site surveys for UWF Related Works therefore;
- The probability of disturbance is significantly reduced (to an evaluation as low), notwithstanding suitable habitat is present.

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

Element 1: UWF Grid Connection

Impact Magnitude:
Golden Plover are not considered to be significantly disturbed by any works on the public road network, due to the level of noise and visual disturbance already associated with traffic on the public road network. Furthermore the duration of works along the public road are assumed to be brief given the linear nature of the works. Due to the lack of suitable habitat for Golden Plover at the Mountphilips Substation works, disturbance will not occur here.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- No Golden Plover were recorded at the Mountphilips Substation site in 2016 or 2017.
- No Golden Plover recorded during the habitat surveys on the 110kV UGC route in January 2019.
- Some suitable habitat exists in close proximity to the public road 110kV UGC route, however traffic is already causing disturbance on roads and use of suitable adjacent lands is unlikely.
- Activities such as cable trenching will not contrast significantly from baseline activities such as road works or farming related works, and;
- The duration of any 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., 2012) and therefore unlikely to alter long term wintering trends;

Element 3: UWF Replacement Forestry

Impact Magnitude: None

Significance of the Impact: Neutral effect

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 effect

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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 effect
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.
Evaluation of Other Cumulative Impacts – Disturbance/Displacement
Whole UWF Project Effect
Cumulative Impact Magnitude: Instances of disturbance has potential to occur on suitable foraging/roosting winter habitat from construction works and the presence of work crews on either side of the Slievefelim to Silvermines Mountain upland area. There is no potential for likely cumulative whole project effects, as no Golden Plover were recorded within study areas for any Element.
Significance of the Cumulative Impact: Not Significant
Rationale for Cumulative Impact Evaluation: • No birds recorded, and; • Activities such as cable trenching, road works, 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., 2012) and therefore unlikely to alter long term wintering trends;

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 Related Works or the Other Elements of the Whole UWF Project (see Section 8.7.2.1).

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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: The Meadow Pipit is a Red-listed species due to sharp breeding declines thought to be a result of the unusually severe winters of 2009/10 and 2010/11. Based on this it is assigned a medium sensitivity rating. However, numbers of Meadow Pipit have been increasing since 2012 (CBS, 2013)[17]. 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.

Meadow Pipit will benefit from enhancement measures for Hen Harrier as part of the Upperchurch Hen Harrier Scheme (UWF Other Activities), 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 2: UWF Related Works – direct/indirect impact

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).

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),
- 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 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative impacts relates to additional habitat loss as a result of Upperchurch Windfarm (7.81ha) and UWF Replacement Forestry (3.98ha), both of which occur within 1km of UWF Related Works and will involve land cover change in suitable Meadow Pipit habitat. The cumulative impact magnitude is expected to be low, due to small area of land cover change, in the context of the extent of available habitat in the wider surrounding area.

Significance of the Impact: **Not Significant**

[17] Citation: Crowe, O., R. H. Coombes, O. O'Sullivan, T. D. Tierney, A. J. Walsh & J. O'Halloran. 2014. Countryside Bird Survey Report 1998-2013. BirdWatch Ireland, Wicklow

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Rationale for Impact Evaluation:

- The extent of suitable habitat to be affected;
- The availability of habitat in the wider surrounding area;
- The permanent duration, and;
- Low reversibility with land use change likely.

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

Element 1: UWF Grid Connection

Impact Magnitude:

A total of 1.39Ha of suitable foraging habitat will be lost due to land use change at Mountphilips substation and access roads. No suitable habitat loss will occur along the 110kV UGC route.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The medium sensitivity of the species, based on conservation status, and;
- No loss of suitable breeding habitat
- The extent of suitable foraging habitat to be affected (1.39Ha), evaluated as low.

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;

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• 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)
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 habitats present), which; • Comprises a major alteration to baseline features, and • The long term duration, over the lifetime of the project, and; • Low reversibility.
Evaluation of Other Cumulative Impacts – Meadow Pipit: Habitat Loss
Whole UWF Project Effect
Cumulative Impact Magnitude: Instances of land use change in respect of suitable breeding habitat will occur from works associated with the UWF Related Works (0.2Ha), UWF Replacement Forestry (3.99Ha) and the Upperchurch Windfarm (7.81Ha). No cumulative habitat loss effects will occur to meadow pipit as a result of UWF Related Works in combination with UWF Grid Connection works, as any land use change associated within the UWF Grid Connection are outside the zone of effect for the UWF related works. No land Use change will occur within the SPA (where either UWF Grid Connection or UWF Related Works overlaps the SPA) 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 habitat loss overall in the context of the availability of habitat within the study area (12ha), (Overall habitat loss is 12ha, consisting of 0.2Ha from related works, 7.81Ha from Upperchurch Windfarm and 3.99Ha from replacement forestry), • The extent of land use change overall (12Ha), comprises of a small extent of available habitat within 1km. • 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 to permanent duration, and with; • Low 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 Bats with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 8.7.2.1).

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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 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 (Whole UWF Project Element: UWF Other Activities) 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 2: UWF Related Works – direct/indirect impact	
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: • The benefit to bird diversity, and; • Long term duration, and; • The low reversibility with proposed enhancement already incorporated into project design.	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: Instances of enhancement, and management of habitat specifically for the benefit of birds will occur within 1km of UWF Related Works as part of the UWF Related Works, UWF Replacement Forestry (by design), Upperchurch Windfarm and UWF Other Activities (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.	

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Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 1: UWF Grid Connection
Impact Magnitude: At Mountphilips, 700m of new native species hedgerow will be planted alongside the new access road between Site Entrance No. 1 and the new Mountphilips Substation.
Significance of the Impact: Imperceptible (positive)
Rationale for Impact Evaluation: • The benefit to bird diversity, and; • The positive 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
Element 3: UWF Replacement Forestry
Impact Magnitude: In total, 6Ha of mixed species, native woodland will be created, which will comprise tall trees and understorey 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
Evaluation of Other Cumulative Impacts – General Birds: Habitat Enhancement
Whole UWF Project Effect
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.

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 Related Works or the Other Elements of the Whole UWF Project (see Section 8.7.2.1).

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 8-54 below.

Table 8-54: 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 from Elements (1, 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 - No evidence of Curlew within the study areas for Elements 1, 2, 3, 4, 5 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. Furthermore, there will be no loss of suitable habitat in relation to element 1. 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, Peregrine Falcon Dipper (in combination), Grey Wagtail (in combination), Barn Owl (in combination))	General Birds and Peregrine Falcon: Evaluated as Excluded 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. Dipper, Grey Wagtail and Barn Owl; Evaluated as Excluded as these species were not identified during related works surveys, only recorded in relation to element 1.
	1,2,3,4,5	Visibility		Red Grouse: Evaluated as Excluded - No habitat loss from Whole UWF Project Elements 1, 2, 3, 4, 5 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'.

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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[18]) and operation (Pearce-Higgins *et al.* 2009[19]) have found little evidence of significant disturbance effects on passerine species.
	1,2,3,4,5			Eurasian Curlew: No Eurasian Curlew recorded within the study areas for Elements 1, 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 Dipper (in combination), Grey Wagtail (in combination), Barn Owl (in combination))	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. Dipper, Grey Wagtail and Barn Owl; Evaluated as Excluded as these species were not identified during related works surveys, only recorded in relation to element 1.
Hedgerow trimming Forestry Felling	1,2,3,4,5	Direct Contact	Physical injury/destruction of nests or chicks – General Birds	Evaluated as Excluded; 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, Dipper (in combination), Grey Wagtail (in combination), Barn Owl (in combination))	Golden Plover: Evaluated as Excluded - Neutral disturbance/displacement effects are expected due to maintenance activities because all maintenance works will be carried out from hardcore surfaces (Elements 1, 2, 3, 4), from public road (Elements 1,5), or on foot (Elements 2,3,5). Dipper, Grey Wagtail and Barn Owl; Evaluated as Excluded as these species were not identified during related works surveys, only recorded in relation to element 1.
	1,2,3,4,5			Eurasian Curlew: Evaluated as Excluded; Neutral effects predicted
				Red Grouse: Evaluated as Excluded; Neutral effects predicted
				Merlin: Evaluated as Excluded; Neutral effects predicted
				Meadow Pipit: Evaluated as Excluded; Neutral effects predicted.

Biodiversity

Topic

[18] 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

[19] 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.)

Source(s) of Impacts	Project Element	Pathway	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Decommissioning Stage				
Noise and human activity	1,2,3,4,5	Visibility	Disturbance/ Displacement (Golden Plover, Eurasian Curlew, Red Grouse, Merlin)	Golden Plover: Evaluated as Excluded - as there are no 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. No Golden Plover were recorded in studies for Upperchurch Windfarm (Element 4).
				Eurasian Curlew: Evaluated as Excluded; Neutral effects predicted
				Red Grouse: Evaluated as Excluded; Neutral effects predicted
				Merlin: Evaluated as Excluded - as there are no 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. Decommissioning (4) 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: Evaluated as Excluded as there are no 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.

8.7.5 Mitigation Measures for Impacts to General Bird Species

Mitigation measures were incorporated into the UWF Related Works 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 Related Works.

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) - **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 Related Works, 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:

RW-BPM-17	Best practice measures for the removal of vegetation during construction
RW-BPM-19	Disturbance to and/or displacement of nesting Common Kingfisher (*Alcedo atthis*).
RW-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 Related Works, 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 Related Works, 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 8-55.

Table 8-55: 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 Related Works *Direct & indirect effects*	**Not Significant**	**Not Significant**	**Not Significant**	**Imperceptible (positive)**
UWF Related Works *Cumulative effects*	**Not Significant**	**Not Significant**	**Not Significant**	**Slight (positive)**
Element 1: UWF Grid Connection	Slight	Not Significant	Slight	Slight (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)**

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.

General Bird Species

Sensitive Aspect

Topic **Biodiversity**

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 Related Works is described in Table 8-56 and illustrated on Figure RW 8.8: Bats within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 8-56: UWF Related Works 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 Related Works Study Area

The UWF Related Works will be located in the eastern foothills of the Slievefelim to Silvermine Mountains upland area in County Tipperary. The landscape present is predominantly improved agricultural landscape, 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[20])*". In addition, the author has recorded Nathusius' pipistrelle *Pipistrellus nathusii* and whiskered bat *Myotis mystacinus* in 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 outside the range of this species. A desktop review of known bat roosts identified no roosts in the UWF Related Works Study Area.

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,

[20] As cited in the 'draft North Tipperary Biodiversity Plan 2007"

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.

Field Survey Results – UWF Related Works Study Area:

In addition to desktop studies, field surveys were used to gather further information on bats in the UWF Related Works area, and comprised surveys of buildings, bridges, trees, and hedgerows and other linear features. Preliminary ecological appraisals were carried out for buildings, bridges and trees in order to determine their suitability for Bats. The methodology for determining the suitability of a building/bridge/tree for Bats is described in Section 8.1.8.3 of the Introductory section of Chapter 8.

Roosts in Buildings

Preliminary ecological appraisals were carried out in 2016 and 2017 of all buildings (35 no.) within the study area. 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). The aim of the assessments was to identify any buildings of high or moderate roost suitability that were at risk of direct or indirect effects, in order to identify priorities for further survey.

28 no. buildings were considered to have negligible or low suitability for bat roosts. 7 no. buildings were considered to have moderate or high suitability, and presence / absence surveys and/or roost characterisation surveys were carried out at these buildings in July/August 2017 to cover the maternity period.

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 located 5m from the UWF Related Works construction works area. One roost is of Local importance, located 130m from the construction works area, and another is of Negligible importance.

Table 8-57: Identified Bat Roosts in the UWF Related Works study area

Code	Type	Evidence of bats	Valuation	Proximity to UWF Related Works construction works area boundary
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

Roosts in Bridges

7 no. bridges / culverts were identified within the construction works area boundary, with none along the material haulage routes on the local road network between the Upperchurch Windfarm main site entrance off the regional road in Shevry and the UWF Related Works locations.

All bridges / watercourse crossing structures were evaluated as having negligible suitability for bats, so no additional bat surveys (e.g. preliminary roost appraisal or presence / absence surveys) were required.

Bridges along material haulage routes from the source quarries (for stone/concrete) and the main entrance for Upperchurch Windfarm were surveyed, and were scoped out, because no bridge strengthening / modifications are required at these bridges. It was evaluated that there was no risk to bats at these bridge locations, due to the absence of any bridge works and in the context of the use of the bridge on a daily basis by HGV traffic.

Roosts in Mature Trees

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].

All trees within 50m of the construction works area were evaluated as having negligible suitability for bats, so no additional bat surveys (e.g. preliminary roost appraisal or presence / absence surveys) were required.

Activity

Bat activity surveys were carried out using automated bat detectors at two sampling locations within the study area, covering both the summer and autumn periods. This method was selected in preference to transect surveys, because automated detectors sample activity throughout the night (transect surveys typically only cover the post-emergence period), and because they allow comparative analyses between multiple sites that are sampled concurrently.

Activity levels 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 the common pipistrelle; 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 8-58: 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	

[21] Andrews H & Gardener M 2016. Bat Tree Habitat Key – Database Report 2016. AEcol, Bridgwater

Further detailed data on activity and roost surveys and results are included in Appendix 8.1: Detailed Biodiversity Information and Data (Section A8.1.3.3) and maps showing the preliminary ecological appraisals of buildings, trees and bridges are provided in Figure RW 8.8: Bats within the UWF Related Works Study Area.

Note: The locations of bat roosts are not shown in Figure RW 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, and their breeding / resting places, are legally protected in Ireland under the Wildlife Act 1976 (as amended in 2000). The Wildlife Act, 1976, is the principal national legislation providing for the protection of wildlife and the control of 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 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 can 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' from their roosts to a suitable feeding area, 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 except Natterer's bat and whiskered bat. **To date the populations of all monitored species appear to be stable or increasing**.

If the 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.

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8.8.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.8.2.1 Cumulative Evaluation Study Areas

8.8.2.1.1 UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works was evaluated for cumulative effects with other projects and the study area is set out in the table below.

UWF Related Works Cumulative Evaluation Study Area for Bats	**Justification for the Study Area Extents**
• 300m of the UWF Related Works construction works area boundary	The increased distance facilitates the identification of other Elements or Other Projects or Activities which will be carried out within 150m of an identified bat roost in a building or potential feeding area (in any directions) / commuting route affected by UWF Related Works, or within 50m of an identified bat roost in any trees. Beyond 150m from roosts, it is considered that cumulative effects to bats will be negligible.

The study is illustrated on Figure CE 8.8 Bats within the UWF Related Works Cumulative Evaluation Study Area.

8.8.2.1.2 Whole Project Cumulative Evaluation Study Area

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

The Other Elements must be considered because UWF Related Works 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.

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 Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works Study Area along with the study areas for Other Elements which are described in Table 8-59 and illustrated on Figure WP 8.8: Bat within the Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

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Table 8-59: Whole Project Cumulative Evaluation Study Area for Bats

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	• 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 for Elements of the Whole UWF Project.	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 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

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8.8.2.2 Scoping of Other Elements, Other Projects or Activities & for Potential for Impacts

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 Related Works 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 A2.3.2.8).

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 Related Works 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.

8.8.2.2.1 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 8-60.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 8.8 The baseline character of the areas around these Elements is described in Section 8.8.2.3.

Table 8-60: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	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 feature was recorded within 150m of the existing entrance to the afforestation lands,

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	• 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

8.8.2.3.1 Element 1: UWF Grid Connection

The UWF Grid Connection will provide a new substation and connection to the existing overhead lines at Mountphilips and new underground cabling between this new Mountphilips Substation and the consented Upperchurch Windfarm substation at Knockcurraghbola Commons. Most development will be within public roads (primarily the R503), with a short section crossing agricultural land at the western end of the route. The landscape surrounding the 110kV UGC route is predominantly improved agricultural landscapes and forestry, with hedgerows / treelines along roadsides, in addition to low-density houses and farm buildings.

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 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 and natterer's bat; moderate suitability for soprano pipistrelles, Leisler's bat, whiskered bat, Daubenton's bat, and brown long-eared bats, and negligible suitability for Nathusius' pipistrelles and lesser horseshoe bats.

A desktop review of known bat roosts identified no bat roosts in the UWF Grid Connection Study Area.

Buildings, Bridges and Trees with Suitability for Bats

Preliminary ecological appraisals were carried out for 83 buildings within 150m of the 110kV UGC route (there are no buildings within 150m of Mountphilips Substation). 45. no of these buildings were of high or moderate roost suitability, and were considered for potential indirect effects (there is no potential for direct effects to roosts due to the location of 110kV UGC entirely within road pavements – i.e. no works or damage to buildings will occur). To facilitate the cumulative evaluation, it is presumed as worst-case scenario that bats are present at these locations.

Mature trees within 50m of the UWF Grid Connection construction works area were inspected from ground level. At the Mountphilips Substation site 3 no. trees were considered to have low suitability for bats (e.g. small crevices that could be used by individual roosting bats), while 1 no. was considered to have moderate suitability (e.g. multiple or larger crevices that could support multiple roosting bats). Along the 110kV UGC on the public road network 10 no. trees (or closely-spaced groups of trees) were considered to have low suitability for bats, and 1 no. was considered to have moderate suitability. These trees are classified as having 'potential' for bats as no presence/absence surveys have been undertaken, however, to facilitate the cumulative evaluation, it is presumed as worst-case scenario that bats are present at these locations. All other mature trees within 50m of the construction area boundaries were inspected and evaluated as having negligible roost suitability.

As the 110kV UGC will be installed over/under c.63 watercourse crossing structures (i.e. bridges and culverts), all structures along the route were inspected. Within the study area, 10 no. bridges had moderate suitability for roosting bats, 5 no. bridges had low suitability, and 48 had negligible suitability. However, it should be noted that these numbers only refer to the potential suitability of these structures for bats. Bridges with moderate suitability were surveyed by endoscope (with regard to Section 5.3 of the Bat Conservation Trust guidelines 2016) to determine whether or not bats were using suitable structures. No live bats, or evidence of bats, was recorded at any bridge.

Activity surveys

Bat activity surveys using automated detectors were carried out in the area around the Mountphilips Substation site in the summer of 2016. Activity levels (from four sampling locations) were relatively high, with an average of one bat pass every two minutes throughout the survey period (a Bat Activity Index of 24.6). 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. All were considered to be of Local Importance as feeding areas / commuting routes.

Table 8-61: 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	
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 bat survey details and data are included in Appendix 8.1: Detailed Biodiversity Information and Data (Section A8.1.3.3). Maps showing the preliminary ecological appraisals of in respect of bats buildings, trees and bridges are provided in Figure WP 8.8.

Geographical Overlap with UWF Related Works:

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in Knocknabansha, Knockmaroe, Knockcurraghbola Crownlands and Knockcurraghbola Commons where 110kV UGC works (entirely along paved roads) will occur within the boundary of the UWF Related Works Cumulative Evaluation Study Area. Works from both projects could occur in the vicinity of both 110kV UGC works for the UWF Grid Connection and Haul Route Works and Internal Windfarm Cabling works for UWF Related Works, however it should be noted that the developer is committed to carrying out works in these areas where they occur within 350m of houses at different times, so any cumulative effects will be sequential (longer duration) rather than in-combination (larger effect). This protection for local residents will also protect bat species.

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 8-62: 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."

Consideration of the Passage of Time: the composition of suitable roosting and foraging habitat for bat species on the Upperchurch Windfarm site, has not materially changed since 2012/2013, and surveys for UWF Related Works confirmed continued usage of suitable buildings and habitats by bat species, of which pipistrelles remained the most abundant species. Therefore it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR.

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 Related Works, 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 8-63 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Bats**.

Table 8-63: UWF Related Works 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 the Consented Upperchurch Windfarm Site Compound No.1~~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.
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. (Note. It is not expected that any trees with moderate or high suitability will be felled).
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. Bat boxes will be placed on an exposed section of tree trunk at a minimum height of 4-5m, providing a clear space in front of the box for bats to enter and exit. Boxes will be placed in locations that will receive at least 6-7 hours of sunlight during summer months, and will typically be placed on the southern side of the tree. The Project Ecologist will supervise the installation of bat boxes in order to ensure that they are sited appropriately.
PD42	Installation of bat crossing structures at severed hedgerows, proximate to areas of high bat activity or roost locations. Following the completion of construction works, the replanting of these severed hedgerows with at least the same number of semi-mature ~~shrubs/trees (like for like)~~ Irish-sourced, native trees and ~~limits on~~ no temporary construction works area lighting near hedgerows.

8.8.4 EVALUATION OF IMPACTS to Bats

In this Section, the likely direct and indirect effects of the UWF Related Works are identified and evaluated. Then the likely cumulative effects of the UWF Related Works 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) - Bats.

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

Table 8-64: 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: Tree felling, Trimming and pruning of mature trees and hedgerows Cumulative Impact Source: Tree felling, Removal of mature trees, 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[22]. 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). Impact Quality: Negative	
Evaluation of the Subject Development Impact – Destruction or disturbance of bat roosts in trees	
Element 2: UWF Related Works – direct/indirect impact	
Impact Magnitude: Surveys at UWF Related Works Study Area did not identify any trees with bat roosting suitability. Therefore UWF Related Works will not cause disturbance/destruction of roosts.	
Significance of the Impact: Neutral effect	
Rationale for Impact Evaluation: • no trees with bat roost suitability within 50m of UWF Related Works construction works areas; • no change in baseline conditions	
Element 2: UWF Related Works – cumulative impact	
Cumulative Impact Magnitude: No cumulative impact	
Significance of the Impact: There are no trees which have suitability for roosting bats within 50m of UWF Related Works, and therefore bat roosts within 50m of the works are not expected to exist. Therefore there is no potential for cumulative impacts.	
Significance of the Impact: Neutral effect	
Rationale for Impact Evaluation: • no trees with bat roost suitability within 50m of UWF Related Works construction works areas; • no change in baseline conditions.	

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[22] Andrews H & Gardener M 2016. Bat Tree Habitat Key – Database Report 2016. AEcol, Bridgwater

Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 1: UWF Grid Connection
Impact Magnitude: At Mountphilips, there is 1 No. tree with bat suitability located within 50m of the Mountphilips Substation construction works area boundary. There are a further 3 trees (2 low, 1 moderate) within 150m of the construction works area in the Mountphilips area. There are an additional 11 trees (or small groups of trees) along the UGC route. No trees of moderate or high suitability were recorded within the construction works area. None of the trees mentioned above will require felling for UWF Related Works. The trees were surveyed in 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. 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.
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • Only 1 trees located (low suitability) within the zone of effect at Mountphilips • A further 11 no. are within 50m of 110kV UGC works on the public road, but these trees will not need to be felled; • 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%).
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 effect
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 be required along some roads as part of UWF Other 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 effect.
Rationale for Impact Evaluation:

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• 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 Other Cumulative Impacts – Destruction or disturbance of bat roosts in trees
Whole UWF Project Effect
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. The UWF Grid Connection is the only Element which will cause effects, and it is expected that it will only affect one tree that has low suitability for bats. 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 Related Works or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

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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 road 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 Whole UWF 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 the Subject Development Impact–Severance of commuting routes or feeding areas

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
10m sections of field boundary will be permanently removed at two locations along Realigned Windfarm Road RWR2. However, these areas are un-vegetated, so 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 or field boundary proximal to areas of either high Bat activity or roost locations, in order to avoid severance effects during works. When complete, all temporarily removed hedgerows or field boundaries will be reinstated with semi-mature vegetation.

Topic: Biodiversity

Sensitive Aspect: Bats

Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • Only a small extent of hedgerow will be permanently lost. • The field boundary removed at RWR2, will be reinstated as hedgerow alongside the new road, this 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 2: UWF Related Works – cumulative impact
Cumulative Impact Magnitude: No cumulative impact: The potential for cumulative effects relates to Upperchurch Windfarm only, as the UWF Grid Connection 110kV UGC is entirely located along roads and will not require any hedgerow removal. Due to the separation distances between hedgerow removal for Upperchurch Windfarm and hedgerow removal for UWF Related Works, the hedgerow removal for Upperchurch Windfarm will not result in any increase in the length of field boundary being removed at RWR2, or to the length of the 15 short sections of hedgerow which will be temporarily removed for Haul Route Works and Internal Windfarm Cabling. Where Internal Windfarm Cabling is located within the Upperchurch Windfarm site, the cabling is located within Consented UWF Roads, thereby avoiding the requirement for any additional hedgerow removal in these locations.
Significance of the Impact: Neutral effect
Rationale for Impact Evaluation: • Separation distance between hedgerows subject to temporary or permanent removal.
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 1: UWF Grid Connection
Impact Magnitude: 5m sections of hedgerow will be permanently removed at 2 locations along the new permanent access road to Mountphilips Substation. Both of these hedgerows are evaluated as of local importance to bats. 700m of hedgerow will be planted along each side of the new access road. In addition, approximately 160m of roadside boundary (comprising some immature trees and earthen banks) will be permanently removed at the main site entrance to Mountphilips Substation (E1) to facilitate lines of sight, although the roadside boundary will be replanted with hedgerows behind the sightlines. No hedgerow removal is required for the 110kV UGC which is routed entirely along paved roads (predominately public roads with one short length of paved forestry road).
Significance of the Impact: Imperceptible
Rationale for Impact Evaluation: • Only a very small extent of hedgerow will be permanently lost, and; • 700m of additional hedgerow planting will more than compensate for its loss
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 hedgerow 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."
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
Rationale for Impact Evaluation: • No hedgerows or other similar features will be severed, so there will be no change to the baseline conditions, • 2.8 km of new hedgerow planting will improve bat foraging habitat in the short to medium term.
Evaluation of Other Cumulative Impacts – Severance of commuting routes or feeding areas
Whole UWF Project Effect
Cumulative Impact Magnitude: Only some short sections (5 to 10m in width) of hedgerow at Mountphilips Substation (UWF Grid Connection) and hedgerow or field boundary at Realigned Windfarm Road RWR2, Internal Windfarm Cabling and Haul Route Works HW7(UWF Related Works) will be affected. Bat crossing structures will be installed at UWF Related Works 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 or field boundaries 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. At the Upperchurch Windfarm site an additional 360m of hedgerow will be removed in Shevry. 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

Topic: **Biodiversity**

Sensitive Aspect: **Bats**

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 Related Works or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

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 for security reasons at temporary construction compounds *(Mountphilips Compound for UWF Grid Connection, and the consented Upperchurch Windfarm Site Compound No.1 for Upperchurch Windfarm and UWF Related Works*). 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 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
No additional compounds required for the UWF Related Works. UWF Related Works will be constructed as part of the Upperchurch Windfarm project and the already consented Site Compound No.1 in Shevry will be used by construction personnel working on the UWF Related Works. Upperchurch Windfarm Site Compound No.2 (known bat roost) will not be used by UWF Related Works personnel or to store any material, equipment or tools associated with UWF Related Works.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- No additional lighting requirements for UWF Related Works
- Construction works will be carried out during daylight hours (Project Design Measure);
- The use of cowling on Upperchurch Windfarm Site Compound No.1 to prevent light spill onto bat roosts or key commuting routes / feeding areas, so there will be no change to their baseline condition.
- No requirement for additional lighting on construction works areas.

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative impacts relates to Upperchurch Windfarm only, as no lighting is required for UWF Grid Connection at the eastern end of the 110kV UGC route. No lighting is required for UWF Replacement Forestry or for UWF Other Activities.

UWF Related Works will be carried out by Upperchurch Windfarm construction crews, materials and equipment for UWF Related Works will be stored at Upperchurch Windfarm Site Compound No.1. However, UWF Related Works will not make this compound bigger nor cause additional lighting to be erected.

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In addition the second compound permitted for Upperchurch Windfarm use (site office in Knockcurraghbola Commons), will not be used by personnel involved with UWF Related Works. Therefore it is considered that any additive cumulative impacts associated with UWF Related Works will be negligible. There will be no indirect impacts on the existing bat roost, and a derogation licence will not be required.

Significance of the Impact: Imperceptible

Rationale for Impact Evaluation:

- Construction works will be carried out during daylight hours (Project Design Measure);
- No requirement for additional lighting in construction works areas
- No additional lighting requirements for UWF Related Works
- The use of cowling on Upperchurch Windfarm Site Compound No.1 to prevent light spill onto bat roosts or key commuting routes / feeding areas, so there will be no change to their baseline condition.

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

Element 1: UWF Grid Connection

Impact Magnitude:
1 No. Temporary compound at the Mountphilips substation will be used for up to one year, and 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.

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

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Evaluation of Other Cumulative Impacts – Disturbance or Displacement due to Lighting
Whole UWF Project Effect
Cumulative Impact Magnitude: Lighting will be used at Mountphilips Substation compound, and at the Upperchurch Windfarm Site Compound No.1 (in Shevry) during construction of the Whole UWF Project. 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. These measures, along with the separation distance between compounds (c.30km) will also prevent any sequential effects on roosting or foraging bats from multiple aspects of the Whole UWF Project. Although there are some bat roosts and 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 ensure construction activities are carried out during daylight hours which will prevent the illumination of these areas.
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. • Separation distance between compounds; • 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. • Construction works will be carried out during daylight hours.

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 Related Works 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 8-65 below.

Table 8-65: 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(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage				
Forestry Felling	2, 4, 5	Landcover	Mortality through roost destruction	In relation to UWF Related Works and Upperchurch Windfarm: 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. No forestry felling is required for UWF Grid Connection.
Construction on Works	1,2, 4,5	Culvert replacement works, Bridge Upgrade Works	Mortality through roost destruction	UWF Related Works: The 2 no. culverts which require extension for Haul Route Works have negligible suitability for roosting bats. Elements 1, 2, 4, 5: 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 Elements 1, 2, 4, 5: No potential for cumulative effects, as none of the bridges of moderate suitability for bats on the UWF Grid Connection 110kV UGC route are within the study area for cumulative impacts.
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	Upperchurch Windfarm: 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

Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				change of use would have direct or indirect 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. A derogation licence will not be required. UWF Related Works will not use this unoccupied house, and therefore has no potential to cause effects to roosting bats. 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 known 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, construction works will 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	2, 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

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Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				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.
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.

8.8.5 Mitigation Measures for Impacts to Bats

Mitigation measures were incorporated into the UWF Related Works 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 Related Works.

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) - **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 Related Works, 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:

RW-BPM-13	Minimising the effects of lighting on bats
RW-BPM-14	Protection of potential tree and bridge bat roosts
RW-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 Related Works, which is included as Volume D with the planning application.

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8.8.8 Summary of Impacts to Bats

A summary of the Impact to Bats is presented in Table 8-66.

Table 8-66: 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 Related Works *Direct and indirect impacts*	**Neutral**	**Imperceptible**	**Imperceptible**
UWF Related Works *Cumulative impacts*	**Neutral**	**Neutral**	**Imperceptible**
Element 1: UWF Grid Connection	Imperceptible	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	Neutral
Cumulative Impact:			
All Elements of the Whole UWF Project	No Cumulative Impact	Not Significant	Imperceptible

The greyed out boxes in the 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, because no Other Projects or Activities are likely to cause cumulative effects to Bats with either the UWF Related Works or the Other Elements of the Whole UWF Project (see Section 8.8.2.1).

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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 Related Works is described in Table 8-67 and illustrated on Figure RW 8.9: Non-Volant Mammals within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 8-67: UWF Related Works 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 Related Works 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.

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.

Habitats within 50m of UWF Related Works comprise a total of 171ha of land. Over 66% of this is improved agricultural grassland and 25% is closed canopy conifer plantation. Remaining habitats (9%) comprise various grassland or grassland and heath mosaics, in addition to scrub and remnant peatlands. The majority of the surrounding farmed area is permanent grassland, with livestock farming, dairying and beef cattle rearing ongoing. It is considered that foraging habitat that is present is broadly suitable for Badger however no evidence of Badger was found within the UWF Related Works Study Area.

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.

Other Mammals: Fallow Deer are generally found mainly in mature deciduous or mixed woodlands close to open grassland. Red Squirrel is mainly found in coniferous or mixed woodland. Pine Marten generally occur in coniferous or mixed forestry and scrub. Red Fox is found in a wide range of habitats, while Irish Hare is generally found in bog, moor, heath and marsh in addition to mixed farmland, pastoral farmland and more marginal habitats.

Survey Results

Badger: No Badger setts were recorded within the UWF Related Works study area. Badger surveys of the UWF Related Works were carried out on the 13th July 2017; for the avoidance of doubt, these were carried out on the same date of UWF Related Works habitat survey.

Otter: No Otter evidence was recorded within the UWF Related Works study area. Otter surveys of the UWF Related Works were also carried out on the 13th July 2017.

Other species: Fallow Deer are present throughout the upland area and are expected to occur in habitats adjacent to UWF Related Works. Although no evidence of Pine Martin or Red Squirrel was found during site surveys, both species were recorded in the upland forestry areas to the west of UWF Related Works and are assumed to occur in suitable habitat (coniferous or mixed forestry and scrub) where it occurs. Red Fox and Irish Hare were recorded during site surveys.

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[23]), a 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. favourable in the case of Otter, in line with prospects nationally, 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.

[23] https://www.npws.ie/sites/default/files/publications/pdf/2009_Otter_TRP.pdf

8.9.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.9.2.1 Cumulative Evaluation Study Area

8.9.2.1.1 UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works was evaluated for cumulative effects with other projects and the study area is set out in the table below.

UWF Related Works Cumulative Evaluation Study Area for Non Volant Mammals	Justification for the Study Area Extents
Otter: Watercourse crossing locations plus 600m in either direction Badger and Others: 100m around and incorporating UWF Related Works construction works area.	The study area is doubled to identify those Other Elements (or Other Projects or Activities) which may cause cumulative effects to Non-Volant Mammals with UWF Related Works.

The study is illustrated on Figure CE 8.9 Non Volant Mammals within the UWF Related Works Cumulative Evaluation Study Area.

8.9.2.1.2 Whole Project Cumulative Evaluation Study Area

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

The Other Elements must be considered because UWF Related Works 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.

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 Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works Study Area along with the study areas for Other Elements which are described in Table 8-68 and illustrated on Figure WP 8.9: Non-Volant Mammals within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-68: Whole Project Cumulative Evaluation Study Area for Non-Volant Mammals

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	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 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

8.9.2.2 Overview of Other Elements, Other Projects or Activities

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 Related Works 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 A2.3.2.8).

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 Related Works 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.

8.9.2.2.1 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 8-69.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 8.9. The baseline character of the areas around these Elements is described in Section 8.9.2.2.3.

Table 8-69: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	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 1: UWF Grid Connection

Baseline surveys of the UWF Grid Connection recorded evidence of Badger *(Meles meles),* Otter *(Lutra lutra),* Fox *(Vulpes vulpes)* and Rat *(Rattus Norvegicus)* within the study area, however limited evidence of breeding or resting sites is present, primarily due to the placement of the majority of work locations within the public road. No active breeding or resting sites for Badger (setts) or Otter (Couches and/or holts) are present.

Away from off-road sections such as at the Mountphilips substation location, evidence of mammals is limited to 10 mammal pathways/mammal runs, which is typical evidence of roadside usage. The small number of records is attributed to the generally busy nature of the roads on which the grid route is located. There was an absence of other confirmatory evidence i.e scat, hairs, or prints.

No protected sites in respect of Badger and other general mammals exist within the study area. The Lower River Shannon SAC (site code 002165), which intersects the development at certain watercourse crossing locations, is designated for Otter.

Survey Results

Non-Volant Mammals

Sensitive Aspect

Badger: Records of four Badger latrines and one print were recorded within the 50m buffer of the Mountphilips Substation works boundary during surveys undertaken in April 2017. Surveys undertaken in January 2019 in respect of the preliminary preferred route of the 110kV UGC found no Badger setts within 50m of the route, where it occurs outside of the Mountphilips Substation site. No other evidence in the form of scat, prints and latrines were noted during the survey. No animals were observed however this is typical in respect of a nocturnal species.

Otter: There were four records of Otter within the UWF Grid Connection study area, consisting of paths, slides, tracks and spraints. Two of the four records, which were from the Tooreenbrien Lower River, and consisted of a spraint found approximately 50m downstream of a watercourse crossing location, and a print found on a ledge underneath the bridge arch. The remaining records are from the Bilboa River and the Annagh River, consisting of a single slide at each location. No active breeding or resting sites (Holts or Couches) were identified. Otter evidence has previously been recorded on the Munnia stream, east of the sub-station location at Mountphilips, this location is >300m from the current Grid Connection route, however it is referenced as it occurs upstream. No Otters were observed during current surveys, although 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 WP 8.9.

Other species:

Evidence of scavenging Red Fox *(Vulpes Vulpes)* was noted at one location, as indicated by deposited food wrappers. A number of small mammal burrows were recorded adjacent to a small watercourse; these were identified as likely to be Rat burrows. While no evidence of Fallow Deer, Irish Hare, Pine Marten and Red Squirrel was recorded during the survey, they are likely to be present throughout the receiving environment due to the presence of suitable habitat within the study area, including grassland, heath and bog, and coniferous and broadleaved woodland.

Further survey result details on Badger, Otter and other mammals is included on Figure WP 8.9.

Geographical Overlap with UWF Related Works:

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in the Knockmaroe/Knockcurraghbola Crownlands area where the 110kV UGC (routed along the local road) is crossed by the Internal Windfarm Cabling and close to Haul Route Works, and in Knockcurraghbola Commons where the 110kV UGC (routed along a tarred forestry road) runs parallel to Internal Windfarm Cabling for a short distance.

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.

Biodiversity

Topic

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

Consideration of the Passage of Time: The makeup of suitable habitat for badger, otter and other mammals on the Upperchurch Windfarm site has not materially changed since 2012/2013, and surveys for UWF Related Works confirmed a low usage of the windfarm area by these species. Therefore it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR.

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 Related Works, 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 8-70 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Non-Volant Mammals**.

Table 8-70: UWF Related Works 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 to confirm the current status with respect to 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 Grid Connection, 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 Related Works are identified and evaluated. Then the likely cumulative effects of the UWF Related Works 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 8-71: 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)	*Badger - Temporary Loss of Habitat*
Irish Hare, Pine Marten, Red Squirrel and -Fallow Deer: Habitat Loss (construction stage)	*Secondary Mortality of Badger, (construction stage)*
Irish Hare, Pine Marten, Red Squirrel and Fallow Deer: Disturbance/Displacement (construction stage)	*Secondary Mortality of Pine Marten, Red Squirrel, Fallow Deer, Irish Hare, (construction stage)*
	Introduction or spread of invasive species- White Toothed Shrew, (construction stage)
	Secondary Mortality of General Non-Volant Mammals due to spread of disease such as TB
	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 hardstanding areas
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 and temporary 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 access roads, compounds, and hardstanding areas, in addition temporary loss could occur as a result of groundworks and temporary access roads.

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[24]) 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 (UWF Other Activities).

Impact Quality: Negative, Neutral

Evaluation of the Subject Development Impact – Badger: Habitat Loss

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude: The extent of suitable foraging habitat permanent loss relates to 0.5Ha of Spoil and Bare Ground, recolonising bare ground, improved agricultural grassland, wet grassland, Conifer plantation and Scrub, which will be permanently lost. In addition, 170m of hedgerow will also be lost, comprising primarily earthen banks.

Temporary loss of foraging habitat from works such as internal windfarm cabling (4.6km in agricultural lands and 2.1km in forestry), Haul Route Works (widening of roadside verges for 1710m in total; temporary removal and reinstatement of 1035m of hedgerow and earthen banks which form roadside boundaries; permanent removal of 25m of roadside boundary and the construction of 290m temporary access roads on private lands), temporary Site Entrances (n=14), Temporary Access roads (up to 5.3km) and the storage of temporarily excavated material is also likely to occur during the construction stage and until vegetation has been re-established on reinstated lands. Following the completion of construction works in an area, with the exception of new permanent infrastructure such as Realigned Windfarm Roads or Telecom Relay Pole hardstand, the lands under the construction works areas will be reinstated to their former condition and returned to the landowner for use as before.

No active Badger setts nor signs of foraging activity were recorded at the UWF Related Works study area in 2017. Habitats within 50m of UWF Related Works comprise a total of 171ha of land. Over 66% of this is improved agricultural grassland and 25% is closed canopy conifer plantation. Remaining habitats comprise various grassland or grassland and heath mosaics, in addition to scrub and remnant peatlands. The majority of the surrounding farmed area is permanent grassland, with livestock farming, dairying and beef cattle rearing ongoing.

It is considered that due to the small extent of permanent habitat loss, and full reinstatement of temporary land use change, in the context of the low usage of the site by Badgers, that the magnitude of impact will be negligible.

[24] 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

Non-Volant Mammals

Sensitive Aspect

Significance of the Impact: Neutral effect

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.
- Temporary loss of habitats is reversible with the reinstatement of lands

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects to Badger mainly relates to those habitats where badger could be affected by both UWF Related Works and Upperchurch Windfarm works. As a large proportion of UWF Related Works are located within Consented UWF Roads (62% of Internal Windfarm Cabling located within Consented UWF Roads), the magnitude of cumulative effects is reduced.

No cumulative habitat loss effects will occur to badger as a result of UWF Related Works in combination with UWF Grid Connection works, as the UWF Grid Connection works will be located entirely within paved roads within the zone of overlap, and as badgers are not likely to forage extensively or rely on roadside habitats, it is considered that no loss of habitat is associated with UWF Grid Connection within the UWF Related Works Cumulative Evaluation Study Area.

There is no potential for UWF Related Works to have cumulative effects with UWF Other Activities as the habitat enhancement effects of the Upperchurch Hen Harrier Scheme will not have come into effect at the time of construction works.

There is also no potential for UWF Related Works to have cumulative effects with UWF Replacement Forestry, as this Element does not occur within the UWF Related Works Cumulative Evaluation Study Area (100m from construction works areas).

The extent of suitable foraging/breeding habitat within the UWF Related Works Cumulative Evaluation Study Area is assumed to be the full extent i.e. 398 Ha. However, 2012 and 2017 Surveys found 2 disused sets and signs of foraging activities were recorded on the Consented Upperchurch Windfarm site in 2012, no active Badger setts nor signs of foraging activity were recorded at the UWF Related Works study area in 2017. Based on the available extent of suitable habitat and the low usage of the area by badger, the magnitude of any cumulative habitat loss to badger is negligible.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Small extent of permanent habitat loss (0.5ha)
- No active Badger setts were recorded in baseline studies of the UWF Related Works locations (2017) or Upperchurch Windfarm locations (2012);
- No material contrast with baseline conditions is expected;
- In relation to Haul Route Works and UWF Grid Connection works, badgers are not likely to forage extensively or rely on roadside habitats;
- Temporary loss of habitats is reversible with the reinstatement of lands.

Biodiversity

Topic

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

Element 1: UWF Grid Connection

Impact Magnitude: No active badger setts or other signs of Badger activity were recorded during the baseline survey of the 110kV UWF Underground Grid Connection in 2019. While no evidence of Badger activity was recorded, suitable foraging habitats, consisting of grassland, woodland and hedgerows were recorded within 50m of the UWF Grid Connection route. Considering the widespread distribution of Badger in Ireland, and the

presence of suitable foraging habitat, as recorded along the UWF Grid Connection route, Badger are likely to forage in the area surveyed.

Seeing as the installation of the UWF Grid Connection will be confined to paved public roads, the impact magnitude on Badger resulting from the loss of habitat is expected to be limited only to permanent roads, roadside berms and the Mountphilips substation location, comprising 1.39Ha in total, considered to be negligible.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- Negligible magnitude of foraging habitat landcover change;
- No setts or other signs of badger activity were recorded within the study area for UWF Grid Connection.
- While badgers' cross roads to access feeding areas, they generally do not forage along roads – are are particularly unlikely to forage along a road as busy as the R503.
- the brief duration of the works and the absence of significant habitat loss associated with the UWF Grid Connection
- The extent of land use change, within the context (less than 2%) 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

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 effect
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 Other Cumulative Impacts – Badger: Habitat Loss
Whole UWF Project Effect
Cumulative Impact Magnitude: Instances of foraging and or breeding habitat loss will occur across the UWF Grid Connection, UWF Related Works UWF Replacement Forestry and Upperchurch Windfarm; total habitat loss across the Whole UWF Project areas will be c.6.4ha The 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, and; • Instances of foraging and breeding habitat loss will occur across the UWF Related Works, UWF Replacement Forestry and Upperchurch Windfarm. However, due to a negligible loss of habitat associated with the UWF Grid Connection, this element is expected to have an insignificant cumulative impact magnitude in respect of the other project elements. • The absence of badger setts, and therefore the absence of identified territories; • 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 Related Works 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 2: UWF Related Works – direct/indirect impact	
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 2: UWF Related Works – cumulative impact	
Cumulative 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 or Upperchurch Windfarm.	
Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project	
Element 1: UWF Grid Connection	
Impact Magnitude: No active badger setts or other signs of Badger activity were recorded during the baseline survey of the 110kV UWF Underground Grid Connection in 2019. The UWF Grid Connection is will be located mainly along existing paved roads, with the exception of a short section in the Mountphilips area. Therefore, effects are limited to the Mountphilips area, as roadside habitat along the 110kV UGC is not expected to be used extensively or relied upon as foraging habitat by badger. The installation of the UWF Grid Connection will consist of brief effects confined mainly to the existing public road, the magnitude of impact to badgers are therefore expected to be not significant.	
Significance of the Impact: Not Significant	
Rationale for Impact Evaluation: • The absence of badger setts within 50m of the UWF Grid Connection; • Short term duration of the works;	

Non-Volant Mammals

Sensitive Aspect

• Completion of works during daylight hours; • The works will be confined to the existing public road.
Element 3: UWF Replacement Forestry
Impact Magnitude: None
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 effect
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 Other Cumulative Impacts – Badger: Disturbance/Displacement
Whole UWF Project Effect
Cumulative Impact Magnitude: Construction works will occur across a c.30km wide area, which includes suitable foraging and breeding habitat for badger. However no active badger setts were identified within the UWF Related Works, UWF Replacement Forestry or Upperchurch Windfarm study areas. UWF Related Works and UWF Replacement Forestry are expected to have Neutral Effects, while the effects of the consented Upperchurch Windfarm are expected to be Not Significant. In relation to UWF Grid Connection, effects are limited to the Mountphilips area, as roadside habitat along the 110kV UGC is not expected to be used extensively or relied upon as foraging habitat by badger.
Significance of the Cumulative Impact: Not Significant

Biodiversity

Topic

Rationale for Cumulative Impact Evaluation:

- The absence of active badger setts and badger records in the study areas;
- Project design measures to avoid/reduce effects on Badger, with
- 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 Related Works or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

Non-Volant Mammals

Sensitive Aspect

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 2: UWF Related Works – direct/indirect impact

Impact Magnitude: 32 No. watercourse crossings in total are required for UWF Related Works with instream works required at 25 No. of these crossings. Due to 75% of these watercourses being drains or marginal watercourses, and the absence of otter holts within 150m of the crossing points, impact magnitude is expected to be Negligible

Significance of the Impact: Neutral effect

Rationale for Impact Evaluation:

- 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.
- Application of project design measures for the protection of Otter,

Element 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the in-combination effects of UWF Related Works and Upperchurch Windfarm and to a lesser extent of UWF Related Works with Upperchurch Windfarm and UWF Grid Connection. However, as the majority of watercourses crossings associated with these Projects within the Cumulative Evaluation Study Area are drains or of marginal ecological value, and the absence of otter holts within 150m of works areas, the cumulative impact magnitude is expected to be Negligible.

Cumulative effects with UWF Replacement Forestry will be negligible due to the separation distance between UWF Related Works and UWF Replacement Forestry, and the absence of otter on UWF Replacement Forestry site. There is no potential for Other Projects to cause cumulative effects to Otter with UWF Related Works.

Significance of the Impact: Neutral effect

Rationale for Impact Evaluation:

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- No active holts within 150m of watercourse crossing locations;
- Works will take place during daylight hours only, and;
- Be of brief-temporary duration.
- Application of project design measures for the protection of Otter.

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

Element 1: UWF Grid Connection

Impact Magnitude: There were four records of Otter within the UWF Grid Connection study area, consisting of paths, slides, tracks and spraints. Two of the four records, which were from the Tooreenbrien Lower River, and consisted of a spraint found approximately 50m downstream of the watercourse crossing, and a print found on a ledge underneath the bridge arch. The remaining records are from the Bilboa River and the Annagh River, consisting of a single slide at each location. No active breeding or resting sites (Holts or Couches) were identified, however. No Otters were observed, although this is typical in respect of a species where most activity takes place at night.

Out of the 63 identified watercourse crossings along the UWF Grid Connection route, 15 watercourses were identified from photographs taken during a preliminary survey of all watercourse crossing locations, as having potential to support Otter and were therefore surveyed 150m upstream and downstream of the crossing for the presence of Otter. Out of these 15 watercourses surveyed, evidence of Otter was found at three watercourse crossings. No active breeding or resting sites (Holts or Couches) were identified, however.

Considering the brief duration of works at watercourse crossings and the small scale of the proposed works the magnitude of impact in relation to disturbance of Otter is expected to be slight.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- The implementation of Additional Mitigation Measure AMM-01:Disturbance to or displacement of Otter – see UWF Grid Connection EIA Report
- 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.

Element 3: UWF Replacement Forestry

Impact Magnitude: Negligible

Significance of the Impact: Neutral effect

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 effects

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 effect

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 Other Cumulative Impacts – Otter: Disturbance/Displacement

Whole UWF Project Effect

Cumulative Impact Magnitude:
Construction works involving the use of machinery and excavation work at watercourse crossing points (both existing and new crossing points) will occur across a c.30km wide area within the River Shannon and River Suir catchments. There is potential to cause disturbance or displacement of otter at larger watercourse crossing points. These larger watercourses occur along the UWF Grid Connection, whereas the watercourses on the UWF Related Works and Upperchurch Windfarm sites are mainly drains and larger drains/watercourses with marginal habitat value to otter.

In relation to in-combination effects of the whole project, 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 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. In total 3 no. watercrossing points along the public road had signs of Otter use within 300m, the nearest of these crossing points is separated from UWF Related Works and Upperchurch Windfarm by ca.6km, therefore there is no likelihood of additive cumulative effects to individual Otters from both the UWF Grid Connection works and UWF Related Works or Upperchurch Windfarm works.

Significance of the Cumulative Impact: Slight

Rationale for Cumulative Impact Evaluation:

- Notwithstanding the separation distances between the 3 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 a 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 Related Works or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

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 creation of new hedgerows as part of the 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 2: UWF Related Works – direct/indirect impact

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 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the in-combination effects of UWF Related Works and Upperchurch Windfarm and to a lesser extent of UWF Related Works with Upperchurch Windfarm and UWF Grid Connection. Cumulative effects will be negligible due to the small extent of habitat loss in the context of the availability of habitat in the wider area.

Significance of the Impact: Not Significant

Rationale for Impact Evaluation:

- The extent of permanent land use change, (c.1%), within the context of available habitat, and;
- Comprises a minor shift from baseline conditions, notwithstanding the long term duration, and low reversibility.

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

Element 1: UWF Grid Connection

Impact Magnitude: Considering the 110kV UGC will be located mainly along existing public roads, loss of potentially suitable habitat for these species will be limited to a loss of 1.39 ha of grassland hedgerows and treelines in the Mountphilips area.

Significance of the Impact: Not Significant for Pine Marten, Red Squirrel, Fallow Deer, and Irish Hare

Rationale for Impact Evaluation:

- The extent of permanent land use change, evaluated as extremely low , within the context of available habitat within the study area, and;
- Comprises a minor shift from baseline conditions; notwithstanding
- Reinstatement measures will provide suitable habitat;
- The permanent duration , and
- Low reversibility.
- The location of the UWF Grid Connection is confined mainly to the existing public road network.

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 effects

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 Other Cumulative Impacts – Irish Hare, Pine Marten, Red Squirrel and Fallow Deer: Habitat Loss

Whole UWF Project Effect

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, UWF Replacement Forestry 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 Related Works 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. This is considered unlikely in respect of smaller species within distinct foraging and breeding home ranges such as Red Squirrel, Irish Hare and Pine Marten. The nature of where the initial effect takes place is also a limiting factor - most receptors already being likely to exhibit avoidance of traffic, and sources of noise/disturbance associated with public carriageways, human activity such as farming, land use practices etc. Group size and seasonality is also a variable.

Impact Quality: Negative

Evaluation of the Subject Development Impact – Irish Hare, Pine Marten, Red Squirrel and Fallow Deer: Disturbance /Displacement

Element 2: UWF Related Works – direct/indirect impact

Impact Magnitude:
Populations of the above species in the immediate vicinity of the UWF Related Works locations such as cable trenching, traffic movements, Haul Route Works, access road construction etc. will experience a temporary source of disturbance/displacement. The spatial extent of any disturbance/displacement will be limited to the immediate vicinity (i.e. within 50m) of the construction area boundaries. Sequential effects may occur should animals encounter multiple sources of source stimulus, however sequential effects are reduced by the availability of alternative habitat in the locality.

Fallow deer, Red Fox and Irish Hare were recorded during site surveys, and Pine Martin and Red Squirrel are assumed to be present in suitable habitat. Overall populations are not expected to be affected, given the availability of suitable habitat in the wider area, and therefore the magnitude of impact is Negligible.

Significance of the Impact: Moderate

Rationale for Impact Evaluation:

- The temporary duration of works, and;

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- 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 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: The potential for cumulative effects relates to the in-combination effects of UWF Related Works and Upperchurch Windfarm and to a lesser extent of UWF Related Works with Upperchurch Windfarm and UWF Grid Connection. Mammals such as Pine Martin, Red Squirrel, Irish Hare, Red fox or Fallow deer could be affected by either in-combination effects or sequential effects from multiple construction works areas. However, due to the low numbers of these mammals recorded during site surveys, and the availability of suitable habitat in the surrounding area, the cumulative impact magnitude is expected to be Negligible.

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

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

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: Not significant

Rationale for Impact Evaluation:

- The temporary duration of the main stimulus associated with 110kV UGC works ;
- Works will take place during daylight hours only, and;
- No contrast with baseline conditions from the introduction of visual and other anthropogenic sources is expected.
- The location of the 110kV UGC predominately on the public road network.

Element 3: UWF Replacement Forestry

Impact Magnitude: Negligible

Significance of the Impact: Neutral effect

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) or 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;
- 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 Other Cumulative Impacts – Irish Hare, Pine Marten, Red Squirrel and Fallow Deer: Disturbance /Displacement

Whole UWF Project Effect

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 not significant. 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;
- No significant contrast with baseline conditions from the introduction of visual and other anthropogenic sources is expected from the 110kV UGC (UWF Grid Connection);
- 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 Related Works or the Other Elements of the Whole UWF Project (see Section 8.9.2.1).

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 8-72 below.

Table 8-72: 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 (Elements 2, 4), 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.
Land take	1,2,4	Land cover	Badger: Temporary loss of habitat	Evaluated as Excluded: Some temporary loss will occur during construction works; and as reinstatement will occur immediately following the completion of construction works in an area – effects will be Neutral
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[25]). 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

[25] 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

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Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				additive effects, within the context of background trends (a species already established and increasing rapidly).
Construction works	1,2,3,4	Excavated materials	*Secondary Mortality of General Non-Volant Mammals due to spread of disease such as TB*	Evaluated as Excluded: Local consultation with landowners was that Bovine TB outbreaks have not been a significant issue in recent years at the windfarm location. Additionally, the spread of TB through soils, is not identified as a spread risk in the Department of Agriculture, Food and the Marine's *Irelands Bovine TB Eradication Programme*. Displacement effects due to construction works are not likely to be significant, primarily due to the carrying out of works during daylight hours, the short duration of works and, in relation to badger the distance of setts to construction works areas - no active Badger setts were identified within 50m of construction works areas during baseline studies.
Operational Stage / Growth 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: 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'

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Source(s) of Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
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 effect'. 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 Related Works 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 Non-Volant Mammals as a consequence of the UWF Related Works.

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. No additional mitigation measures are required and thus the Residual Impacts are the same as the Impacts set out in Impact Evaluation Table sections for Non-Volant Mammals above (Section 8.9.4) – i.e. **no significant adverse impacts**.

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 Related Works, 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:

RW-BPM-20	Monitoring of Identified Badger Setts
RW-BPM-21	Disturbance and/or physical injury to Other Mammals
RW-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 Related Works, 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 Related Works.

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 Related Works, 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 Related Works, which is included as Volume D with the planning application.

Non-Volant Mammals

Sensitive Aspect

8.9.8 Summary of Impacts to Non-Volant Mammals

A summary of the Impact to Non-Volant Mammals is presented in Table 8-73.

Table 8-73: 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 Related Works *Direct, indirect effects*	**Neutral**	**No potential for Impact**	**Neutral**	**Not Significant**	**Moderate**
UWF Related Works *Cumulative effects*	**Not Significant**	**No potential for Impact**	**Neutral**	**Not Significant**	**Moderate**
Element 1: UWF Grid Connection	Not Significant	Not Significant	Slight	Not Significant	Not Significant
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	Neutral	Neutral	Moderate
Other Cumulative Impacts:					
Whole UWF Project effect	Not Significant	Not Significant	Slight	Ranges from Not Significant to Slight	Moderate

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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 Related Works 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 Related Works is described in Table 8-74 and illustrated on Figure RW 8.10: Amphibians & Reptiles within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 8-74: UWF Related Works 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 Related Works 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 not indicate any distribution of this species within either 10km square overlapping the UWF Related Works (R95 and R96).

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 likely to occur in suitable habitat as the species is found in a range of habitat such as woodland, marshes, moors, and bog.

Survey Results: Frogs were previously recorded in Knockmaroe, Grousehall and Foilnaman. No Smooth Newt was noted, but this 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. Viviparous Lizard was recorded in suitable habitat (acid grassland) within the UWF Related Works study area boundary.

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.

8.10.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.10.2.1 Overview of Other Elements, Other Projects or Activities

8.10.2.1.1 UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works was evaluated for cumulative effects with other projects and the study area is set out in the table below.

UWF Related Works Cumulative Evaluation Study Area for Amphibians & Reptiles	Justification for the Study Area Extents
100m area around UWF Related Works construction works areas	The study area is doubled to identify those Other Elements (or Other Projects or Activities) which may cause cumulative effects to Amphibians and Reptiles with UWF Related Works.

The study is illustrated on Figure CE 8.10 Amphibians & Reptiles within the UWF Related Works Cumulative Evaluation Study Area.

8.10.2.1.2 Whole Project Cumulative Evaluation Study Area

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

The Other Elements must be considered because UWF Related Works 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.

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 Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works Study Area along with the study areas for Other Elements which are described in Table 8-75 and illustrated on Figure WP 8.10: Amphibians & Reptiles within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-75: Whole Project Cumulative Evaluation Study Area for Amphibians & Reptiles

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	50m area around and incorporating the construction works areas, afforestation lands and activity locations	Professional Judgement and as per Best Practice (CIEEM, 2016).
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

8.10.2.2 Scoping of Other Elements, Other Projects or Activities & for Potential for Impacts

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 Related Works 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 A2.3.2.8).

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 Related Works 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.

8.10.2.2.1 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 8-76.

The location of, and study area boundary associated with, the Other Elements which are included for cumulative evaluation is illustrated on Figure WP 8.10. The baseline character of the areas around these Elements is described in Section 8.10.2.3.

Table 8-76: Results of the Evaluation of the Other Elements of the Whole UWF Project

Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	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.

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8.10.2.3 Cumulative Information: Baseline Characteristics – Context & Character

8.10.2.3.1 Element 1: UWF Grid Connection

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: Due to their wide distribution across Ireland, there is the possibility that Common Frog (Rana temporaria) occurs within suitable habitat (typically garden ponds, natural pools, drainage ditches and quarry ponds).No Common frogs were recorded during surveys undertaken in January 2019, however this was outside the optimum survey period for this species thus suitable habitat for this species was noted. Suitable habitat occurs at a number of locations throughout the UWF Grid Connection route; roadside and field drains occur throughout the study area which could potentially support breeding frogs. Common frogs exploit a wide range of habitats and can breed in puddles, drains and slow flowing sections of watercourses. Frogs forage in a range of wet habitats including wet grassland and marsh; therefore, the locations where these habitats occur along the grid route are likely to support frogs.

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).No Smooth Newt were recorded during surveys undertaken in January 2019, however this was outside the optimum survey period for this species thus suitable habitat for this species was noted.

Foraging smooth newt can exploit a wide range of habitats but show a preference for wet grassland, woodland and scrub; thus, where these habitats occur along the grid route, there is suitable foraging habitat for this species. Breeding Smooth newt show preference for fish free ponds and ditches with abundant emergent vegetation. It is considered that suitable habitat may occur.

Viviparous Lizard: Due to their wide distribution across Ireland, there is the possibility that Viviparous Lizard (Lacerta vivpera) occur within suitable habitat (woodland, marshes, heath, moors, bogs, acid grassland). No Viviparous Lizard were recorded during surveys undertaken in January 2019, however this was outside the optimum survey period for this species thus suitable habitat for this species was noted.

Suitable habitat is present along the route where the above habitats occur within 50m – see terrestrial habitats, and lizards are expected to occur.

Geographical Overlap with UWF Related Works:

UWF Grid Connection project overlaps with the UWF Related Works Cumulative Evaluation Study Area in the Knockmaroe/Knockcurraghbola Crownlands area where the 110kV UGC (routed along the local road) is crossed by the Internal Windfarm Cabling and close to Haul Route Works, and in Knockcurraghbola Commons where the 110kV UGC (routed along a tarred forestry road) runs parallel to Internal Windfarm Cabling for a short distance.

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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.

Consideration of the Passage of Time: The makeup of suitable habitat for amphibians or reptiles on the Upperchurch Windfarm site has not materially changed, and surveys for UWF Related Works confirmed a low usage of the windfarm area by these species. Therefore it is considered that the descriptions in the 2013 and 2014 documents for Upperchurch Windfarm remain relevant to the cumulative evaluations in this Revised EIAR.

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 Related Works, 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 8-77 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Amphibians & Reptiles**.

Table 8-77: UWF Related Works 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 Grid Connection, 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 Related Works are identified and evaluated. Then the likely cumulative effects of the UWF Related Works 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) - Amphibians & Reptiles.

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

Table 8-78: 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 in Section 8.10.4.1)*
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 evaluation in Impact Evaluation Tables sections are described in Table 8-79 below.

Table 8-79: 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	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
Construction Stage / Planting Stage				
Landtake	2, ,4	Soils/ Surface Water	Habitat degradation (compaction, change in drainage)	Evaluated as Excluded: Construction Works associated with Element 2 and 4 may result in some secondary effects on habitat composition for Amphibians and reptiles, however the spatial extent of this will 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 1, 3 or 5.
Landtake	1,2,3,4	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. In relation to Element 1, 2, 4 - 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 the spatial extent, limited frequency, and brief duration will be Negligible and 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 disturbance or displacement 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 Related Works 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 Related Works.

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 Related Works, 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:

RW-BPM-16	Monitoring of non-native invasive plant species
RW-BPM-22	Management of general non-native invasive species
RW-BPM-23	Best practice methods to ensure the protection of common frog (*Rana temporaria*) and smooth newt (*Triturus (Lissotriton) vulgaris*).
RW-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 Related Works, 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 Related Works, 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 8-80: Summary of the impacts to Amphibians & Reptiles

Impact to Amphibians & Reptiles	Impact
Evaluation	*Section 8.10.4.1*
Project Life-Cycle Stage	All
UWF Related Works	**Neutral Impacts / No Likely Impacts**
Element 1: UWF Grid Connection	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 Related Works 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 Related Works is described in Table 8-81 and illustrated on Figure RW 8.11: Marsh Fritillary within the UWF Related Works Study Area (Volume C3 EIAR Figures).

Table 8-81: UWF Related Works 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 Related Works 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).

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 A8.1.3.9). 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.

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 Related Works.

8.11.2 CUMULATIVE INFORMATION - Cumulative Projects & Baseline Characteristics

8.11.2.1 Cumulative Evaluation Study Areas

8.11.2.1.1 UWF Related Works Cumulative Evaluation Study Area

The UWF Related Works was evaluated for cumulative effects with other projects and the study area is set out in the table below.

UWF Related Works Cumulative Evaluation Study Area for Marsh Fritillary	Justification for the Study Area Extents
2km from Whole UWF Project for cumulative effects with Other Projects and Activities	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).

The study is illustrated on Figure CE 8.11 Marsh Fritillary within the UWF Related Works Cumulative Evaluation Study Area.

8.11.2.1.2 Whole Project Cumulative Evaluation Study Area

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

The Other Elements must be considered because UWF Related Works 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.

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 Whole Project Cumulative Evaluation Study Area comprises of the UWF Related Works Study Area along with the study areas for Other Elements and Other Projects or Activities which are described in Table 8-82 and illustrated on Figure WP 8.11: Marsh Fritillary within the Whole Project Cumulative Evaluation Study Area (Volume C3 EIAR Figures).

Table 8-82: Whole Project Cumulative Evaluation Study Area for Marsh Fritillary

Cumulative Project	Cumulative Study Area Boundary	Justification for Study Area Extent
Element 1: UWF Grid Connection	50m area around and incorporating the construction works areas, afforestation lands, activity locations 2km from Whole UWF Project for cumulative effects with Other Projects and Activities	Professional Judgement and as per Best Practice (CIEEM, 2016). 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).
Element 2: UWF Related Works		
Element 3: UWF Replacement Forestry		
Element 4: Upperchurch Windfarm (UWF)		
Element 5: UWF Other Activities		

8.11.2.2 Scoping of Other Elements, Other Projects or Activities & for Potential for Impacts

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 Related Works 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 A2.3.2.8).

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.

8.11.2.2.1 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 8-83.

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 WP 8.11. The baseline character of the areas around these Elements is described in Section 8.11.2.3.

Table 8-83: Results of the Evaluation of the Other Elements and Other Projects or Activities

Other Element of the Whole UWF Project	
Element 1: UWF Grid Connection	Evaluated as excluded: No potential for effects due to: • No suitable habitat for Marsh Fritillary was recorded on or adjacent (50m) to the UWF Grid Connection lands at Mountphilips Substation site. • No potential for habitat loss from 110kV UGC works as the location of the 110kV UGC outside of the Mountphilips site is predominately on public roads, with a short section (0.6km on bitumen-surfaced forestry road), therefore there is no suitable habitat for Marsh Fritillary within 110kV UGC Construction Works Areas, furthermore there was no suitable Marsh Fritillary habitat was identified within 50m of the 110kV UGC route, during habitat surveys in January 2019. • No potential for mortality of in-flight adults or in-situ larvae, as no suitable habitat or records of Marsh Fritillary populations within or adjacent (50m) to UWF Grid Connection, • No potential for disturbance or displacement effects during operational stage activities, as no suitable habitat or Marsh Fritillary populations were recorded within or adjacent (50m) to the afforestation lands and the minimal scale of operational activities.
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:	Included for the evaluation of cumulative effects

Upperchurch Windfarm (UWF)	
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 Projects or 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 1: UWF Grid Connection

Not applicable –evaluated as excluded. See Section 8.11.2.2.1.

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 within the UWF Related Works Study Area – 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).

Consideration of the Passage of Time: Marsh Fritillary was not recorded during site investigations for Upperchurch Windfarm, (this is not unusual as populations often fluctuates within their range depending on weather, food supply and interaction with parasites), in order to facilitate the cumulative evaluations within this Revised EIAR, the magnitude and significance of Upperchurch Windfarm related impacts to Marsh Fritillary is evaluated, and the results are included in the Impact Evaluation Tables in Section 8.11.4.

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 Whole Project Cumulative effects (within 2km from UWF Grid Connection); this is located at Cummer Bog to the south of the R503. 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.

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8.11.3 PROJECT DESIGN MEASURES for Marsh Fritillary

At the conception of the UWF Related Works, 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 8-84 are relevant to the Environmental Factor, Biodiversity, and in particular to the sensitive aspect **Marsh Fritillary**.

Table 8-84: UWF Related Works 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
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.
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 Related Works), describes drainage systems which will be installed and reinstatement that will be carried out on site:

Section 5.2.3.5.6 - 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 5.2.3.5.11 - 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.

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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 Grid Connection. These Project Design Measures are included in the description of UWF Grid Connection, which can be found in this EIA Report in 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 Related Works are identified and evaluated. Then the likely cumulative effects of the UWF Related Works 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 8-85: 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 – **Section 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.

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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. Internal Windfarm Cabling within Consented UWF Roads, and the tightening of 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 and positive

Evaluation of the Subject Development Impact – Habitat Loss

Element 2: UWF Related Works – cumulative impact

Impact Magnitude:
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. Permanent land use change of 0.062Ha or 11.5% of suitable habitat present will occur during the construction stage along a section of Internal Windfarm Cabling in Shevry.

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 2: UWF Related Works – cumulative impact

Cumulative Impact Magnitude: Cumulative impacts only relate to in-combination effect with Upperchurch Windfarm, where construction works for Consented UWF Roads will take place in the area of the Marsh Fritillary habitat. However, there will be no additional habitat loss effect because the construction works area boundaries for both UWF Related Works and the Upperchurch Windfarm overlap completely at this location.

Significance of the Impact: Slight

Rationale for Impact Evaluation:

- No additional habitat loss, due to overlap of construction works areas.

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Cumulative Information: Individual Evaluations of Other Elements of the Whole UWF Project
Element 1: UWF Grid Connection – *N/A, evaluated as excluded, see Section 8.11.2.2.1.*
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 area 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 Other Cumulative Impacts – Habitat Loss
Whole UWF Project Effect
Cumulative Impact Magnitude: Suitable habitat for this sensitive receptor of County Importance is present within the Whole Project Cumulative Evaluation Study Area at a location in Shevry where UWF Related Works and Upperchurch Windfarm are both located. 0 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). No populations of Marsh Fritillary or suitable supporting habitat was identified within 50m of the 110kV UCG route (UWF Grid Connection). Therefore, there is no potential for likely cumulative effects to Marsh Fritillary associated with the UWF Related Works/Upperchurch Windfarm colonies and the UWF Grid Connection.

Sensitive Aspect: **Marsh Fritillary**

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 0.062Ha of suitable habitat for this sensitive receptor of County Importance is present within the Whole UWF Project Study Area – specifically at UWF Related Works/Upperchurch Windfarm works area. Habitat loss from peat extraction within the geographical study zone is evaluated as high on a precautionary basis however, as the distance from the Cummer Bog colony is greater than 5km to the UWF Related Work/Upperchurch Windfarm colonies, no in-combination impact is expected.

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 Turf Cutting activities;
- County Important of Marsh Fritillary;
- 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 8-86 below.

Table 8-86: 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)	Neutral effects: In respect of the UWF Grid Connection 110kV UGC, no effects to Marsh Fritillary are expected due to the absence of populations and suitable supporting habitat within 50m of the UGC route. In respect of UWF Related Works/Upperchurch Windfarm habitat patches/colony: •Implemented surface water management at Shevry for Upperchurch Windfarm will maintain surface water flows to down-gradient areas of habitat.
Movement of Soils and Machinery	2,4	Soils	Habitat degradation (Compaction)	Evaluated as Excluded; In relation to Elements 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 close to 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. In respect of the UWF Grid Connection 110kV UGC, no effects to Marsh Fritillary are expected due to the absence of populations and suitable supporting habitat within 50m of the UGC route.
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. Zero webs were located within the 5m buffer zone of vehicular usage (at Shevry).

Sensitive Aspect: **Marsh Fritillary**

Source(s) Impacts	Project Element	Pathway(s)	Impacts (Consequences)	Rationale for Excluding (Scoping Out)
				Neutral effects are considered likely.
Excavation Works	1,2,4	Excavations	Mortality of In-Situ larvae	Project Design Measures, which involve relocating any Marsh Fritillary larvae will avoid mortality of in-situ larvae at UWF Related Works/Upperchurch Windfarm construction works area in Shevry. In respect of the UWF Grid Connection 110kV UGC, no effects to Marsh Fritillary are expected due to the absence of populations and suitable supporting habitat within 50m of the UGC route.
Operational Stage				
Machinery Movement	1,2,4	Ground and Air Vibrations	Potential disturbance/displacement of Marsh Fritillary individuals breeding in suitable habitat proximal to maintenance activities	Evaluated as Excluded: Annual maintenance, comprising 1-2 people, travelling in light vehicles along new/existing roads or walking over lands over cable routes will have Neutral effect.
Decommissioning Stage				
Evaluated as Excluded: Neutral effects on General Invertebrates are considered likely due to the scale of works required.				

Topic: **Biodiversity**

8.11.5 Mitigation Measures for Impacts to Marsh Fritillary

Mitigation measures were incorporated into the UWF Related Works 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 Related Works.

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 impact**.

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 Related Works, 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:

RW-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 Related Works, which is included as Volume D with the planning application.

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8.11.8 Summary of Impacts to Marsh Fritillary

A summary of the Impact to Marsh Fritillary is presented in Table 8-87.

Table 8-87: 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 Related Works *Direct, indirect effects*	**Slight**
UWF Related Works *Cumulative effects*	**Slight**
Element 1: UWF Grid Connection	No Potential for Impacts - Evaluated as Excluded, see Section 8.11.2.2.1
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
Other Cumulative Impacts:	
Whole UWF Project effect	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.

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Policy Context

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

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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[26] 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*."

[26] Department of Agriculture, Food and the Marine (2017). Felling and Reforestation Policy.

8.13 Best Practice Measures

RW-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: **WW1, WW2, WW4, WW12, WW13, WW14, WW21, WW22, WW24, WW25 AND WW31.**

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: **WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.**

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;
- 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;
- If 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.

Best Practice Measures

RW-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: **WW5, WW7, WW8, WW16 and WW27**

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: **WW3, WW9, WW10, WW17, WW18, WW19, WW20, WW26 and WW28.**

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 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 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 downstream 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;
- Only once the watercourse flow is isolated from the excavation area, will the watercourse bed excavation works be allowed to commence (Project Design Measure);

Topic: Biodiversity

- 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 re-stored;
- 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 re-quired;
- 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 sur-face 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.

Best Practice Measures

RW-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	
No planned location, BPM included on a precautionary basis	
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;
- 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;

Topic Biodiversity

- 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 re-stored;
- 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.

Best Practice Measures

RW-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: **WW12, WW21 and WW31**	
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 RW-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 RW-BPM-01 or RW-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;	

Topic: Biodiversity

• 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.

Best Practice Measures

RW-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 UWF Related Works sections **SW12, SW24, SW25, SW26, SW27, SW28, SW52, RW3, SW53, SW54, SW55, SW67, SW68 and HW11**;

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 works 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;
- 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;

Topic: Biodiversity

- 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.

Best Practice Measures

RW-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: RWR1/SW16 and SW24

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;
- 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;

Topic: Biodiversity

- 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.

Best Practice Measures

RW-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

- Internal Windfarm Cabling – public road crossing locations and
- Telecom Relay Pole - foundations

Responsibility of	**Role/Duty**
Construction Manager	• Monitor weather conditions. • Ensure best practice e 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 and pre-cast products will be used for watercrossing structures;
- 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.

Topic Biodiversity

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.
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.

Best Practice Measures

RW-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.

Topic Biodiversity

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 Related Works, Section 6: Environmental Emergency Procedure for Oil/Fuel Spillage

Best Practice Measures

RW-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: **WW1, WW12, WW13, WW15, WW21, WW24, WW25 and WW31** (Class 4 water crossings), also **WW14** (Class 3 water crossings), also **WW2, WW4 and WW22** (Class 2 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.	

Topic Biodiversity

RW-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:

Internal Windfarm Cabling, construction works area boundary

Haul Route Works locations

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.

Best Practice Measures

RW-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:

- Telecom Relay Pole
- Realigned Windfarm Roads

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.

Topic Biodiversity

RW-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 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	
• No construction works for UWF Related Works will take place during the breeding season March to August (Project Design Measure). • 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).	

Best Practice Measures

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 RW-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

Topic Biodiversity

RW-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 Related Works 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
- 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

RW-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.	

Topic: Biodiversity

Derogation Licenses

- 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

RW-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 Related Works	
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

RW-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 Related Works - Invasive Species Management Plan.	

Best Practice Measures

RW-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

RW-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.	

Best Practice Measures

- 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.
- 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

RW-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

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.

Best Practice Measures

- 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

RW-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

RW-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

RW-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.

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- 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

RW-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 UWF Related Works 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 works area. • 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.

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RW-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

RW-BPM-25	Measures to ensure the protection of Marsh Fritillary (*Euphydryas aurinia*)
Environmental Commitment	
To avoid effects on Marsh Fritillary / Marsh Fritillary habitat during the pre-construction and construction phase.	
Work Sections/Locations	
UWF Related Works: SW13 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 Related Works. • 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

Summary of the Biodiversity Chapter

8.14 Summary of the Biodiversity Chapter

UWF Related Works is mainly located on agricultural lands in the eastern hills of the Slievefelim to Silvermine Mountain uplands area, with some works also in roadside verges and boundaries in the vicinity of Upperchurch Windfarm. The majority of the footprint of the UWF Related Works is located within the catchment area of the River Suir with the remainder located in the catchment area of the River Shannon. The UWF Related Works are not located within either the Lower River Suir SAC or the Lower River Shannon SAC. The Slievefelim to Silvermines SPA for hen harrier is located to the west and southwest of the UWF Related Works, and with the exception of a small area (no works required at this location) adjacent to an existing hardcore forestry yard, UWF Related Works is not located within the SPA. There are no NHAs or pNHAs in close proximity to the UWF Related Works.

Surveys of the site recorded typical upland habitats and bird species, while low numbers of non-volant mammals, amphibians and reptiles were recorded. A small population of Marsh Fritillary butterfly was recorded in Shevry.

The Sensitive Aspects of Biodiversity which were evaluated in this topic chapter are: European 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 (40 no.) has been integrated into the project design to ensure that significant effects to the Biodiversity environment are avoided.

In addition to the Project Design Measures, Best Practice Measures (25 no.) will be implemented during the construction and early operational stage of the UWF Related Works, these measures will provide further protection to receiving waters.

An Environmental Management Plan has been developed for the UWF Related Works 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 Related Works site. The UWF Related Works 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 Revised Appropriate Assessment Report for UWF Related Works (See Volume E), that UWF Related Works, either alone or in-combination, will not result in any effects that will adversely affect the integrity of the Slievefelim to Silvermines SPA or Lower River Shannon SAC or Lower River Suir SAC in light of their conservation objectives and rationale for designation.

8.14.2 Summary of UWF Related Works Impacts to the other Sensitive Aspects

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The likely impacts to the individual Sensitive Aspects as a result of UWF Related Works are outlined below:

- Impacts to Aquatic Habitats & Species will range from Imperceptible to Moderate in relation to decreases in aquatic habitat quality, riparian habitat degradation or the spread of invasive species, and Slight adverse in relation to changes to flow regimes, and disturbance or displacement of aquatic habitats or speices.
- 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 Related Works.
- Adverse impacts to the Hen Harrier will be Slight adverse in relation to temporary or permanent reduction in or loss or suitable foraging habitat, and Slight adverse in relation to disturbance or displacement

of foraging hen harrier (ex-situ). Although the hen harrier is a very high sensitivity receptor, there are no nests within 2km of the UWF Related Works, and together with the low usage of the UWF Related Works/Upperchurch Windfarm area by hen harriers and measures, including no construction works during the hen harrier breeding season, impacts are evaluated as Slight Adverse.

- Adverse impacts to the General Bird Species will be Not Significant in relation to displacement/disturbance effects and habitat loss effects. Imperceptible positive habitat enhancement effects will occur due to the planting of 370m of new hedgerow along Realigned Windfarm Road RWR2.
- Adverse impacts to Bats will be no greater than Imperceptible.
- Impacts to Non-Volant Mammals will be Neutral in relation to Badger and Otter, and are expected to be Not Significant in relation to habitat loss effects to Other Mammals (Irish Hare, Pine Marten, Red Squirrel and Fallow Deer), disturbance/displacement effects to these Other Mammals is expected to be Moderate but temporary.
- Neutral effects to Amphibians & Reptiles are expected as a consequence of the development of UWF Related Works.
- Adverse impacts to Marsh Fritillary is expected to be of Slight significance as a consequence of the development of UWF Related Works.
- There is no potential for UWF Related Works to cause effects to National Sites, due to separation distances.

8.14.3 Summary of UWF Related Works Cumulative Impacts

Cumulative impacts of UWF Related Works generally relate to the in-combination effect of both UWF Related Works and Upperchurch Windfarm being constructed together. Cumulative impacts are no greater than for UWF Related Works on its own.

8.14.4 Summary of Cumulative Impacts with Other Elements of the Whole UWF Project

As UWF Related Works is one element of the larger Whole Upperchurch Windfarm Project (Whole UWF Project), the potential for cumulative effects was examined with these Other Elements, as the whole project effect.

- In-combination impacts to Aquatic Habitats & Species will range from Imperceptible to Moderate.
- In-combination adverse impacts to Terrestrial Habitats will not be of a greater significance than for the UWF Related Works on it own, - 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 Slight adverse for UWF Related Works 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). Disturbance or displacement effects of the Whole UWF Project to foraging hen harrier will be no greater than for UWF Related Works (either alone or cumulatively with Upperchurch Windfarm), this is largely due to the separation distance (greater than 2km) to hen harrier nests, and the location of the UWF Grid Connection 110kV UGC along the public road corridor.

- In-combination adverse impacts to General Bird Species will cumulatively Slight in relation to habitat loss effects to Golden Plover and Meadow Pipit, and Not Significant in relation to displacement/disturbance effects to Golden Plover. The cumulative positive effects to General Bird Species as a result of habitat enhancement effects will increase to Slight positive, when all Elements are taken into consideration.
- Cumulative effects to Bats of the UWF Related Works in-combination with the Other Elements will be Imperceptible or not Significant.
- Adverse cumulative effects 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), and Not Significant to Slight adverse in relation to Otter.
- Cumulative impacts to Marsh Fritillary of the UWF Related Works in-combination with the Other Elements (in particular the consented Upperchurch Windfarm) will remain at Slight adverse significance.
- There is no potential for in-combination impacts to National Sites or Amphibians & Reptiles.

8.14.5 Summary of Cumulative Impacts with Other Projects or Activities

Other projects or activities are scoped in for Aquatic Habitats and Species, with the effect to aquatic habitat no greater than for either UWF Related Works (alone or cumulatively), or the Whole UWF Project.

Milestone Windfarm, Castlewaller Windfarm, Bunkimalta Windfarm, and Forestry, Agriculture and Turf-Cutting activities were examined for cumulative effects to Hen harriers. Because of their substantial hen harrier management plans, both Castlewaller Windfarm and Bunkimalta Windfarm are expected to have neutral effects to hen harrier. When considered cumulatively with forestry, agriculture and turfcutting, cumulative foraging habitat effects will be neutral, while disturbance/displacement effects Slight Adverse overall

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8.15 Reference List

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